



# Pūmanawa Downtown West

Service Lane Flood Mitigation Options

05 November 2024

Precinct.

WARREN AND MAHONEY®

# Contents:



1. Service Lane Movements Overview
2. Detailed Service Lane Mitigation Plans
3. Proprietary Barrier Options

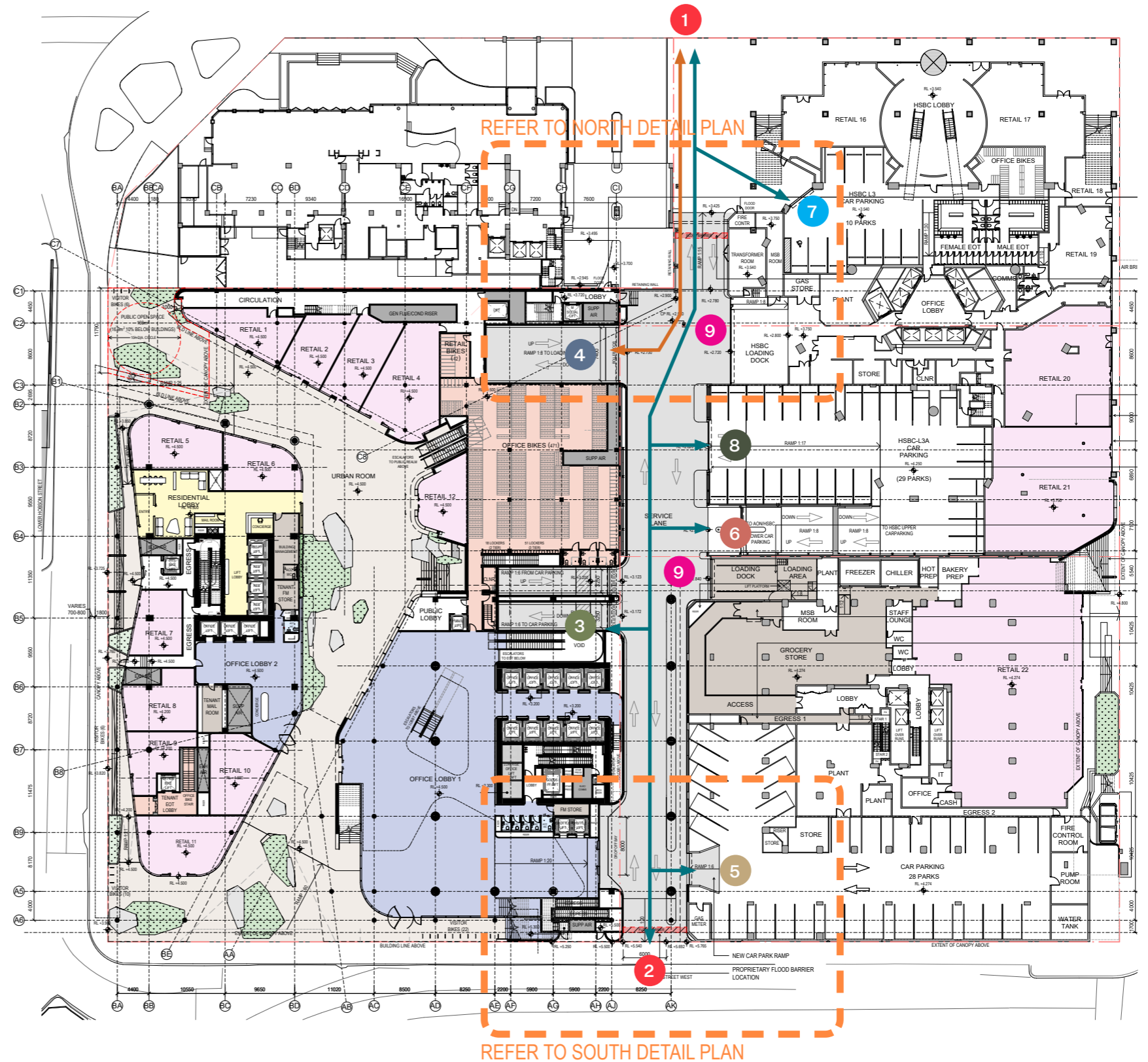


# Service Lane Overview



# Carparking and Access Ground Floor

KEY	
Quay Street Access	1
Custom Street Access	2
DTW Carpark Ramp	3
DTW Loading Ramp	4
Modified AON Carpark Access	5
AON/HSBC Lower Carpark Access	6
HSBC Lower Carpark Access	7
HSBC Upper Carpark Access	8
AON/HSBC Loading Docks	9
Car Access Routes	
Truck Access Routes	



# Detailed Service Lane Mitigation Plans



# Service Lane Flooding Mitigation - North End

## Assumptions / Impacts

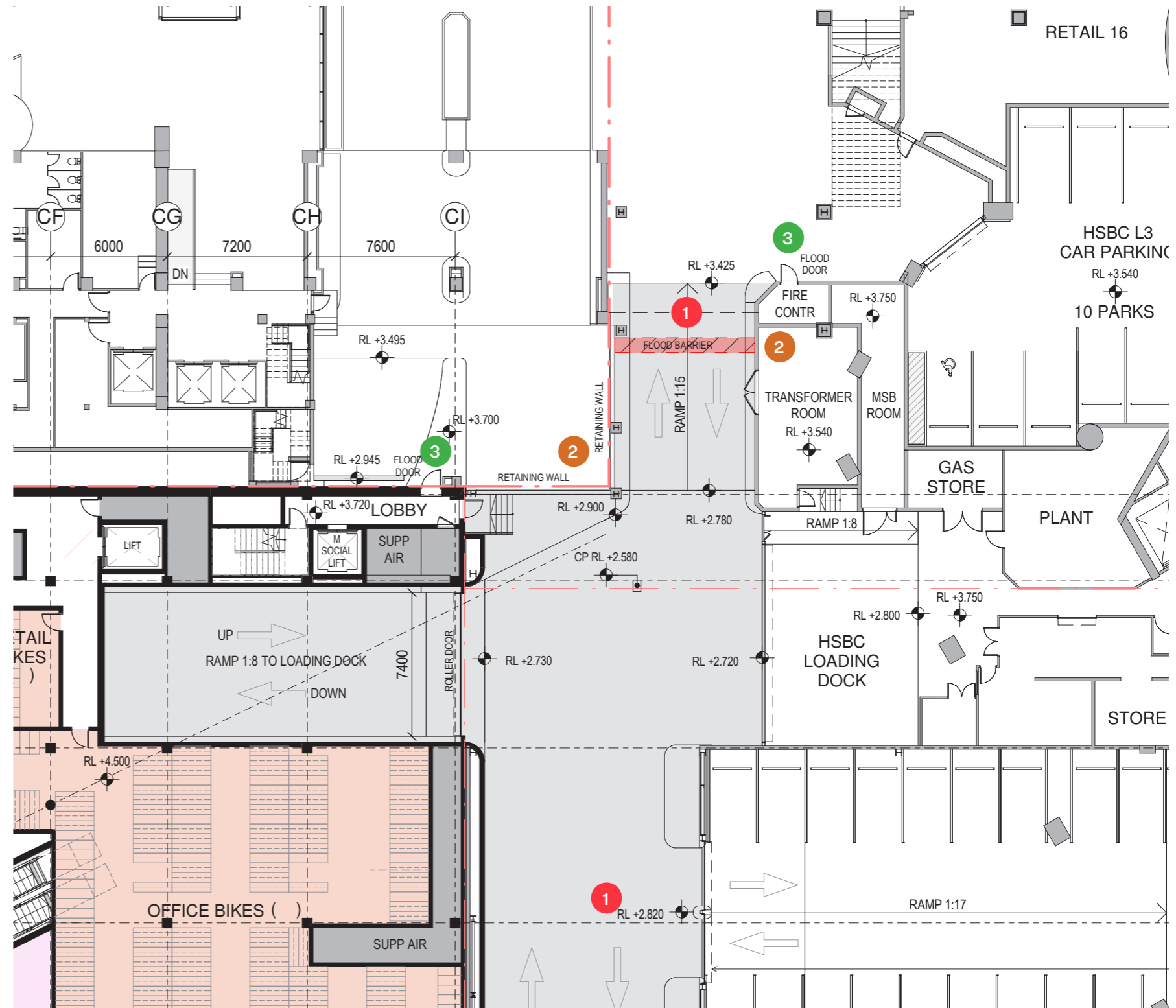
- The barrier/protection measures indicated have been developed to reflect the PCT preference for Option 1 expressed in meeting 24.10.24.
- Location of main flood barrier reflect the suggested positions in the T&T report issued with the RC documentation.
- Additional waterproofing measures to existing structure may be required to ensure flood resistant construction and protection of the Service Lane.
- Assessed Flood Depth (FD) at the Northern end at 3.62 (excluding freeboard) is above the existing FFL in HSBC building Fire Control Room/Transformer Room, we propose replacing the existing exterior door with a flood door to mitigate the risk of flood water finding its way around the proposed flood barrier.
- While proposed MSocial basement access is marginally above assessed FD, we propose a flood

## KEY

- |                                 |   |
|---------------------------------|---|
| Proprietary Flood Barrier       | 1 |
| Flood Resistant Construction    | 2 |
| Proprietary Flood Door          | 3 |
| Overland Flow Diversion Feature | 4 |

### \*Note -

- Proposed locations and types of flood barriers are indicative and are subject to be review and design by Civil Consultant.
- Flood Design Levels indicated are based on T&T Flood Hazard and Risk Assessment Report (V2 09/08/23).



# Service Lane Flooding Mitigation - South End

## Assumptions / Impacts

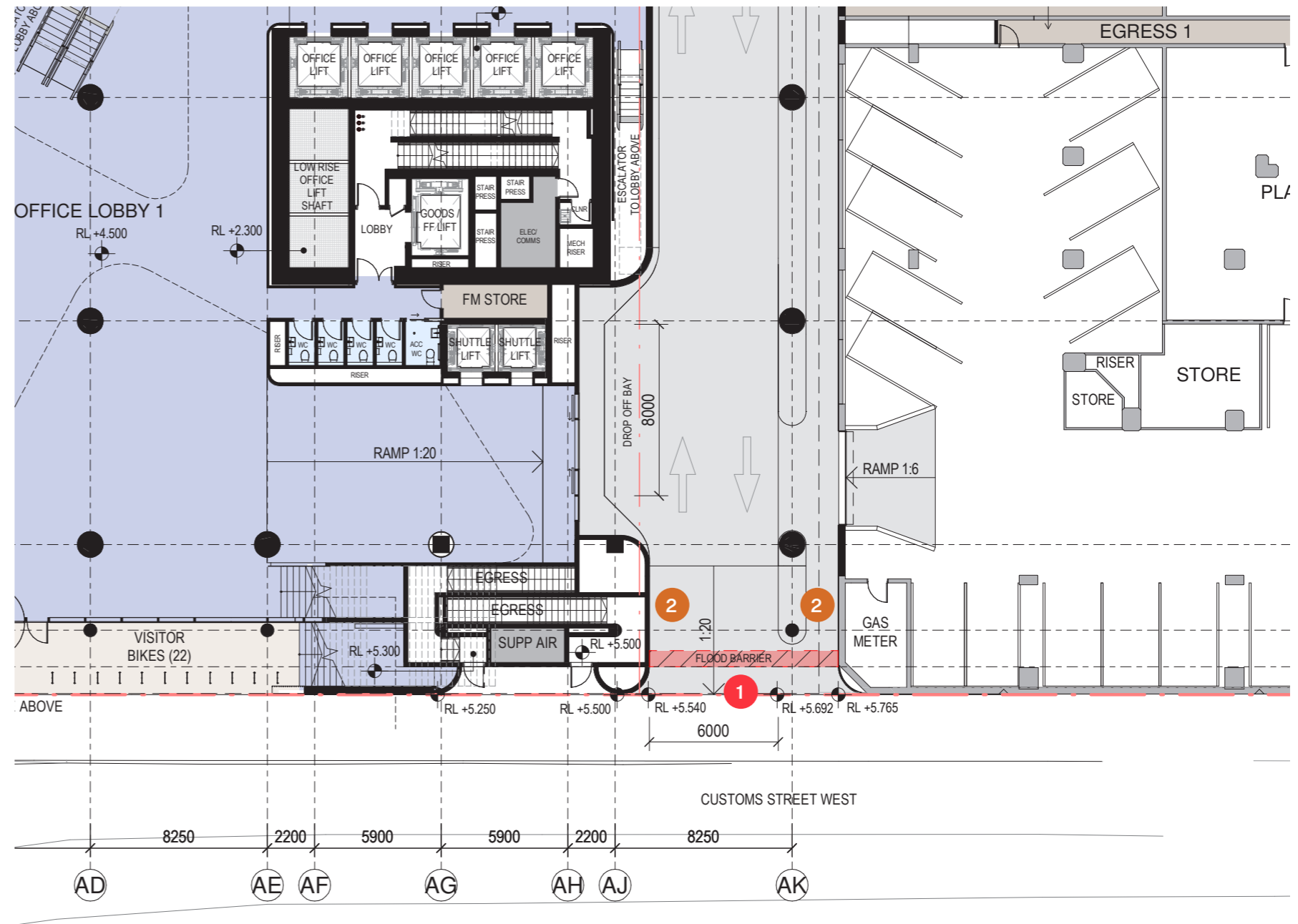
- The barrier/protection measures indicated have been developed to reflect the PCT preference for Option 1 expressed in meeting 24.10.24.
- Location of main flood barrier reflect the suggested positions in the T&T report issued with the RC documentation.
- Additional waterproofing measures to existing structure may be required to ensure flood resistant construction and protection of the Service Lane.
- Assessed Flood Depth (FD) at the Southern end is 5.59 (excluding freeboard).

## KEY

Proprietary Flood Barrier	1
Flood Resistant Construction	2
Proprietary Flood Door	3
Overland Flow Diversion Feature	4

## \*Note -

- Proposed locations and types of flood barriers are indicative and are subject to be review and design by Civil Consultant.
- Flood Design Levels indicated are based on T&T Flood Hazard and Risk Assessment Report (V2 09/08/23).



# Proprietary Barrier Options





# Barrier Option - Tilting\*

## Advantages

- Self-actuating barrier, no operator interaction requirement.
- Minimal maintenance required.
- Shallow installation depth minimises impact to in-ground services.
- Possible to retrofit

## Disadvantages

- Installation barrier width may be aesthetically detractive.

\*Note -

- Presented flood barriers are indicative of operation/impact only, brand/types of barrier are subject to be review by the Client and Civil Consultant.

# TILTING FLOOD BARRIERS

The Tilting Flood Barrier is installed horizontally at ground level. It is self-actuating, deploying via floatation, tilting upwards to the specified flood height.

## FEATURES & BENEFITS

- Tilting Flood Barriers may be Passive or Actuated.
- Fabricated from marine grade aluminium.
- Designed for strength, high corrosion resistance and long asset life.
- Tilting Barriers require minimal depth / excavation.
- Low maintenance design.
- Fully trafficable.
- Excellent sealing.

## APPLICATIONS

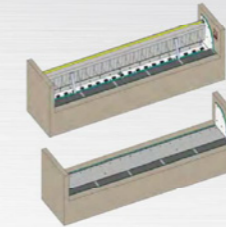
- Commercial.
- Residential.
- Basement Car Park Entrances.
- Building Entry.



^ Pictured above is the Floodfree Passive Tilting Flood Barrier which self-deploys as water levels rise.



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# TILTING FLOOD BARRIERS

## DESIGN

### DESIGN SUPPORT

- AWMA's R&D and Engineering teams are available under Early Contractor Involvement (ECI), to assist in developing flood barrier solutions for bespoke green-field and brown-field sites.
- All FloodFree Barriers are purpose-designed, engineered and manufactured.
- When required, AWMA can provide design support to ensure the product delivered will be engineered to withstand site specifications in regards to flood water height, debris loading, deployment times etc.
- The Passive Tilting Flood Barrier is manufactured from marine grade aluminium and shall be trafficable for Class G medium traffic maximum 10Tn GVW as per AS1170.1 when fully lowered as standard.
- Heavy duty solution available subject to approval by AWMA engineering as part of the design process.
- Optional extras for actuated systems include battery charged backup systems (to ensure flood protection during power black-outs), warning lights and SMS alarms.

### SIZES

- Passive Tilting Flood Barrier: Minimum height 500mm, plus 250mm increments up to 1500mm.
- Powered Tilting Flood Barrier: height customised to suit, from a minimum of 500mm.

### MATERIALS

- Materials used in the construction of AWMA's FloodFree range have a high corrosion resistance and can be operated for many years with minimal maintenance.

### MAINTENANCE

- The AWMA Flood Gate range has a minimum 25 year design life.
- Minimal maintenance is required ensuring low 'whole of life costs'

## MANUFACTURE

### QUALITY

- All AWMA products meet relevant Australian and international standards.
- AWMA hold international accreditations for ISO 9001; Quality, ISO 14001; Environment and ISO 45001 OH&S management.
- AWMA's Integrated Management System aims to provide a framework to deliver products and services that consistently exceed customer expectations.

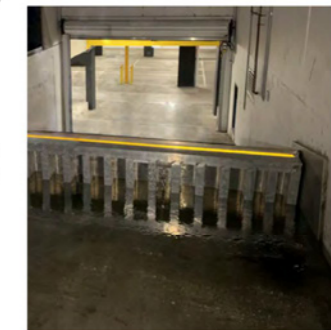
## DEPLOYMENT

- Tilting Flood Barriers may be Passive or Actuated.
- Passive Tilting Flood Barriers deploy automatically, using principles of buoyancy to ensure barriers raise ahead of flood waters. The passive flood barrier will deploy and retract as required, without any human interaction, providing complete peace of mind.
- Powered Tilting Flood Barriers use remote/local control as standard, with the option to be automatically deployed.

## COMMISSIONING

### DOCUMENTATION AND TRAINING

- Detailed documentation on operation, testing procedures and maintenance will be provided with all AWMA flood defence systems.
- Comprehensive on and/or off site training available.



## HEAD OFFICE

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# Barrier Options - Concealed\*

## Advantages

- Self-actuating barrier, no operator interaction requirement.
- Minimal maintenance required.
- Minimal width has low aesthetic impact.

## Disadvantages

- Installation depth requirement will likely impact in-ground services.
- Difcult to retrofit.

\*Note -

- Presented flood barriers are indicative of operation/impact only, brand/types of barrier are subject to be review by the Client and Civil Consultant.

# CONCEALED FLOOD BARRIERS

The Concealed Flood Barrier is a self-actuating flood protection barrier that rises, vertically, via floatation to the specified flood height.

## FEATURES & BENEFITS

- The barrier is permanently installed below ground level at the isolation point, ready for deployment when required.
- Rising water levels cause an automatic response, elevating the isolation barrier via floatation.
- The barrier then retracts below ground level as water levels decrease.
- Suitable for small to large openings.
- Low maintenance design.
- Low aesthetic impact.
- No human intervention required to deploy.

## APPLICATIONS

- Basement and carpark access points.
- Pedestrian access and pathways.
- Flood levees.
- Residential and commercial property protection.
- Doorways.
- Loading Docks.
- Driveways.



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# CONCEALED FLOOD BARRIERS

## DESIGN

### DESIGN SUPPORT

- AWMA's R&D and Engineering teams are available under Early Contractor Involvement (ECI), to assist in developing flood barrier solutions for bespoke green-field and brown-field sites.
- The FloodFree Concealed Flood Barrier is manufactured from marine grade aluminium and shall be trafficable for Class G medium traffic maximum 10Tn GVM as per AS1170.1 when fully lowered as standard.
- Heavy duty solution available subject to approval by AWMA engineering as part of the design process.

### SIZES

- Customizable to suit specific site requirements.
- Minimum height 300mm.
- After 300mm, the next height is 500mm, then height increases in 250mm increments, up to 1500mm.

### MATERIALS

- AWMA select materials to meet a minimum design life of 25 years.
- Marine grade aluminium.
- Materials used in the construction of AWMA's Flood Free range have a high corrosion resistance and can be operated for many years with minimal maintenance.

### MAINTENANCE

- The AWMA Flood Gate range has a minimum 25 year design life.
- Minimal maintenance is required ensuring low 'whole of life costs'.

## MANUFACTURE

### QUALITY

- All AWMA products meet relevant Australian and international standards.
- All fabrication is in accordance with the 'Australian Technical Specification for Fabricated Water Control Infrastructure'.
- AWMA hold international accreditations for ISO 9001; Quality, ISO 14001; Environment and ISO 45001 OH&S management.
- AWMA's Integrated Management System aims to provide a framework to deliver products and services that consistently exceed customer expectations.

## INSTALLATION

### MOUNTING OPTIONS

- Barriers are designed to retrofit existing infrastructure or 'green field sites', they are also suitable for 'brown field sites'.
- AWMA offer install supervision for all turn-key installations.

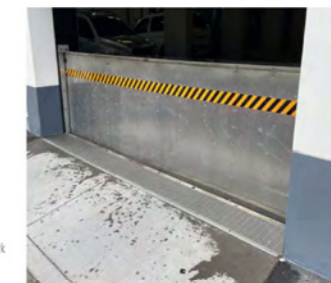
## DEPLOYMENT

- The AWMA Concealed Flood Barrier is designed to self-deploy ahead of rising flood waters.
- No operator intervention is required.
- Variety of audio and visual warning systems available for most barriers.

## COMMISSIONING

### DOCUMENTATION AND TRAINING

- Detailed documentation on operation, testing procedures and maintenance will be provided with all AWMA flood defence systems.
- Comprehensive on and/or off site training available.



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# Barrier Options - Swinging\*

## Advantages

- Minimal maintenance required.
- Easy to retrofit.

## Disadvantages

- Manually actuating barrier as standard, operator interaction requirement. (Note: Can be mechanised/actuated as option)
- Requirement to hinge/open out will limit the option for installation to level areas.
- Gate is surface mounted, high aesthetic impact.

\*Note -

- Presented flood barriers are indicative of operation/impact only, brand/types of barrier are subject to be review by the Client and Civil Consultant.

# SWING FLOOD BARRIERS

The Swing Flood Barrier is an outward opening hinged floodgate designed to provide effective isolation of floodwaters up to the height of the gate.



## FEATURES & BENEFITS

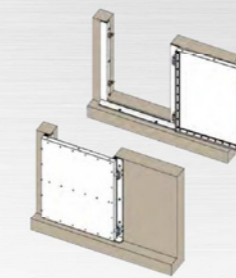
- Swing Barriers are manufactured from marine grade aluminium.
- A manual locking mechanism(s) secure the gate in the closed position.
- Seals are manufactured from UV stabilised plasticised PVC.
- Seal frames are manufactured from aluminium or stainless steel and are designed for face mount installation onto the wall of a building, levee or other structure.
- Swing Barriers can be supplied as either right or left hand hinged.
- Swing flood barriers are supplied with a mill finish as standard.
- Optional coating of AWMA Swing Barriers is available in any colour to integrate with the surrounding building or structure.
- Full perimeter sealing available.
- Locking mechanisms may be custom latches or handle assemblies.

## APPLICATIONS

- Pedestrian access.
- Basement entry.
- Utility Boxes.
- Doorways.
- Liftwells.
- Bunds / Levees.
- Access hatches.



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# SWING FLOOD BARRIERS

## DESIGN

### DESIGN SUPPORT

- AWMA's R&D and Engineering teams are available under Early Contractor Involvement (ECI), to assist in developing flood barrier solutions for bespoke green-field and brown-field sites.

### SIZES

- Customisable to suit specific site requirements.

### MATERIALS

- AWMA select materials to meet a minimum design life of 25 years. Where required, AWMA can offer higher grade materials, coatings and protection systems to extend the design life to 100 years.
- Marine grade aluminium, stainless steel.
- Materials used in the construction of AWMA's FloodFree range have a high corrosion resistance and can be operated for many years with minimal maintenance.

### MAINTENANCE

- The AWMA Flood Gate range has a minimum 25 year design life.
- Minimal maintenance is required ensuring low 'whole of life costs'.

## MANUFACTURE

### QUALITY

- All AWMA products meet relevant Australian and international standards.
- AWMA hold international accreditations for ISO 9001; Quality, ISO 14001; Environment and ISO 45001 OH&S management.
- AWMA's Integrated Management System aims to provide a framework to deliver products and services that consistently exceed customer expectations.

## INSTALLATION

### MOUNTING OPTIONS

- Barriers are designed to retrofit existing infrastructure or 'green field sites', they are also suitable for 'brown field sites'.
- AWMA offer install supervision for all turn-key installations.

## DEPLOYMENT

- The Swing Barrier is manually operated as standard, can be mechanised/actuated upon request, depending on application.

## COMMISSIONING

### DOCUMENTATION AND TRAINING

- Detailed documentation on operation, testing procedures and maintenance will be provided with all AWMA flood defence systems.
- Comprehensive on and/or off site training available.



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# Barrier Options - Flood Door\*

## Advantages

- Operated like a standard door and designed for every day use, no special operator interaction requirement to seal.
- Minimal maintenance required.
- Door design has low aesthetic impact.

## Disadvantages

- Potential limitation on vision panel inclusion.

\*Note -

- Presented flood barriers are indicative of operation/impact only, brand/types of barrier are subject to be review by the Client and Civil Consultant.

# PERSONAL ACCESS FLOOD DOORS

Flood protection for any standard, outward opening door. The FloodFree Personal Access Flood Door (PAFD) is engineered to withstand the designated flood level. Once closed it provides a flood protected, lockable point of entry/exit.



## FEATURES & BENEFITS

- Can be used as an everyday door.
- Feels, operates and looks like a regular door.
- Design complies with Australian Standard AS1428.1 (Design Access and Mobility Standards).
- Designed to fit standard door frame sizes.
- Hydrostatically charged door seals designed for optimum sealing performance.
- Multiple frame fixing points securely anchor door frame to wall.
- All fixings concealed.
- Suitable for most types of door hardware.
- Door and frame supplied in a range of powder coat colours.
- Door supplied pre-hung for easy installation.
- Designed for minimal maintenance.
- Permanent protection.
- Corrosion resistant.
- Robust construction.

## APPLICATIONS

- Shopping centres.
- Sporting complexes.
- Offices.
- Residential houses.
- Storage facilities.
- Industrial buildings.
- Utility rooms.
- Commercial.



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# PERSONAL ACCESS FLOOD DOORS

## DESIGN

### DESIGN SUPPORT

- AWMA's R&D and Engineering teams are available under Early Contractor Involvement (ECI), to assist in developing flood barrier solutions for bespoke green-field and brown-field sites.

### SIZES

- Suits standard door sizes (between 720mm - 1266mm wide and 2040mm - 2340mm high).
- Customisable to suit.

### MATERIALS

- PAFDs are fabricated from marine grade aluminium, designed for strength, high corrosion resistance, long asset life and minimal maintenance.
- Doors will be supplied with Mortice Locks, handles and door closer unless otherwise specified.

### SEALING

- To meet wheelchair and mobility compliance AS1428.1 the FloodFree door design, frame and seals will provide water resistant sealing up to 1045mm.
- A FloodFree Door with full perimeter sealing is available for up to 2.4m high flood level. Custom door hardware available to suit this design option.

### MAINTENANCE

- The AWMA Flood Gate range has a minimum 25 year design life.
- Minimal maintenance is required ensuring low 'whole of life costs'

## MANUFACTURE

### QUALITY

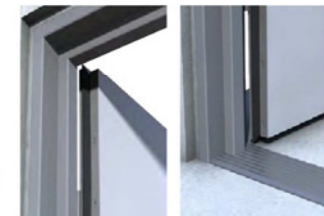
- All AWMA products meet relevant Australian and international standards.
- AWMA hold international accreditations for ISO 9001; Quality, ISO 14001, Environment and ISO 45001 OH&S management.
- AWMA's Integrated Management System aims to provide a framework to deliver products and services that consistently exceed customer expectations.

## INSTALLATION

- Installation procedure similar to standard door frames.
- Doors supplied pre-hung and painted with hardware.
- Installation instructions provided.



LOOKS, FEELS AND OPERATES LIKE A STANDARD DOOR.



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# Barrier Options - Demountable\*

## Advantages

- Minimal maintenance required.
- Minimal aesthetic impact as only installed in the event of a flood.

## Disadvantages

- Relies on management decisions.
- Manually installed barrier, operator interaction required to install and remove post event.
- Storage space for barrier elements required while not in use.

\*Note -

- Presented flood barriers are indicative of operation/impact only, brand/types of barrier are subject to be review by the Client and Civil Consultant.

# DEMOUNTABLE FLOOD BARRIERS

Demountable Flood Barriers allow property and asset owners to manually deploy their own protection barriers to isolate flood and storm waters in and around existing infrastructure.

## FEATURES & BENEFITS

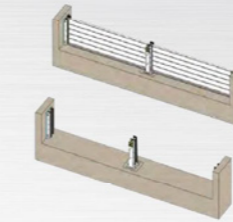
- Proven flood protection.
- Designed to suit square and rectangular openings of an infinite length.
- Modular segments are fabricated in 100mm high increments.
- Permanent end frames and permanent footings enhance rapid deployment.
- Segments consist of extruded section with embedded seals.
- Storage solutions and transportation trolleys available.
- Economical, proven flood prevention solution.

## APPLICATIONS

- Residential and commercial building protection.
- Liftwell barriers.
- Driveway barriers.
- Doorway barriers.
- Ventilation outlet isolation.
- Basement barriers.
- Access barriers.



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# DEMOUNTABLE FLOOD BARRIERS

## DESIGN

### DESIGN SUPPORT

- AWMA's R&D and Engineering teams are available under Early Contractor Involvement (ECI), to assist in developing flood barrier solutions for bespoke green-field and brown-field sites.
- Where required centre posts, in-ground footings and props are incorporated in the design to ensure the barrier is structurally sound in the event of a flood.

### SIZES

- All AWMA Flood Barriers are custom sized to ensure they meet specific site requirements.

### MATERIALS

- AWMA select materials to meet a minimum design life of 25 years. Where required, AWMA can offer higher grade materials, coatings and protection systems to extend the design life to 100+ years.
- Marine grade aluminium barrier segments and posts.
- Materials used in the construction of AWMA's Flood Barrier range have a high corrosion resistance and can be operated for many years with minimal maintenance.
- 316 Stainless Steel End Post Covers included as standard

### MAINTENANCE

- The AWMA Floodfree range has a minimum 25 year design life.
- Minimal maintenance is required ensuring low 'whole of life costs'.

## MANUFACTURE

### QUALITY

- All AWMA products meet relevant Australian and international standards.
- AWMA hold international accreditations for ISO 9001; Quality, ISO 14001; Environment and ISO 45001 OH&S management.
- AWMA's Integrated Management System aims to provide a framework to deliver products and services that consistently exceed customer expectations.

## INSTALLATION

### MOUNTING OPTIONS

- Barriers are designed to retrofit existing infrastructure or 'green field sites', they are also suitable for 'brown field sites'.
- AWMA offer install supervision for all turn-key installations.

## DEPLOYMENT

- The AWMA Demountable Flood Barriers are designed to be manually deployed by a single operator.
- Storage Racks are available, custom manufactured from marine grade aluminium to suit the number of barriers and posts required. Can include wheels or forklift provision.

## COMMISSIONING

### DOCUMENTATION AND TRAINING

- Detailed documentation on operation, testing procedures and maintenance will be provided with all AWMA flood defence systems.
- Comprehensive on and/or off site training available.



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