



Construction Flood Risk Management Plan

**Shared Path Bridge over Newcastle
Road, Jesmond**

1630

INTEGRATED MANAGEMENT SYSTEM

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TABLE OF CONTENTS

1	INTRODUCTION	5
1.1	PURPOSE	5
1.2	SCOPE	5
1.3	CONSULTATION	8
1.3.1	CONSULTATION FOR THE PREPARATION OF THE CFRMP	8
1.3.2	CONSULTATION LOG	8
1.3.3	ONGOING CONSULTATION DURING CONSTRUCTION	8
2	OBJECTIVES AND TARGETS	9
2.1	OBJECTIVES	9
2.2	TARGETS	9
3	SUB-PLAN REFERENCE DOCUMENTS	10
3.1	LEGISLATION	10
3.2	STANDARDS, CODES OR GUIDELINES	10
3.3	CLIENT DOCUMENTS	10
3.4	PROJECT APPROVALS AND/OR LICENSING	11
3.5	HOLDPOINTS	11
4	CONDITIONS OF APPROVAL	11
5	EXISTING ENVIRONMENT	12
5.1	CATCHMENT OVERVIEW	12
5.2	EXISTING FLOOD	14
5.3	EXISTING LOCAL EMERGENCY RESPONSE AND EVACUATION	16
5.4	HISTORY OF FLOODING	16
5.5	RAINFALL	16
6	ENVIRONMENTAL ASPECTS AND IMPACTS	17
6.1	CONSTRUCTION ACTIVITIES	17
6.1.1	WORK IN FLOOD AFFECTED AREAS	17
6.1.2	ANCILLARY FACILITIES AND STOCKPILES	17
6.1.3	WORKS IN EXISTING WATERCOURSES	19
6.1.4	IMPACTS ON EXISTING DRAINAGE SYSTEMS	19
6.1.5	CHANGES TO EMERGENCY RESPONSE AND EVACUATION	19
7	ENVIRONMENTAL MITIGATION AND MANAGEMENT MEASURES	20
8	COMPLIANCE MANAGEMENT	21
8.1	ROLES AND RESPONSIBILITIES	29
8.1.1	SITE SUPERVISOR	29
8.2	COMMUNICATION	29
8.3	COMPLAINTS MANAGEMENT	29
8.4	TRAINING	29
8.5	MONITORING AND INSPECTION	30
8.6	INCIDENTS	30
8.7	AUDITING	30
8.8	NON-CONFORMANCES	30
8.9	REPORTING	30

9 REVIEW AND IMPROVEMENT31

9.1 CONTINUOUS IMPROVEMENT 31

9.2 CFRMP UPDATE AND AMENDMENT 31

10 DEFINITIONS.....31

11 ASSOCIATED DOCUMENTS AND PROCEDURES.....31

1 INTRODUCTION

This Flood Risk Management Plan (FRMP) forms part of the Construction Environmental Management Process Plan (CEMPP) for the Shared Path Bridge (SPB) over Newcastle Road, Jesmond which is being delivered as early works for the Newcastle Inner City Bypass (NICB) between Rankin Park and Jesmond (RP2J).

1.1 PURPOSE

This CFRMP has been developed with specific information to document warning and evacuation procedures for the site as well as address the potential for flooding and manage flood impacts on construction activities and neighbouring properties.

This plan has been developed taking into consideration the Integrated Project Management Plan (IPMP), Daracon's Legal and Other Requirements including but not limited to relevant Acts, Regulations, Codes of Practice and Industry Standards / Guidelines.

In addition, the framework for this plan has been prepared to align with the Daracon Management System (DMS), AS/NZS & ISO Standards and Client requirements where applicable.

The purpose of the Construction Flood Risk Management Plan is to provide guidance in the implementation and management of the following;

- Identification of rainfall events which may cause flooding at the site;
- Monitoring of Bureau of Meteorology (BOM) weather forecasts to predict heavy rainfall events that may lead to flooding of the site;
- Daily onsite monitoring is performed to identify any issued emergency warnings such as State Emergency Service (SES) and other agencies;
- Ensure emergency procedures are developed for the evacuation of personnel, facilities, plant, equipment and materials in a flood event that has the potential to impact low lying areas of the Site;
- Ensure storage and stockpile areas are positioned in the highest areas possible to limit the potential for loss or damage to facilities, plant, equipment and materials in these areas;
- Ensure hazardous chemicals are not stored in flood prone areas of the site;
- Detail control measures for the protection of water quality in the event of a flood over the site;
- Detail contingency procedures for removal of plant and equipment from high risk flood areas when a flood event is imminent; and
- Detail progressive stabilising methods for exposed areas or areas affected by flooding.

1.2 SCOPE

The project involves the construction of a new shared path bridge over Newcastle Road and associated works at Jesmond, within the City of Newcastle (CoN) Local Government Area (LGA).

The scope of work required for the project involves the following specific activities:

- Site Establishment
- Vegetation clearing, including riparian vegetation, and topsoil stripping
- Earthworks, including excavation or filling
- Transportation of cut or fill materials
- Site access
- Drainage works
- Stockpiling of topsoil, vegetation and other construction materials
- Movement of heavy vehicles across exposed ground
- Demolition works to remove a redundant retaining wall and ramps structures
- Piling works to facilitate the construction of the SPB
- Construction of a new shared path bridge over Newcastle Road west of Steel Street;
- Concrete Ramps, stairs and retaining structures providing access to the new shared path bridge;
- Relocation of existing utilities including overhead electricity and underground water mains;
- Roadworks in Coles Street and Jesmond park to connect the new bridge to existing facilities;
- Roadworks for minor widening on the northern side of Newcastle road west of Steel Street;
- Removal of the existing mid-block pedestrian crossing and removal of the existing bus shelter and
- Miscellaneous works including erosion and sedimentation control, utility adjustments, the construction of earthworks, drainage, kerbs and/or gutters, pavement, safety barriers, concrete paving for the shared path, footpaths and driveways, pavement markings and vegetation works.

Other operations will be undertaken by Daracon that are considered normal in delivery of the above activities. Additional activities may also be realised at the request of the Client throughout the duration of the project.

See [Figure 1](#) outlining the Shared Path Bridge (SPB) Project Location on the following page.

FIGURE 1 – SHARED PATH BRIDGE PROJECT LOCATION



1.3 CONSULTATION

1.3.1 CONSULTATION FOR THE PREPARATION OF THE CFRMP

This CFRMP has been developed in consultation with Newcastle City Council (NCC) as required by CoA A9(a). In accordance with CoA A5, the evidence of the consultation undertaken for the preparation of this CFRMP, this documented in the following table.

1.3.2 CONSULTATION LOG

TABLE 1 – CONSULTATION LOG

Department	Contact	Date	Correspondence Type	Description
CoN	██████████	13 June 2019	Email	Nil comments
Environmental Representative	██████████	16 August 2019	Email	Draft plan submitted 13/8/19 and found to satisfy requirements. Updated by Daracon and resubmitted 8/11/19.

1.3.3 ONGOING CONSULTATION DURING CONSTRUCTION

Ongoing consultation between Roads and Maritime and Daracon, stakeholders, the community and NCC regarding the management of flood impacts will be undertaken during the construction of the SPB as required. The process for consultation is documented in the Construction Community Liaison Management Plan (CCLMP), which includes the key principals contained within the RP2J Community Communication Strategy (CCS) developed by Roads and Maritime.

2 OBJECTIVES AND TARGETS

2.1 OBJECTIVES

The key objective of the CFRMP is to ensure that flood impacts due to construction of the SPB are minimised. To achieve this objective, Daracon will:

- Ensure compliance with relevant legislative requirements and the Infrastructure Approval requirements as addressed in this Plan;
- Minimise and manage construction impacts on hydrology and flooding from works; and
- Avoid any significant adverse impacts to people and property within the project area.
- Implement appropriate measures to address the environmental mitigation and management measures, refer [Table 6](#).

2.2 TARGETS

The target for the management of flood impacts during the construction of the SPB is to ensure all reasonable and practical measures are implemented prior to a flood to mitigate any environmental impacts downstream of the SPB.

3 SUB-PLAN REFERENCE DOCUMENTS

Daracon will comply with all legislation, standards and guidelines, client documents and project approvals, as nominated within the [Section 3](#) of this CFRMP.

3.1 LEGISLATION

- Environmental Planning and Assessment Act 1979 (EP&A Act).

3.2 STANDARDS, CODES OR GUIDELINES

- Managing Urban Stormwater, Soils and Construction, Volume 14th Edition, March 2004 (Landcom 2004) and Managing Urban Stormwater, Volume 2D - Main road construction (DECC 2008)
- Roads and Maritime Erosion and Sedimentation Management Procedure (Roads and Traffic Authority 2009)
- Roads and Maritime Technical Guideline, Temporary Stormwater Drainage for Road Construction (Roads and Maritime Services 2011)
- Roads and Maritime Stockpile Site Management Guideline (Roads and Maritime Services 2011).

3.3 CLIENT DOCUMENTS

The following Client documents have been identified as being important to ensure Daracon deliver the project safely, with minimal environmental impact and to specification.

TABLE 2 – CLIENT DOCUMENTS

Client Document Number and Name	
Document Number	Document Name
Newcastle Inner City Bypass – Rankin Park to Jesmond Environmental Impact Statement (GHD, November 2016)	
Submissions and Preferred Infrastructure Report – Newcastle Inner City Bypass, Rankin Park to Jesmond (GHD, March 2018)	
NSW Department of Planning & Environment Minister’s Conditions of Approval (Feb 2019)	
Department of the Environment and Energy (DoEE) - Commonwealth Controlled Action Approval (April 2019)	
QA Specification G1	Job Specific Requirements
QA Specification G36	Environmental Protection
QA Specification G38	Soil and Water Management
QA Specification G40	Clearing and Grubbing
QA Specification G10	Traffic Management
QA Specification G22	Work Health and Safety (Construction and Maintenance Works)
QA Specification Q6	Quality Management System (Type 6)

Where there are changes to the above document references, communication of changes that are applicable to this project will be communicated to all workers using a suitable means of communication as prescribed within this Sub-Plan.

3.4 PROJECT APPROVALS AND/OR LICENSING

The following approvals have been obtained by Roads and Maritime:

- EPBC Decision Notice dated October 2015 (confirming the RP2J project is a controlled action).
- Project Approval under Part 5.2 of the EP&A Act – SSI 6888 granted by the minister for planning on 15 February 2019.

All necessary licences, permits and approvals required for Daracon’s contracted works will be obtained and maintained as required throughout the life of the Project. Inspection and monitoring programs completed as part of this plan will ensure the control measures outlined in any of the above approvals, licenses or permits are complied with at all times.

3.5 HOLDPOINTS

Roads and Maritime specifications are a key source of environmental protection management processes relevant to this CFRMP. The specifications set out environmental protection requirements, including Hold Points, that will be complied with during construction of the SPB. A Hold Point is a point beyond which a work process must not proceed without express written authorisation from Roads and Maritime. Hold points applicable to soil and water management are provided in Table 3;

TABLE 3 – HOLDPOINTS APPLICABLE TO FLOOD RISK MANAGEMENT

Clause no.	Description
Specification G36 – Environmental Protection	
4.15	Site facilities
Specification G38 – Soil and Water Management	
3.9	Flood Management

4 CONDITIONS OF APPROVAL

There are no specific conditions of approval relevant to this CFRMP.

5 EXISTING ENVIRONMENT

The following sections summarise existing flood regime within the SPB area based on information provided in Section 12 and Appendix J of the EIS and Section 6.7 and Appendix F of the SPIR.

5.1 CATCHMENT OVERVIEW

The proposed SPB is located within the catchment of Dark Creek.

Figure 2 shows the sub-catchments through which the RP2J project traverses. The catchments draining to the ephemeral watercourse W2 upstream of the SPB include:

- sub-catchment E – this catchment contains the southern branch of WC2 and consists of an area of moderate slopes which is vegetated with native forest
- sub-catchment F – this catchment contains the northern branch of WC2 and contains an area of bushland with moderate slopes draining to Dark Creek in the north
- sub-catchment G – this catchment contains the confluence of the northern and southern branches of WC2 and is bounded in the north by the east-west Jesmond cycle path within Jesmond Park. This catchment consists of bushland with minor to moderate slopes.

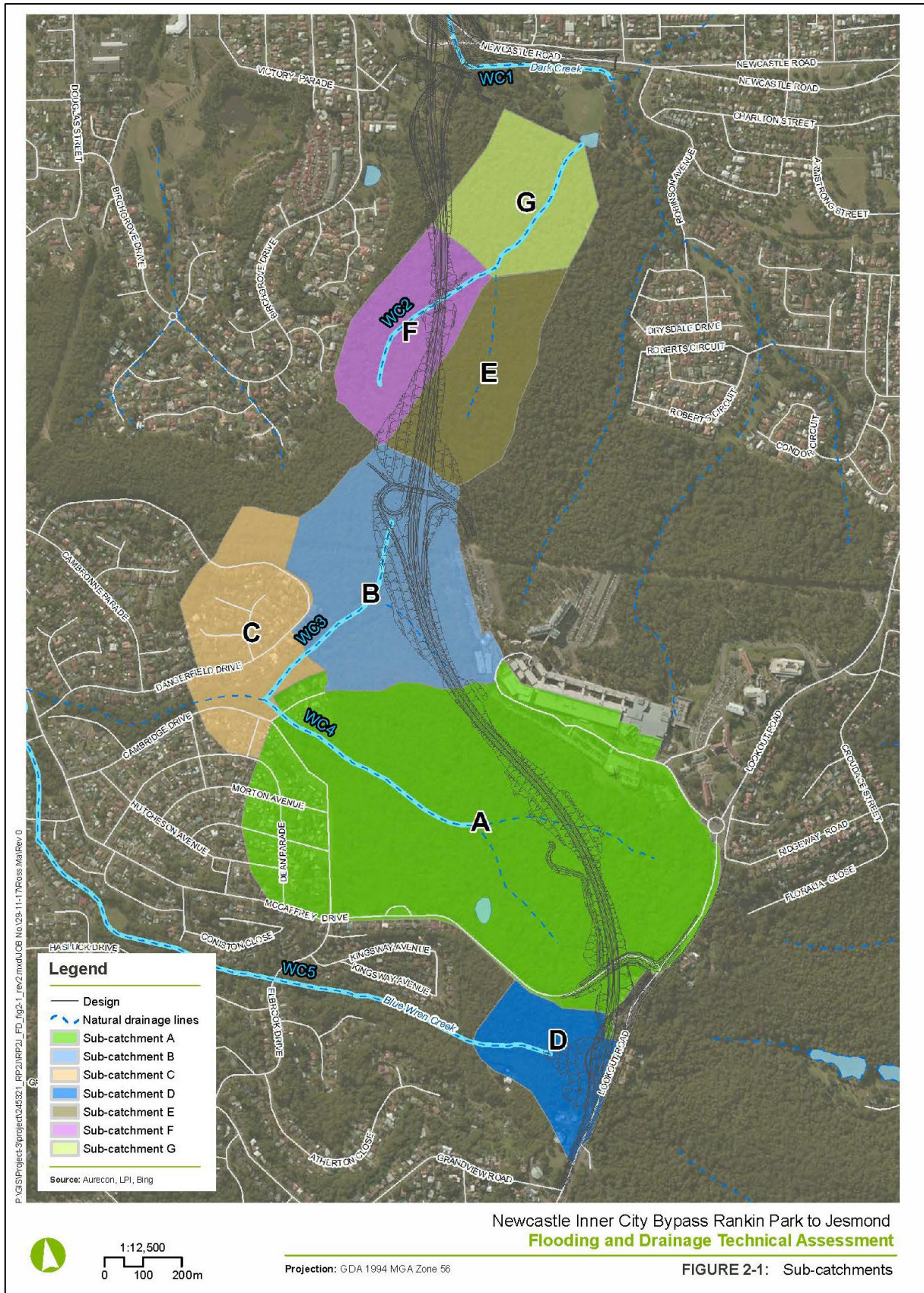
Sub-catchments E, F and G drain to W2 via several small creeks. W2 flows in a northerly direction and discharges to Dark Creek (W1) via a box culvert on the northern side of the Jesmond cycle path.

Sub-catchment H, located offsite to the east of the RP2J footprint, drains to Dark Creek (W1) via a number of creeks, as shown on [Figure 2](#). Sub-catchment H comprises natural bush areas in the upstream southern portion of the catchment and urbanised areas in the downstream northern portion of the catchment.

Dark Creek is a highly modified concrete lined channel in the vicinity of Newcastle Road and the SPB. Dark Creek flows in a westerly direction near the SPB and Newcastle Road, and then in a north-westerly direction to Ironbark Creek, which in turn drains via developed urban areas to the Hunter River at Hexham.

Sub-catchments A – D in [Figure 2](#) drain west to Blue Wren Creek and do not influence flood conditions at the SPB.

FIGURE 2 – WATERWAYS AND CATCHMENTS IN THE VICINITY OF THE SPB PROJECT LOCATION

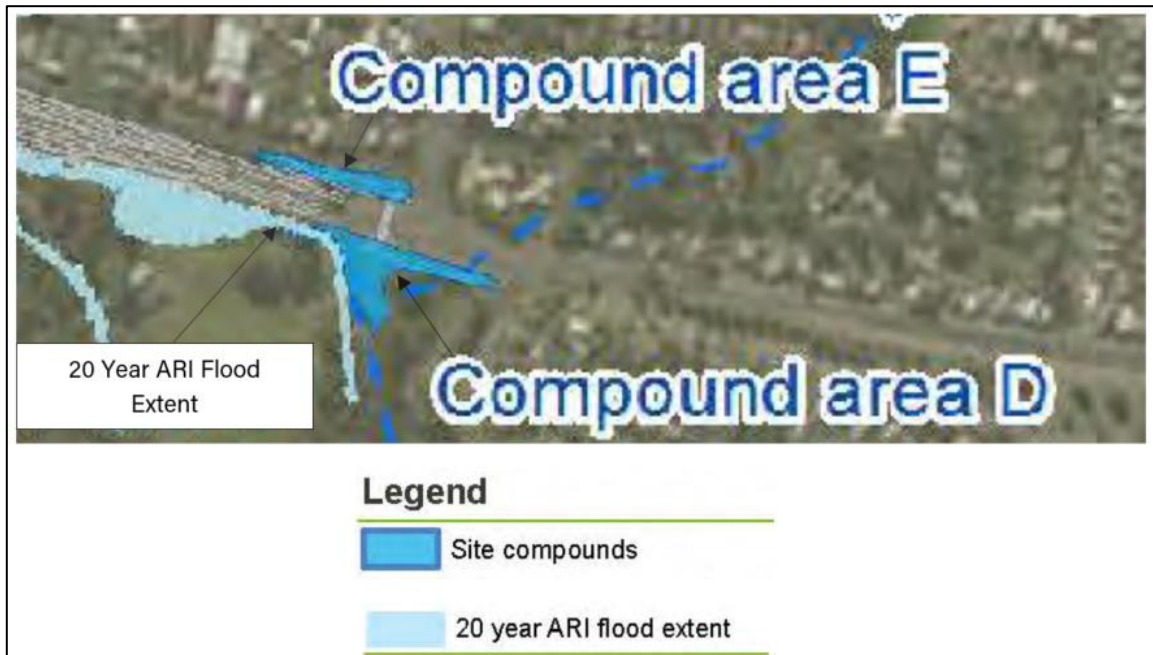


5.2 EXISTING FLOOD

Flood modelling carried out for the EIS was undertaken for a range of flood events from the 5-year ARI to the Probable Maximum Flood (PMF).

In the vicinity of the SPB, the modelling indicates that floods of 20-year ARI and less are contained within the concrete lined channel of Dark Creek, as shown in [Figure 3](#).

FIGURE 3 – 20 YEAR ARI FLOOD EXTENT IN THE VICINITY OF THE SPB



The modelling results presented in the SPIR indicate that the 5-year ARI event would not inundate Newcastle Road, the 10-year ARI event would result in some minimal flooding of Newcastle Road to the west of the SPB works and the 100-year ARI event would result in some more extensive flooding of Newcastle Road of up to 0.5 m in depth. This flooding is not anticipated to impact on the SPB works as it is located on Newcastle Road to the west of the SPB.

FIGURE 4 – 100 YEAR ARI FLOOD EXTENT IN THE VICINITY OF THE SPB

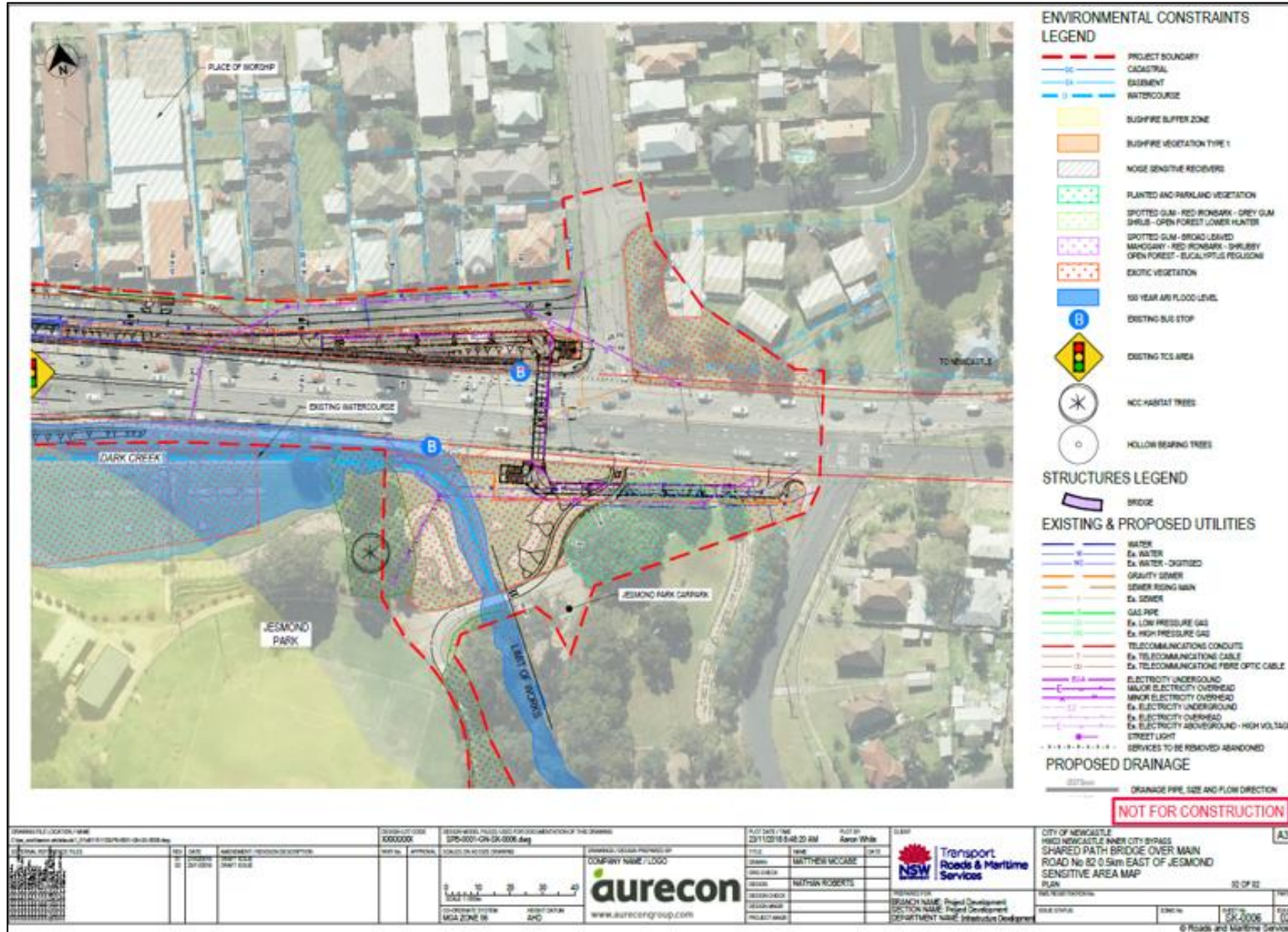


Figure 4 shows the extent of the 100-year ARI flood in the immediate vicinity of the SPB. It can be seen from Figure 4 that the proposed SPB works will not be impacted by floods up to the 100-year ARI event. Construction compound D, located on the southern side of Newcastle Road, is bounded on the west by the Dark Creek concrete lined channel. Flood waters that overtop the channel in the 100-year ARI flood could encroach on the western edge of compound D. The extent of the 100-year ARI flood is also shown on the Sensitive Area Maps (Appendix 15 of the CEMPP).

5.3 EXISTING LOCAL EMERGENCY RESPONSE AND EVACUATION

The City of Newcastle has in place the Flood Risk Management Plan for the Newcastle City Area (Newcastle City-wide Floodplain Risk Management Study and Plan, 2012). The plan states that the NSW SES is responsible for developing an evacuation plan based on flood warnings provided by the Bureau of Meteorology (BoM).

5.4 HISTORY OF FLOODING

Flooding near the Project site occurred in April 1988 and June 2007, listed as the top events by SES NSW Flood Data Portal in the Dark Creek Flood Study.

5.5 RAINFALL

The Projects rainfall Intensity-Frequency-Duration (IFD) values are obtained from the Bureau of Meteorology website. The parameters are summarised in Table 4;

TABLE 4 - DESIGN IFD RAINFALL PARAMETERS

Parameter	2-year ARI	50-year ARI
1 hr Event Intensity (mm/h)	26.6	52.3
2 hr event Intensity (mm/h)	17.4	34.8
12 hr Event Intensity (mm/h)	5.71	12.2
72 hr Event Intensity (mm/h)	1.87	3.65

The Bureau of Meteorology has been collating statics at Newcastle Nobbys AWS since 1862. Results from 1862 to 2019 show the highest mean rainfall periods as per Table 5.

TABLE 5 – HIGHEST MEAN RAINFALL PERIODS IN JESMOND

March	April	June
119.2 mm	116.7 mm	118.9 mm

Other weather characteristics can be found using the below link through the BOM website;

http://www.bom.gov.au/climate/averages/tables/cw_061375.shtml

6 ENVIRONMENTAL ASPECTS AND IMPACTS

Section 6 in Appendix J of the EIS and Section 5 of Appendix F in the SPIR describes construction flood impacts.

Daracon will manage the potential impacts on construction due to flooding as well as the impacts of construction on flooding in the immediate vicinity of the SPB.

6.1 CONSTRUCTION ACTIVITIES

The following sections describe the potential flooding and drainage impacts that could occur during construction of the SPB.

6.1.1 WORK IN FLOOD AFFECTED AREAS

[Figure 4](#) shows the SPB construction footprint is generally located outside the extent of floods up to the 100-year ARI event.

6.1.2 ANCILLARY FACILITIES AND STOCKPILES

Ancillary facility D is approximately 4665m² in area and is located near the eastern end of Jesmond Park on the southern side of Newcastle Road as shown on [Figure 5](#). Access to this ancillary facility is via Robinson Avenue and/or temporary access from Newcastle Road. The proposed activities at this facility include:

- site offices and amenities
- containers with chemicals, tools etc
- storage of building supplies
- materials stockpiles
- construction work for permanent infrastructure.

Ancillary Facility E is about 1,000m² in area and is located near the intersection of Coles Street and Steel Street on the northern side of Newcastle Road as shown on [Figure 5](#). Access to ancillary facility E is via Steel Street, Coles Street and/or temporary access from Newcastle Road. Ancillary Facility E is located well clear of the extents of the 20- and 100-year ARI flood events.

Ancillary facility D is located immediately to the west of Dark Creek. Flood flows are generally contained within the concrete lined channel of Dark Creek near Ancillary Facility D during the 20-year ARI event. Overtopping of the channel may occur during the 100-year ARI event, which could result in minor encroachment on the western boundary of Ancillary Facility D. Greater impacts would result if floods in excess of the 100-year ARI event occurred.

Ancillary Facilities D and E are temporary and are only required during the works associated with the construction of the SPB.

FIGURE 5 – SPB COMPOUND D AND E LOCATIONS



6.1.3 WORKS IN EXISTING WATERCOURSES

Operation of the Dark Creek concrete channel will be maintained during construction to avoid potential impacts to Ancillary Facility D, Jesmond Park and Newcastle Road during a major storm event. No realignment of Dark Creek or works in Dark Creek are required for the construction of the SPB.

6.1.4 IMPACTS ON EXISTING DRAINAGE SYSTEMS

Construction of the SPB will involve modifications to existing drainage systems (pits and pipes) along Newcastle Road. If existing drainage systems are blocked or become inoperable during construction, flooding and drainage impacts may occur during major storm events.

To mitigate the risk of flooding during construction, Daracon will maintain the existing drainage system within the SPB works footprint and ensure that the capacity of the existing system is not reduced during construction

6.1.5 CHANGES TO EMERGENCY RESPONSE AND EVACUATION

SPB construction activities would not have a significant impact on existing evacuation routes. Daracon will notify the SES and Roads and Maritime of any partial or total road closures during construction.

6.2 FLASH FLOODING RISK

Flash Flooding is sudden and often unexpected because it is caused by sudden local or nearby heavy rainfall. It is sometimes defined as flooding which occurs within six hours of the rain that causes it. The Australian Government Bureau of Meteorology provides severe weather warnings when flash flooding is likely to occur which will be utilised by the site management team.

7 ENVIRONMENTAL MITIGATION AND MANAGEMENT MEASURES

In accordance with the SPIR / EIS, the following environmental management measures have been developed to minimise potential impacts on Construction Flood Risk Management. Relative management measures applicable to the CFRMP during construction are identified below;

TABLE 6 – ENVIRONMENTAL MANAGEMENT MEASURES

No.	Environmental Safeguards	Daracon Reference	Responsibility	Timing
F006	<p>The construction environmental management plan will include a flood risk management plan that details the processes for flood preparedness, materials management, weather monitoring, site management and flood incident management.</p> <p>The plan will be developed in accordance with:</p> <ul style="list-style-type: none"> Managing Urban Stormwater, Soils and Construction, Volume 14th Edition, March 2004 (Landcom 2004) and Managing Urban Stormwater, Volume 2D - Main road construction (DECC 2008) Roads and Maritime Erosion and Sedimentation Management Procedure (Roads and Traffic Authority 2009) Roads and Maritime Technical Guideline, Temporary Stormwater Drainage for Road Construction (Roads and Maritime Services 2011) Roads and Maritime Stockpile Site Management Guideline (Roads and Maritime Services 2011). 	<p>This CFRMP</p> <p>Clause 3.2</p>	Daracon ESR	Pre-Construction

8 FLOOD MITIGATION MEASURES

8.1 FLASH FLOODING MANAGEMENT

Upon receipt of a Bureau of Meteorology Preliminary Flood Warning, Flood Warning, Flood Watch, Severe Thunderstorm Warning or a Severe Weather Warning for flash flooding; site teams will commence the start of response operations that will include but will not be limited to the following:

- Stopping construction works when made safe;
- Removing temporary water crossings that may impact upon flood water flows;
- Removing equipment and materials out of likely flood impacted areas where possible;
- Evacuating personnel; and
- Implementing other controls where possible to reduce the risk of impact to works, local property or impacts to the environment and other infrastructure from construction materials where practicable.

The Project Manager and/or delegate will liaise with the RMS Authorised Representative to ensure controls implemented are verbally consulted upon and accepted by both parties; this should also include contacting the local NSW SES Hunter Region Headquarters and Council Representative to understand Flood Risks further.

In order to better understand the local flood response processes, the following persons and organisations are typically advised by the SES at the start of flood response operations:

- NSW SES Hunter Region Headquarters;
- NSW SES Newcastle Unit Controllers;
- Hunter Shire Local Emergency Operations Controller (for transmission to the NSW Police Force Local Area Command Headquarters);
- Hunter Shire Local Emergency Management Officer (for transmission to appropriate council officers and departments);
- Newcastle City Council Mayor; and
- Other agencies will be advised by the Local Emergency Management Officer (SES) on the request of the NSW SES Hunter Local Incident Controller and as appropriate to the location and nature of the threat.

8.2 AGENCY FLOOD WARNING SYSTEMS & ALERTS

Daracon will ensure the Project Manager and/or delegate has daily access to weather reports from the Bureau of Meteorology including Preliminary Flood Warnings, Flood Warnings, Flood Watch alerts, Severe Thunderstorm Warnings and/or Severe Weather Warnings for flash flooding.

Typical warning that are likely to be received by external agencies are as follows:

8.2.1 BUREAU OF METEOROLOGY SEVERE THUNDERSTORM WARNING

These are issued direct to the media by the Bureau when severe thunderstorms are expected to produce dangerous or damaging conditions, including flash flooding. Severe thunderstorms are usually smaller in scale than events covered by Flood Watches and Severe Weather Warnings.

8.2.2 BUREAU OF METEOROLOGY SEVERE WEATHER WARNINGS FOR FLASH FLOODING

These are issued direct to the media by the Bureau and provide a warning of the possibility for flash flooding as a result of intense rainfall. These warnings are issued when severe weather is expected to affect land-based communities with 6 to 24 hours. Severe Weather Warnings may also include other conditions such as Damaging Winds.

8.2.3 BUREAU OF METEOROLOGY SEVERE THUNDERSTORM WARNING

These are issued direct to the media by the Bureau when severe thunderstorms are expected to produce dangerous or damaging conditions, including flash flooding. Severe thunderstorms are usually smaller in scale than events covered by Flood Watches and Severe Weather Warnings.

8.2.4 BUREAU OF METEOROLOGY FLOOD WATCHES

Flood Watches are issued by the Bureau to advise people of the potential for flooding in a catchment area based on predicted or actual rainfall. Flood Watches will be included in NSW SES Flood Bulletins issued by the NSW SES Newcastle Headquarters.

8.2.5 BUREAU OF METEOROLOGY FLOOD WARNINGS

The NSW SES Hunter Region Headquarters will send a copy of Bureau Flood Warnings to the NSW SES Newcastle Unit. On receipt the NSW SES Local Incident Controller will provide the NSW SES Hunter Region Headquarters with information on the estimated impacts of flooding at the predicted heights for inclusion in NSW SES Flood Bulletins.

8.2.6 NSW SES EQUIPMENT WARNINGS

Following heavy rain or when there are indications of significant creek or river rises (even to levels below Minor Flood heights), the NSW SES Hunter Shire Local Incident Controller will advise the NSW SES Newcastle Headquarters which will issue NSW SES Equipment Warnings.

8.2.7 NSW SES LOCAL FLOOD ADVICES

The NSW SES Local Incident Controller may issue Local Flood Advices for locations not covered by Bureau Flood Warnings. They may be provided verbally in response to phone inquiries but will normally be incorporated into NSW SES Region Flood Bulletins.

8.2.8 NSW SES FLOOD BULLETINS

The NSW SES Newcastle Headquarters will regularly issue NSW SES Flood Bulletins, which describe information on the estimated impacts of flooding at the predicted heights (using information from Bureau Flood Warnings and NSW SES Local Flood Advices) to NSW SES units, media outlets and agencies on behalf of all NSW SES units in the Region.

8.2.9 NSW SES EVACUATION WARNINGS AND EVACUATION ORDERS

These are usually issued to the media by the NSW SES Region Incident Controller on behalf of the NSW SES Local Incident Controller.

8.3 WEATHER AND FORECASTING SYSTEMS

During the preparation of this FMP various local agencies have been consulted. These agencies include the following:

- Local State Emergency Services (SES); and
- Newcastle City Council (NCC).

In order to obtain early warning of a potential flood event, Daracon has registered with the above authorities / agencies in order to receive the relevant Flood Watch and Flood Warning alerts.

Daracon have also invested time in establishing RSS Feed Links and other warning systems as detailed below.

8.3.1 RSS FEEDS

Site Management shall set-up RSS Feeds using the BOM catalogue through Microsoft Outlook. A collection of RSS feeds has been developed by the BOM to assist people who need to stay up to date with the latest information issued by the Bureau of Meteorology.

The RSS feeds have been divided into State based options for all weather warnings, and for specific user groups such as Marine. Information may be issued at any time, so you may need to set your RSS reader to refresh regularly.

This can be established by following the below steps:

- Click here to open the BOM RSS Feeds website - <http://www.bom.gov.au/rss/>
- Click RSS Feeds in the Favourites folder of your Outlook Account;
- Right Click and Click on 'Add New RSS Feed'...;
- Click on the relevant Weather and Warning Link on the BOM RSS Webpage;
 - In this instance select 'State Based Warning Feeds (Land and Marine) – NSW and Act (All) and
- Copy the URL address from the BOM webpage and paste into the Outlook 'New RSS Feed' box and then Click 'Add'; and
 - This will then download any current feeds from the BOM and should be operational.

- Select 'Land Warning Feeds' as your second RSS Feed and follow the same prompts as before.

For additional queries on BOM RSS Feeds please click on this link <http://www.bom.gov.au/rss/rss-guide.shtml>.

8.3.2 OTHER WEB BASED ACCESS

Other Web Based Weather Warning Systems may be set up by using the resources of webpages and the initiation of email alerts for various weather warnings to the Superintendent, Site Project Manager (or delegate) and the Site Environmental Representative.

Regular notifications will be provided to the work crews via prestart meetings, over the UHF radio, and/or telephone communication.

8.3.3 LOCAL INFORMATION

Local information can provide an invaluable understanding with regards to how the floods occur in the area as well as areas that are inundated. The project team when planning works and setting up work areas will observe flood heights including reviewing potential impacts at specific locations as detailed in the GHD Environmental Impact Statement:

- Newcastle City-wide Floodplain Risk Management Study and Plan (BMT WBM 2012)
- Dark Creek Flood Study (DHI Water and Environment Pty Ltd (DHI) 2008)
- Floodplain Development Manual (Department of Infrastructure, Planning and Natural Resources 2005)

8.4 CONSTRUCTION FLOOD MITIGATION MEASURES

8.4.1 CONSTRUCTION PLANNING & STAGING

The site management team when planning for works shall consider the following when planning for works in a flood plain but are not limited to:

- What site construction activities should be completed taking into consideration local weather patterns including long and short-range forecasts;
 - Program works in lower risk seasonal periods if possible.
- What the risks of flooding is in each area of works and the evacuation ability and/or requirements are for various plant, equipment, materials and/or personnel;
- Assessment of high-risk drainage infrastructure including other site activities where blockages and or obstructions may occur to ensure these are identified, resolved and managed in the event of flood; and
- What will be the likely impact from construction works on local waterways and flood waters in the event of severe weather and rainfall being realised during works.

8.4.1.1 FLOOD SURVEY

Onsite Survey and pegging will be utilised to measure and assess the available working and storage areas within Compound and other Storage Areas across the project to limit the potential for loss or damage to facilities, plant, equipment and materials stored in these areas.

8.4.2 SITE SPECIFIC CONTROLS

In addition to the controls and processes listed above in the planning stages; the following controls will be considered for implementation where applicable to the works:

- Ensure that soil & water management is done in accordance with Blue Book where practicable and regularly maintained;
- Ensure scour protection measures are installed before and during construction works;
- Materials used in flood prone areas for erosion and sedimentation controls should be reinforced or selected taking into consideration the flood risk impact and what may occur during a flood event to those materials;
- Minimise exposed areas by only stripping where we are working and stabilising/rehabilitation the areas as soon as practicable;
- Promptly install permanent protection measures (such as rip rap etc.) on completed works;
- Stockpile materials out the known flood prone areas where practicable;
- Place hazardous materials outside of flood prone areas;
 - All fuels, chemicals, and liquids will be stored at least 50m away from any waterway or drainage line as far as is practicable and will be stored in an impervious bunded area.
- In the event of forecast storms, heavy rainfall or flooding events, works will be assessed to better understand if there is a need to cease work activities within flood-prone areas.
 - The assessment must consider the need to remove loose materials, plant, equipment, personnel and wastes that may be impacted upon by such weather and natural flood events.
- Undertake regular inspections of the site and the erosion and sediment controls;
- Provide toolbox training to workers on the basic requirements of the Flood Management Plan;
- Consider soil stabilisation binders where practicable;
- Backfill excavations where practicable;
 - Where excavations cannot be backfilled identify potential excavation support needed based on specific circumstances.
- Consider slope protection of fill areas;
- Consider bracing and/or support for vertical structures that are midway through construction;
- Construct small temporary levee banks / bunds around high-risk construction areas where practicable; and

- Remove temporary waterway crossings to prevent additional inadvertent flood impacts from rising waters and flash flooding where practicable.

8.4.2.1 PROGRESSIVE STABILISATION OF EXPOSED AREAS

An important management strategy to minimise the effects of flooding, specifically water quality, is to progressively stabilise exposed areas as the works progress.

Where deemed appropriate, stabilisation will be undertaken on finished areas progressively to reduce risk associated with erosion. Treatments may include covering with geotextile fabric, stabilised mulch, soil binder or spray grass.

Temporary formation treatments may be applied to exposed construction areas to mitigate the risk of erosion such as soil binders. Longer-term dormant and/or completed areas where site access is achievable should be targeted for stabilisation within 2 weeks of work completion / vacation of work areas.

8.5 FLOOD EVACUATION PROCEDURES

8.5.1 COMMUNITY EMERGENCY SHELTERS AND EVACUATION CENTRES

The usual purpose of evacuation centres or assembly areas is to meet the immediate needs of community affected people following evacuation from an emergency situation. Workers and Visitors onsite during an emergency evacuation will be advised if they need to go to or be taken to the nearest accessible community evacuation centre. These centres are not managed by the project, they are likely to be initially established at the direction of the NSW SES Hunter Local Incident Controller but managed as soon as possible by Welfare Services.

8.5.2 DETAILS OF EVACUATION LOCATIONS AND ROUTES

Following the receipt of a Severe Weather or Flood notification, the entire site will be placed on a tentative alert for potential evacuation based on the alert type and affected areas of the site. The, evacuation routes from the flood plain would be as follows unless otherwise shown on the site emergency response plan and/or vehicle movement plan for the works:

- For works on the Southern side of Newcastle road, the excavation route will be via Newcastle Road or Robinson Avenue.
- For works on the Northern Side of Newcastle road, the excavation route will be via Newcastle Road, Steel Street or Coles Street.

For more information on emergency evacuations, refer to the Integrated Project Management Plan (IPMP).

8.5.3 RELOCATION OF PLANT, EQUIPMENT AND MATERIALS

Where a Flood warning is received by the Project Team and/or project planning completed by the Project Manager identifies there may be a risk of flooding during a specific period that may result in failed attempts to remove plant, equipment and/or materials from flood prone areas; Plant, Equipment and Materials will be relocated where safe to do so to locations that are considered to be out of the likely flood impact levels.

These specific locations are likely to be site compounds that have been elevated to be outside of flood impact levels however locations must be determined onsite in consultation with RMS, the Daracon Project Manager and Superintendent. This process will allow for an onsite assessment that will take into consideration the flood warnings and the stage of the project.

This will assist in determining more accurate decisions as areas inside current flood impacted areas will change with the importation of fill into the project alignment including other engineering assessments that may need to be made based on stages of infrastructure construction and other earthworks on the project.

8.6 RE-INSTATEMENT AFTER A FLOOD EVENT (FLOOD RECOVERY)

8.6.1 SES END OF RESPONSE OPERATIONS

When the immediate danger to life and property has passed the NSW SES Newcastle Incident Controller will issue an 'All Clear' message signifying that response operations have been completed.

The message will be distributed through the same media outlets as earlier evacuation messages.

The relevant Controller will also advise details of recovery coordination arrangements, arrangements made for clean-up operations prior to evacuees being allowed to return to their homes, and stand-down instructions for agencies not required for recovery operations.

This will be received by the Project Manager and action in response to the end of response notification will be managed in accordance with the site conditions and safety to assess work areas.

8.6.2 CONSTRUCTION CONSIDERATIONS

Consideration needs to be given to the processes that should take place once potential flood waters have subsided. The post flood protocols will vary significantly depending on the severity of the flood event, and each event will be different, however the following details are provided to be used as a framework for post flooding re-instatement:

- Prior to any personnel returning to work the Local SES shall be consulted with to ensure the location is safe from further flash flooding and other local related risks potentially not known by Daracon;
- RMS and Daracon Project Managers and/or Delegates shall consult to determine if the site is considered safe based on Local SES and/or other information available;

- The Daracon Project Manager, Superintendent, Applicable Package Engineer(s), WHS and Environmental Managers for the site shall inspect the site to determine what, if any, corrective actions need to be completed before returning to works.
 - During this time, an ample quantity of photographs should be taken to accurately record the condition of the site prior to commencing any rectification work and
 - A Post Flood dilapidation survey of local infrastructure should be completed, recorded and provided to the RMS.
- In the case of a relatively small flooding event, there may be little or no corrective actions required. However, regardless of the severity of the flood it would be necessary to confirm the integrity of the works and ensure that all materials are accounted for prior to continuing with construction activities;
- Make good any damage to partially constructed works or temporary works caused by the flood event following passage of a flood event;
- Clear 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;
- Worker safety will need to be considered as the presence of debris or unsafe conditions should be removed and rectified prior to normal construction works recommencing and
- Environmental Controls shall be re-established where practicable before re-commencing normal construction works.

9 COMPLIANCE MANAGEMENT

9.1 ROLES AND RESPONSIBILITIES

The organisational structure and roles and responsibilities for Daracon personnel are provided within IPMP (refer IPMP – Appendix 2). The roles and responsibilities specific to the construction of the SPB are provided within IPMP, which displays the organisational chart for the project (refer IPMP – Appendix 1).

9.1.1 SITE SUPERVISOR

The site supervisor shall ensure the requirements of this plan are implemented during flood related site emergencies. The emergency response actions to be implemented during a flood event are detailed within the Pollution Incident Response Management Plan (Appendix 8 of the CEMPP).

9.2 COMMUNICATION

Communication with stakeholders and the community is detailed within the Construction Community Liaison Management Plan (CCLMP), which includes the key aspects identified within the Community Communication Strategy (CCS) developed by RMS.

Flood management information will be communicated to the community and stakeholders in accordance with the principles and procedures outlined CCLMP.

9.3 COMPLAINTS MANAGEMENT

The management of complaints for the SPB will be in accordance with the Construction Community Liaison Management Plan (CCLMP), which includes the key aspects identified within the Complaints Management System (CMS) developed by RMS.

9.4 TRAINING

To ensure the effective implementation of this CFRMP, personnel will undergo training relating to flood risk management issues, this training will include;

- CFRMP requirements, including Flood emergency response
- relevant legislation and regulations
- risks associated with flooding
- incident response, management and reporting
- complaints response and reporting
- roles and responsibilities for flood management
- flood safety and evacuation routes during flooding.
- Site Inductions
- Tool Box Talks

- EWMSs

For further details on training refer to section 8 of the IPMP, and section 5.5 of the CEMPP.

9.5 MONITORING AND INSPECTION

Daracon will undertake weekly site inspections to assess the site for flooding preparedness, and will also implement the following flood related monitoring;

Daracon will implement flood related monitoring including:

- monitoring the forecast of large rainfall and flood events in the vicinity of the SPB
- methods of monitoring rising water (i.e. visual observations and records in site supervisor diaries) and, where possible, notification from upstream
- monitoring of work sites and ancillary facilities during flood events.

Weather will be monitored daily for construction planning purposes to identify any risk of high rainfall and flooding events.

During any flood events regular monitoring of the SPB project area will be undertaken and any damage during flooding will be recorded.

9.6 INCIDENTS

Incidents will be managed in accordance with Section 9 of the IPMP and Section 6.11 of the CEMPP

9.7 AUDITING

Audits (both internal and external) will be undertaken to assess the effectiveness of flood management measures, compliance with this CFRMP, conditions of approval and other relevant approvals, licenses and guidelines. Audit requirements are detailed in Section 11.4 of the IPMP and Section 5.9 of the CEMPP.

9.8 NON-CONFORMANCES

A non-conformance is the failure or refusal to comply with the requirements of project system documentation, including this CFRMP. Non-conformances may be identified through, auditing and review processes (Section 11.4 of the IPMP and Section 5.9 of the CEMPP) or incident management (Section 9 of the IPMP and Section 6.11 of the CEMPP).

9.9 REPORTING

Reporting requirements and responsibilities are documented in Section 5.11 of the IPMP and section 5.11 of the CEMPP.

10 REVIEW AND IMPROVEMENT

10.1 CONTINUOUS IMPROVEMENT

Continuous improvement of this CFRMP 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 flood management
- identify environmental risks not already included in the risk register
- 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.

10.2 CFRMP UPDATE AND AMENDMENT

The processes described in Section 11 of the IPMP may result in the need to update or revise this CFRMP. This will occur as needed.

Any revisions and/or changes to the CFRMP will be distributed to all relevant stakeholders in accordance with the approved document control procedure detailed in section 13 of the IPMP.

11 DEFINITIONS

All terms referenced within this plan are included within [REG.00001](#) *Definitions & Glossary of Terms Register*.

12 ASSOCIATED DOCUMENTS AND PROCEDURES

Approved Forms, Process Flowcharts, Registers and/or other documents referenced within the body of, or those that are associated with this plan, are accessible and made available for all Daracon personnel via the following link: <https://dms.daracon.com.au/documents>