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Ref. 30250700-GC-001-01-Ipswich Western Corridor Civil  
Technical Review

1/04/2026

## **Ipswich Western Corridor Civil Technical Review (Stormwater)**

Dear Nicholas,

**IN RESPONSE TO THE IPSWICH WESTERN CORRIDOR FUTURE HOUSING PLAN AS REQUESTED BY ICC, WE HAVE REVIEWED THE INFORMATION AVAILABLE TO DATE REGARDING FLOODING AND TOPOGRAPHY OF THE WESTERN CORRIDOR REGION. A TECHNICAL REVIEW SUMMARY BELOW HAS BEEN PREPARED TO DOCUMENT THE EXISTING AND PROPOSED INFRASTRUCTURE AND PROPOSED SUB-CATCHMENT STRATEGIES.**

# 1 STORMWATER AND FLOODING

## 1.1 Background & Historical Approvals

### 1.1.1 Existing Flood Overlay

The review of the Ipswich 2024 Draft Ipswich Plan, identifies a significant portion of the Western Growth Corridor Area is affected by flood risk overlay. For summary of available flood reporting and corresponding models refer to Figure 1-1, below, and the subsequent commentary.

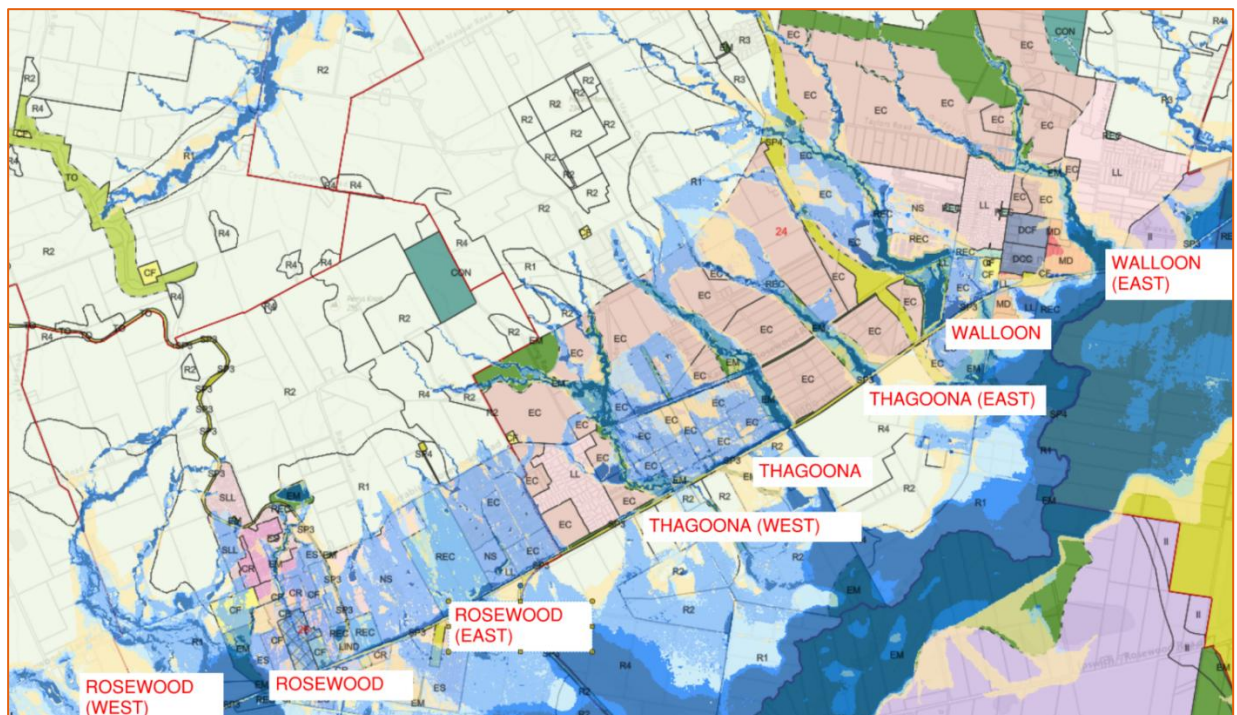


Figure 1-1: Rosewood, Thagoona and Walloon Flood Overlay Mapping (source: Ipswich City Council 2024)

#### 1.1.1.1 WALLOON AREA

A number of flood studies have been conducted for the Walloon Area and are listed as follows:

- **Walloon Area (WLN) Flood Study – Volume 1 of 2 (February 2022)**
  - **Purpose:** Conducted to inform the Ipswich Integrated Catchment Plan (IICP 2021) and future floodplain management.
  - **Study Area:** Covers 30.7 km<sup>2</sup> west of Ipswich CBD, including Western Drain, Guilfoyle's Gully, and Campbells Gully.
  - **Methodology:** Developed XP-RAFTS and TUFLOW HPC models, calibrated using 2009 and 2011 flood events.
  - **Key Findings:**
    - 2011 flood event was significantly larger than 2009.
    - Identified joint probability effects between local waterways and the Bremer River.

- Critical storm duration identified as 25 minutes.
- **Recommendations:**
  - Study outputs should be used for future floodplain management.
  - Recognised LiDAR limitations in vegetated and water-covered areas.
- **Walloon Area (WLN) Flood Study – Summary of Hydraulic Risk and Future Development Assessment (February 2022)**
  - **Purpose:** Assesses hydraulic risk, future development impacts, and flood-related property damages.
  - **Methodology:**
    - Integrated local hydraulic risk with broader Brisbane and Bremer River risks.
    - Evaluated two development scenarios (UD1 and UD2).
    - Calculated Average Annual Damages (AAD) using IICP 2021 and SFMP methodologies.
  - **Key Findings:**
    - UD1 and UD2 scenarios increase overall flood damages.
    - AAD for local flooding: \$145,314; for all flood sources: \$638,568.
    - Most affected properties are residential, community, public, and industrial.
    - Residential and commercial properties dominate total flood damages.
  - **Recommendations:**
    - Acknowledge data limitations, especially for commercial/industrial properties.
    - Use damage estimates with caution due to a 60% accuracy tolerance in floor level data.

#### Walloon East Catchment

Minimal development instigated flood and stormwater analysis has been completed for the Walloon East Catchment. Notably the lower reach area extending to the rail/road corridor is dominated by the Bremer River (backwater). Analysis would need to understand how much fill (floodplain storage loss) can be tolerated in this area to inform zone extends and SPP provisions concerning flood isolation and impacts.

#### Walloon Catchment

The Walloon Catchment has had significant flood and stormwater management investigation already completed and includes several mitigation devices and structures already established. Sensitivity analysis has been undertaken concerning both Climate Change (CC) and developed upstream catchments; however, the analysis is not in accordance with current industry practice – specifically ARR 2019 and application of series of temporal rainfall patterns.

Catchment constraints include less than desirable flood immunity to both the Karrabin Rosewood Road and rail/road crossing. The former road immunity may be acceptable where it can be established that future development areas have alternate ingress/egress for major flood events.

Notwithstanding the above, zone / land use establishment can be identified with relative confidence and structure plan development on basis of existing approvals and that further assessment can be deferred to subsequent DA reviews.

### 1.1.1.2 THAGOONA AREA

A number of flood studies have been conducted for the Thagoona Area and are listed as follows:

- **2012 Thagoona Flood Study (October 2012)**

- **Purpose:** Conducted for Ipswich City Council and NDRP to assess flood risks and mitigation options in Thagoona.
- **Methodology:** Used hydrologic and hydraulic models calibrated with 2008 and 2011 flood events.
- **Key Findings:** Identified critical flood risks, short warning times, and recommended vertical evacuation over road evacuation.
- **Recommendations:** Concerning Thagoona and Thagoona West catchments the proposed flood awareness initiatives identified Option F3 (bund and O'Shea Gully lowering) as the most effective mitigation strategy. Notably, lowering O'Shea Gully may have environmental constraints.

A further Option C was also investigated which expands on Option F3 to include mitigation works along both Karrabin-Rosewood Road and railway corridors which offer further protection and flood immunity to the existing immediate residential properties. It is evident from Nearmap review that the Karrabin-Rosewood Road mitigation works were undertaken by ICC in 2016.

- **2019 Thagoona Report Addendum (May 2019)**

- **Purpose:** Updated the 2012 study with revised modelling and joint probability analysis.
- **Methodology:** Adjusted hydrologic lag parameters, incorporated new tailwater data, and integrated the Rosewood model.
- **Key Findings:** Found no significant impact from joint probability effects on flooding in Thagoona. Provided updated peak flood level comparisons.
- **Recommendations:** No new mitigation measures but emphasized the importance of considering updated hydraulic modelling in planning decisions.

#### Thagoona East Catchment

ICC 2024 flood hazard mapping appears in the most part to limit flooding to the Environmental Management (EM) corridors for THAGOONA EAST.

### 1.1.1.3 ROSEWOOD AREA

A number of flood studies have been conducted for the Walloon Area and are listed as follows:

- **2012 Rosewood Flood Study – Final Report (December 2012)**

- **Purpose:** Conducted for Ipswich City Council to assess flood risks and flood management options for the Rosewood catchments.
- **Methodology:**
  - Utilised hydrologic and hydraulic modelling, calibrated against the January 2011 and November 2008 flood events.

- Assessed structural and non-structural mitigation options, considering integrated water management.
- **Key Findings:**
  - Significant flood risks identified, with modelled extents and depths for 2011 and 2008 events.
  - A critical storm duration of 60 minutes for the Rosewood town area.
  - Evaluated structural mitigation options, with the eastern diversion having the highest Benefit-Cost Ratio (BCR = 4.9).
  - Non-structural measures included emergency management and community education.
  - Identified potential for a mobile disaster warning system.
  - Considered water quality and pollutant load mitigation.
- **Recommendations:**
  - Prioritised structural works: upgrade the town drain (Masons Gully), lower John Street, and upgrade railway and road crossing culverts (subject to funding and consultation).
  - Develop and distribute a fact sheet with flood extents, evacuation routes, and mitigation measures.
  - Enhance emergency management and community preparedness.
- **2015 Rosewood Flood Study Addendum (August 2015)**
  - **Purpose:** An update to the 2012 study, refining flood models and reassessing mitigation options.
  - **Methodology:**
    - Revised XP-RAFTS and TUFLOW models.
    - Additional hydraulic modelling.
  - **Key Findings:**
    - Focused on the 100-year ARI event and mitigation impacts.
    - Confirmed the 60-minute storm duration as critical.
    - Did not include Integrated Water Management and Flood Risk Management sections from 2012.
    - TUFLOW results were used for a benefit-cost analysis.
  - **Recommendations:**
    - Improvements to Masons Gully to address town centre flooding.
    - No specific recommendations for the Eastern tributary.
- **2019 Rosewood Flood Study Addendum (May 2019)**
  - **Purpose:** Further updates to hydrologic and hydraulic models, refining flood risk assessments and testing the sensitivity of local flood levels to boundary condition assumptions.
  - **Methodology:**

- Updated models and conducted joint probability analysis.
- Combined Rosewood and Thagoona hydraulic models into a single model.
- **Key Findings:**
  - Identified gaps in the original 2012 study and 2015 addendum, including missing western and eastern catchments and inadequate representation of the Rosewood detention basin.
  - Downstream boundary conditions in the 2015 study were extracted from Ipswich Rivers Flood Study.
  - Joint probability analysis indicated minimal benefit in further detailed examination for Rosewood.
  - Simulated additional AEP events with updated hydraulic models.
- **Recommendations:**
  - Use the updated models for planning and flood risk management.
  - Apply classified hydraulic hazard output following Australian Disaster Resilience Guidelines.
  - Incorporate updated peak flood level maps in planning decisions.

## 1.2 Strategic Policy Consideration

Ipswich City Council flood mitigation strategy (Ipswich Draft 2024 Scheme and ICCP 2021) is to maximise community safety and minimise future potential damage due to flooding, both by introduction of structural protection and by planning controls to ensure that only compatible development occurs on floodplains in the future.

Fundamental to this overarching strategy is the identification of existing community vulnerability in relation to flood islands, particularly concerning existing Low Flood islands (Refer Figure 1-2). The Structure Plan area is a high-risk concern in terms of this vulnerability type with both Walloon and Rosewood currently identified in the top 10 suburbs affected by flood islands. Notably, the urbanisation of the Thagoona suburb would further exacerbate this situation where strategic implementation of structural protection and planning controls are not effectively implemented for urbanisation of habitable and commercial land use within the floodplain.

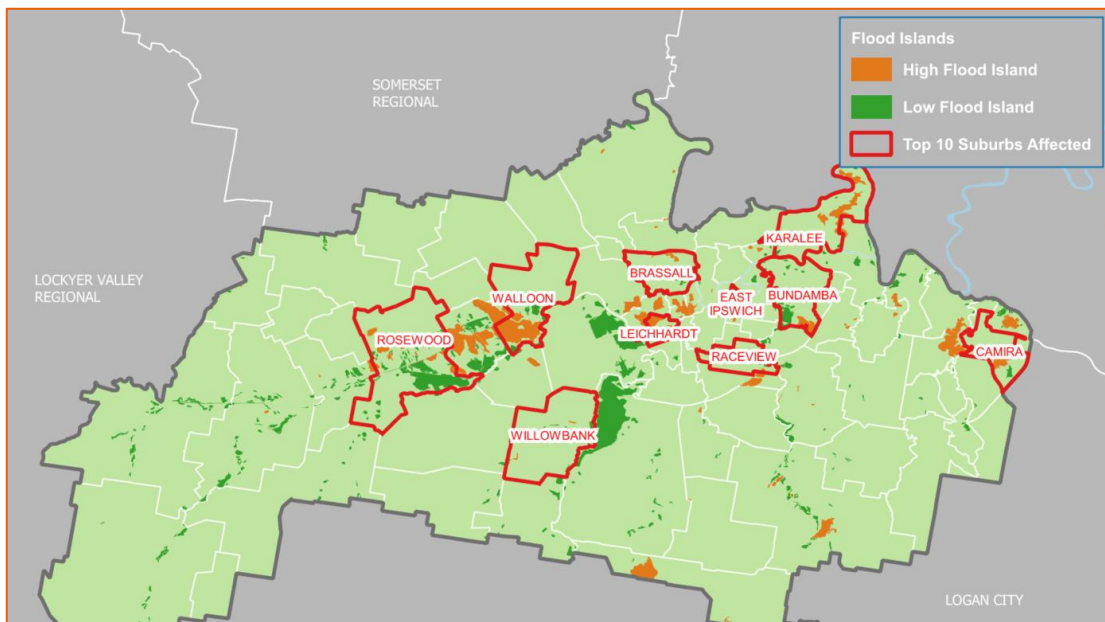


Figure 1-2: Distribution of flood islands and suburbs with the highest number of properties affected (source IICP 2021)

### 1.3 Sustainable Land Use – Floodplain

The principles of best proactive risk management are recommended to effectively manage flood risk and increase the sustainable use of the floodplain for the structure plan area. The Australian Disaster Resilience Handbook 7 lists the principles of best proactive risk management as:

- A cooperative approach between all levels of government in managing flood risk;
- A risk management approach to focus on understanding and managing flood risk where it is needed most;
- A proactive approach to actively manage the risks of occupying the floodplain;
- A consultative approach to understanding and managing flood risk;
- An informed approach, combining knowledge and experience of historical flood events with sophisticated modelling to increase understanding of historical events and explore a broader range of potential flood risks, behaviours and events;
- Supporting informed decisions, ensuring the flood information is readily accessible to government and non-government entities and the community;
- Recognition that all flood risk cannot be eliminated; and
- Recognition of individual responsibility.

Importantly, effective floodplain management concerning earthworks can also contribute towards optimisation of utility services, particularly sewer network, and avoid the need for unnecessary small pump stations and rising mains.

Critically, to lessen either the demand on emergency services during flooding events, it is recommended community vulnerability (existing and future) is identified within the Structure Plan land classification types with corresponding risk management approach required to facilitate sustainable habitable and commercial land uses on the floodplain. Table 1-1 provides a summary of such land classification and corresponding risk management approach.

Table 1-1: Risk Management Approach

| Land Classification                           | Description                                                                                                                                                                                                                 | Risk Management Approach                                    |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| Land Type 1 – High islands                    | Land is above the PMF                                                                                                                                                                                                       | Shelter in place – Flood free refuge                        |
| Land Type 2(a) – Flood free access (Natural)  | Habitable and commercial land uses located outside medium to extreme flood risk areas.<br><br>Topography naturally grades to land that is above the PMF level.                                                              | Evacuate – relocate to flood free areas. Low flood islands. |
| Land Type 2(b) Flood free access (Engineered) | Habitable and commercial land uses located outside medium to extreme flood risk areas. Modify floodplain, including fill placement.<br><br>Land is linked to land above the PMF level by fill, roads, bridges and the like. | As for 2(a)                                                 |

## 1.4 Floodplain Management Tools

To satisfy the previous risk management approaches, the following sections provide insight to typical measures for potential adoption within the floodplain, which can be utilised independently or a combination thereof for an effective management approach to flood risk.

### 1.4.1 Dry Detention Basin

Detention basins can be designed to suit a range of catchment sizes. Community and regional scale basins may have considerable community benefits as areas for recreation and may be built around specific sizes and shapes of fields for sports such as football, netball and cricket. The sides of basins are usually sloping earth embankments, suitable for occasional spectator use. Basins used for passive recreation may include stands of trees (within the basin but not on any fill embankment), lawns and other vegetation.

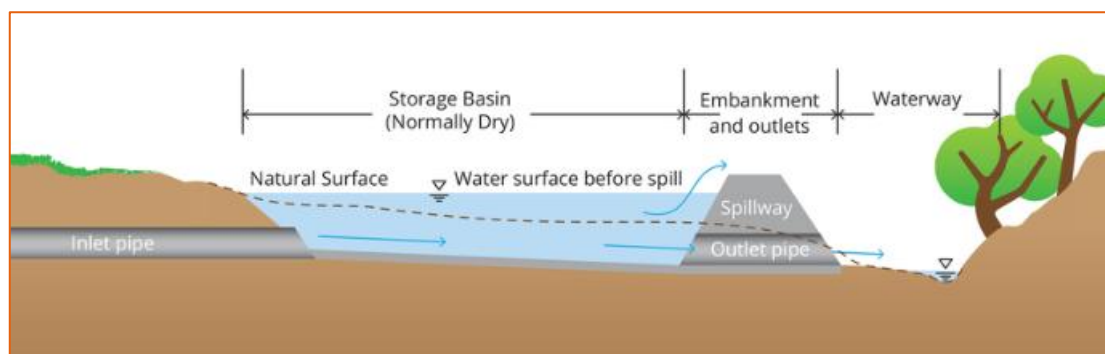


Figure 1-3: Typical Dry Detention Basin Section.

### 1.4.2 Constructed Open Channel – Natural

Whilst the retention of existing natural drainage lines may be an important consideration from ecological perspectives, it is noted that it is an impractical expectation for existing waterways (pristine or otherwise) to remain unchanged subsequent to urbanisation. Further, large land areas within the structure plan have been subject to degradation activities including past deforestation, agricultural land use practices and mining.

Importantly, the reconstruction of structure plan waterways will allow for the required effective flood conveyance and storages whilst achieving:

- Conveyance and storage of ultimate catchment flows associated with major to rare storm events;
- Zero exposure for habitable and commercial land uses concerning medium to extreme flood risk;
- Prescribed road flood immunity for purposes of safe evacuation approach;
- Waterway (bed and banks) and riparian sustainability and stabilisation;
- Fauna movement corridor; and
- Aquatic life passage.

Importantly, the application of this management tool can vary in terms of the extent of works undertaken, specifically the reconstruction can range from full cross-section redesign to planned stabilisation works, subject to collectively achieving the above outcomes. Notwithstanding, it is anticipated that flood conveyance works will involve the application of both excavation and filling within the floodplain without necessarily balancing to achieve existing flood storage.

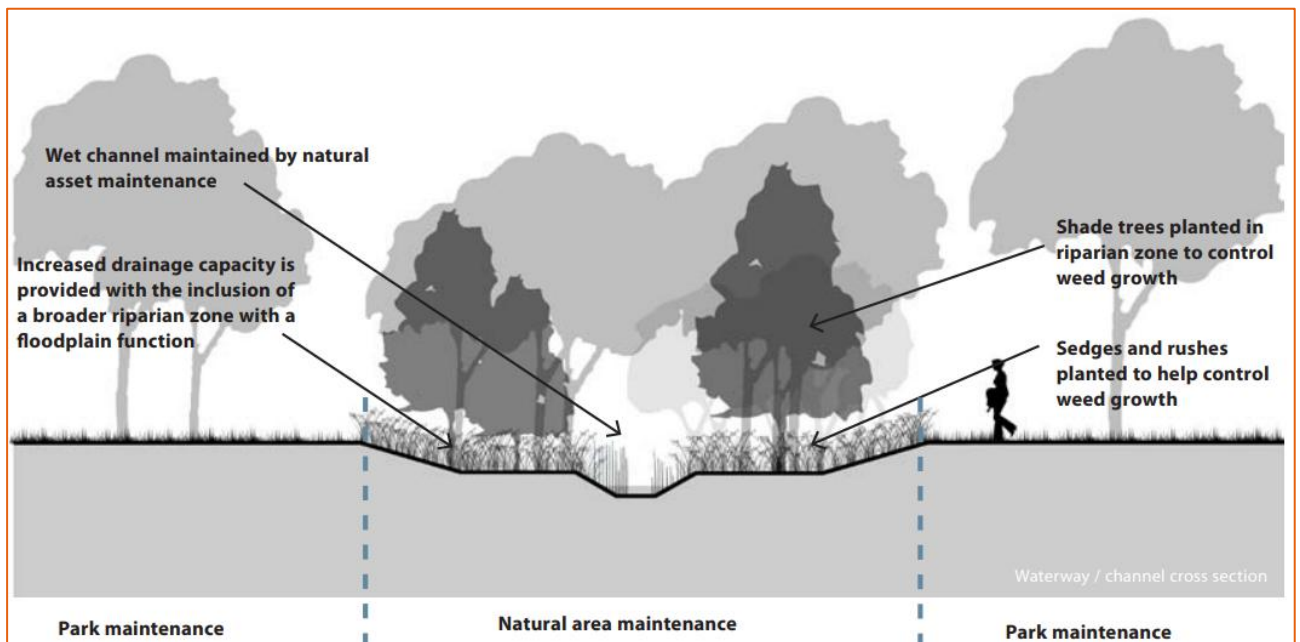


Figure 1-4: Typical Reconstructed Naturalised Open Channel (Source: Ipswich Waterway and Channel Guideline V3)

### 1.4.3 Constructed Open Channel – Grassed Swale

The grassed swale system is intended for use where small scale application and to enhance other conventional conveyance systems such as road flows and pipe drainage. Importantly, such conveyance open channel can also be an integral component to implementation of levee and control of upslope runoff. Further, implementation should generally be applied to low hydraulic hazard environments. Refer to Figure 1-5 for typical example.



*Figure 1-5: Example open channel swale.*

#### **1.4.4 Levee Embankment**

According to the Water Act 2000, a levee is an artificial embankment or structure which prevents or reduces the flow of overland flow water onto or from land. For the purposes of the Structure Plan area, the primary objective of such structural measure is to provide protection against flood events. Notably, any levee-related infrastructure can be incorporated into non-habitable land uses such as open space including recreational parks and sport fields. For example, an earth embankment forming elevated viewing platform surrounding playing areas or facilitation of recreational pathway (see image example below). Similarly, a sport field (school or recreational) playing area (excluding hard infrastructure areas), where positioned adjacent to waterway, can provide online backwater storage to assist with the floodplain management outcomes.

Category 2 levees are code assessable in accordance with the Planning Act 2016; however, it is likely that where a levee system is introduced, the structure plan area inter-dependency of any levee system will likely exceed the number of persons impacted corresponding to code assessment and as such will be classified as a Category 3 levee and require impact assessment. Accordingly, preference is that the implementation of such levee systems be limited, but it is acknowledged that they may be unavoidable in some instances, to achieve flood protection for some existing communities. Notably, a levee may well offer flood protection outcomes which have significantly less impact on existing vegetation.



Figure 1-6: Example Levee Embankment supporting recreational pathway.

### 1.4.5 Grade Control Structures

Steep slope topography and corresponding waterway bed slopes are present within the structure plan area. A number of techniques are available to control erosion along the bed of such waterway corridors, and include the provision of either log weirs, rock chutes or rock lined plunge pools (refer to Figure 1-7). The provision of such techniques will need to be consistent with aquatic life passage requirements as weirs are often seen as a barrier to fish passage and as such rock chutes can then be preferred options for erosion control.

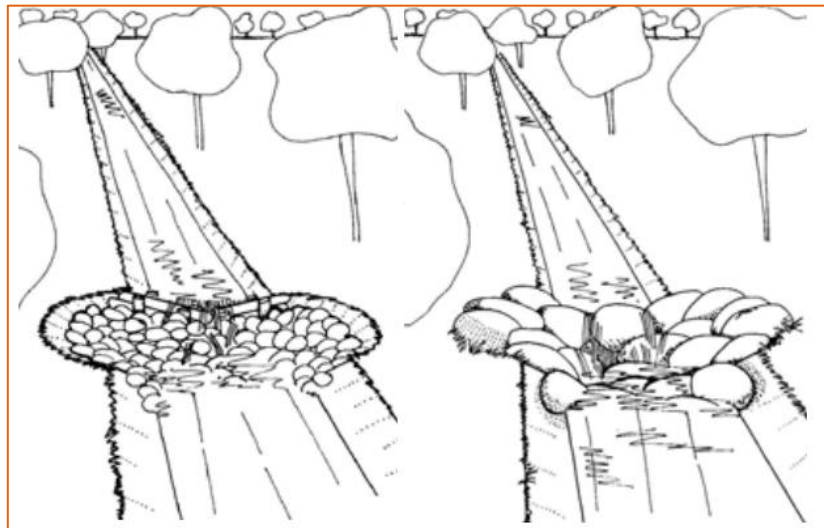


Figure 1-7: Typical Log Weir or Rock Plunge Pool (Source: Ipswich Waterway and Channel Guideline V3)

## 1.4.6 Flooding Mitigation & Erosion Control Measures

Urbanisation of catchments can modify the existing (natural or otherwise) drainage regime and potentially alter flood behaviour. Stormwater mitigating control measures, including detention and retention systems, can be used to assist with the minimisation of any such regime changes and runoff characteristics of drainage catchments. Retention systems include a broad range of water features which offer key benefits including treating stormwater; however, the introduction of constructed lakes or wetlands is not considered further herein, but rather the implementation of detention systems.

Typically, detention systems are used for the purposes of attenuating site-base peak discharges to avoid adverse nuisance flows or overwhelming operational capacity for existing drainage system. Concerning, the structure plan area the implementation of such control measures will primarily focus on the control of peak discharges for purpose of reducing or preventing increases in downstream creek and development area flooding. In accordance with QUDM (section 5.5.6), utilisation of control measures for minimising accelerated channel erosion within downstream waterways is typically not required when development is located upstream of:

- Minor waterway which is modified in such a manner that would remove the risk of such erosion, or
- A constructed drainage channel or waterway is appropriately designed for ultimate development of the catchment.

It is on these principles that, unless otherwise documented, individual detention system may not likely be required from site-based perspective, but rather the mitigation control measures are required for the purpose of managing existing flooding, the safe and efficient conveyance of ultimate development flows throughout the structure plan area and flood protection to existing communities.

Notably, concerning the intended detention system appropriate consideration must be given to the potential effects of lead-up rainfall prior to the storm burst to assess likely storage levels prior to the storm burst.



Figure 1-8: Existing Online Structure – Adelong Ave, Thagoona

### 1.4.7 Fill in Floodplain (Riverine)

While "filling" a floodplain for development or other purposes is possible, it's a highly regulated and generally discouraged in practice due to significant environmental, safety concerns, and hydraulic impacts (conveyance or loss of storage). Hence it is crucial to consider the potential impacts of such actions with general outcomes in order to preference as follows:

- Avoid high and extreme flood risk areas; or
- To achieve habitable land use flood immunity, limit the fill extents to minor (relative to structure plan floodplain); or
- Compensatory excavation works to maintain flood storage.

Where no compensatory fill is proposed, hydraulic impact assessment is necessary to demonstrate no change to flood risk parameters (depth, velocity, time to inundation).

### 1.4.8 Off-site Stormwater Quality Improvement Program

Difficulties can be encountered in low grading areas where development is required to daylight stormwater drainage from stormwater quality treatment devices. These areas present an opportunity to utilise the ICC Off-site Stormwater Quality Improvement Program to adopt a more regional approach to stormwater management.

## 1.5 Integrated Floodplain Management Options

The following sections provide high-level options for flood measures and structural planning outcomes and where not subject to existing Development Approval should then be subject to detailed assessment and review of in-situ environments and conditions. Notwithstanding, the below strategies are intended to inform the overarching outcomes for each corresponding catchment and form the basis for the structure plan development concerning flood management. Critically, the below strategic options are informed by:

- Existing Development Approvals and corresponding completed works,
- Flood risk management approaches (Section 1.3);
- Proposition that future urbanisation will change the existing waterways and will require either:
  - appropriately designed erosion control measures or
  - online attenuation of peak discharges for top of bank flows; and
- Provision of site-based attenuation of peak discharges where:
  - Binding agreements between affected property owners are not provided; or
  - Downstream operational capacity of existing drainage system does not allow for ultimate development of the catchment.
- Strong preference and priority to locate and implement works concerning any broad sub-catchment mitigation solution or flood protection works within the following areas:
  - Existing land parcels in the control of LGA;
  - Formed and unformed road reserves; and
  - Integration to future recreational space (including sport field playing areas) without compromise to Desired Standards of Service (DSS).

***Importantly, the below prescribed catchment solution sets are a starting point of the aforementioned strategic intent and are required to be tested through hydraulic modelling and formulation of staged phasing for delivery of catchment drainage whilst ensuring the key flooding protection outcomes listed***

*in Section 1.3 are sequentially achieved. Further, the associated commentary is not to be inferred as endorsement of any related hydraulic impact assessments or studies but rather set high-level strategic direction and guidance concerning the evolving and developing structure plan.*

### 1.5.1 Walloon Catchments

Notably, sub-catchments related to current DA approvals somewhat pre-determine the broader catchment strategy and adopted flooding integration principles. A regional approach for sub-catchment solution was not pursued for this catchment area owing to:

- Significant portion of the catchment has existing development approvals.
- Significant existing development and mitigation measures which are site specific and development driven.
- Limited access to either LGA owned land holdings or unformed road reserve to locate mitigation measures.

Consequently, such strategy typically includes constructed open channel (natural) aligned with existing drainage corridor and online mitigation devices for conveyance management and flood protection for proposed habitable land use areas. Refer to Tables 1-2 and 1-3 for summary of specific Walloon and Wallon East catchment strategic objectives respectively. Plan 1 (enclosed) provides layout details for type and location of suggested management tools

Table 1-2 – Walloon Catchment

| Strategy Element                             | Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1. Constructed Open Channel - Natural</b> | <p>Site based drainage corridors to be fully reconstructed as naturalised open channels to accommodate the ultimate upstream flow regime<sup>1</sup>. Realignment may occur but maintain existing bed slope where practical.</p> <p>Habitable land use areas must be free from medium to extreme flood risk areas under the development ultimate scenario. Further compensatory earthworks are not required as they are accounted for in the appropriately designed open channel.</p> <p>Maintain aquatic life passage.</p> |
| <b>2. Grade control structures</b>           | Provision of rock chutes to control erosion where constructed waterway bed slope is excessive.                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>3. Land Type 2(a) and 2(b)</b>            | Fill placement provision within the overland flows/floodplain / Road orientation / flood immune road crossings to link with land located above the PMF.                                                                                                                                                                                                                                                                                                                                                                     |
| <b>4. Dry Detention Basin</b>                | Provision of specific online mitigation measures to ensure no adverse impact to offsite flooding parameters.                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>5. Roadside Swale and cross-drainage</b>  | Provision of conveyance swale along Haigslea-Amberley Road and cross-drainage. DFE Flood immune access to future Western Bypass interchange to link with land located above the PMF.                                                                                                                                                                                                                                                                                                                                        |
| <b>6. Fill Floodplain (Bremer River)</b>     | Limited extent provision of fill within high and extreme flood risk areas (Kingsley, Bell and Calvin Streets) to provide flood immunity to habitable land use areas. Compensatory excavation (where practical) within the adjoining recreation open space corridor subject to environmental consideration.                                                                                                                                                                                                                  |
| <b>7. Road Cross-drainage Structures</b>     | <p>Provision of cross-drainage structures for Taylors Road, Karrabin-Rosewood Road. Flood immune access to future Western Bypass interchange (Taylors Road) and to link network with land located above the PMF.</p> <p><u>Opportunity</u></p> <p>Such structures can also be utilised for mitigation control subject to hydraulic modelling and Failure Impact Assessment.</p>                                                                                                                                             |

1. The Dawn Development sensitivity assessment suggest capacity for ultimate development within this catchment and any impacts would be tolerable given the conservative assumptions – Engeny Report dated 23 Oct 2024.

Table 1-3 – Walloon Catchment – East

| Strategy Element                                       | Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1. Constructed Open Channel – Natural (FULL)</b>    | <p>Site based drainage corridors to be reconstructed as naturalised open channel for ultimate upstream flow regime. Realignment may occur but maintain existing bed slope where practical.</p> <p>Habitable land use areas must be free from developed ultimate defined flood event and freeboard in accordance with planning scheme. Further compensatory earthworks not required, included to appropriately design channel.</p> <p>Maintain aquatic life passage.</p> |
| <b>2. Constructed Open Channel – Natural (PARTIAL)</b> | <p>Site based drainage corridors to be partially reconstructed with works limited to waterway stability improvements.</p> <p>Habitable land use areas must be free from developed ultimate defined flood event flows with freeboard in accordance with planning scheme. Fill and excavation permitted to very low – medium flood risk areas. Compensatory earthworks required to balance floodplain storage guided by vegetation survey.</p>                            |
| <b>3. Grade control structures</b>                     | Provision of rock chutes to control erosion where constructed waterway bed slope is excessive.                                                                                                                                                                                                                                                                                                                                                                          |
| <b>4. Land Type 2(a) and 2(b)</b>                      | Fill placement provision within the overland flows/floodplain / Road orientation / flood immune road crossings to link with land located above the PMF.                                                                                                                                                                                                                                                                                                                 |
| <b>5. Dry Detention Basin</b>                          | Provision of specific online mitigation measures to ensure no adverse impact to offsite flooding parameters.                                                                                                                                                                                                                                                                                                                                                            |
| <b>6. Roadside Swale and cross-drainage</b>            | <p>Provision of cross-drainage structures for Taylors Road, Haigslea-Amberley Road and Poplar Road Reserve to link with land located above the PMF.</p> <p><u>Opportunities</u></p> <p>Poplar Road reserve site could be investigated for sub-catchment solution.</p> <p>Such structures can also be utilised for mitigation control subject to hydraulic modelling and Failure Impact Assessment.</p>                                                                  |
| <b>7. Roadside Swale and cross-drainage</b>            | Provision of conveyance swale along Taylors Road and cross-drainage. DFE Flood immune access to future Western Bypass interchange and Haigslea- Amberley Road to link network with land located above the PMF.                                                                                                                                                                                                                                                          |
| <b>8. Levee Embankment</b>                             | Provision of fill and levee flood protection works along Karrabin-Rosewood Road and linear corridor to Poplar Street Reserve. Flood protection works to the Bremer River flooding.                                                                                                                                                                                                                                                                                      |

## 1.5.2 Thagoona Catchments

Notably, concerning the Thagoona sub-catchments, it is assumed that the existing constriction points within the QLD rail corridor remain relatively unchanged with urbanisation of the upstream catchments located to the north of the rail corridor. Where development occurs downstream of the rail corridor, it is assumed that the development areas will maintain site-based pre-existing flood parameters. Accordingly, consideration of a somewhat regional approach solution set is progressed for discussion purposes as follows:

- Developments within catchments upstream of rail corridor each provide:
  - Integration to existing LGA flood protection works;
  - Conveyance and storage for catchment ultimate urbanised peak discharge flows;
  - No offline attenuation devices for peak discharges.
  - Online mitigation structures, other management tools and flood storage areas to mitigate and lessen existing flood inundation (extents / flood risk) for both existing communities affected by the respective sub-catchments. The preference is utilisation of existing LGA reserves, future recreational / open space and conveyance channel road crossings (where practical and subject to constraints such as environment).
- Developments located downstream of rail corridor each provide:
  - site-based peak discharge attenuation measure.
  - conveyance and storage for US existing discharge flows (i.e. rail constrictive flows).

Table 1-4 provides a combined summary of the specific Thagoona / Thagoona (West) and Thagoona East catchment strategic objectives. Refer to Plan 2 and the Thagoona Flood Works Sketch (30250700-AAP-DRG-SKE-0004) (enclosed) for layout details concerning the location of the suggested management tools.

Note that the above strategy will require unified landowner participation and potentially require multiple party catchment or sub-catchment-based agreements.

Table 1-4 – Thagoona Catchments (combined)

| Strategy Element                                       | Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1. Constructed Open Channel - Natural</b>           | <p>Site based drainage corridors to be fully reconstructed as naturalised open channel for ultimate upstream flow regime<sup>1</sup>. Realignment may occur but maintain existing bed slope where practical.</p> <p>Habitable land use areas must be free from medium to extreme flood risk areas under the developed ultimate scenario. Further compensatory earthworks not required as they are accounted for in appropriately designed open channel.</p> <p>Maintain aquatic life passage.</p> <p><u>Opportunity</u></p> <p>Where constructed channel adjoins future recreational space (such as sport fields) utilise area for offline storage and mitigation of DS flooding (extent / flood risk).</p> |
| <b>2. Constructed Open Channel – Natural (PARTIAL)</b> | <p>Site based drainage corridors to be partially reconstructed with works limited to waterway stability improvements.</p> <p>Habitable land use areas must be free from developed ultimate defined flood event flows with freeboard in accordance with planning scheme. Fill and excavation permitted to very low – medium flood risk areas. Compensatory earthworks may be required to balance floodplain storage guided by vegetation survey.</p>                                                                                                                                                                                                                                                         |
| <b>3. Grade control structures</b>                     | Provision of rock chutes to control erosion where constructed waterway bed slope is excessive.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>4. Land Type 2(a) and 2(b)</b>                      | Fill placement provision within the overland flows/floodplain / Road orientation / flood immune road crossings to link with land located above the PMF.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>5. Dry Detention Basin</b>                          | Provision of specific online mitigation measures to ensure no adverse impact to offsite flooding parameters.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>6. Roadside Swale and cross-drainage</b>            | Provision of conveyance swale along unformed road adjoining rail corridor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>7. Road Cross-drainage Structures</b>               | <p>Provision of cross-drainage structures for Karrabin-Rosewood Road to link network with land located above the PMF.</p> <p><u>Opportunity</u></p> <p>Such structures can also be utilised for mitigation control subject to hydraulic modelling and Failure Impact Assessment.</p> <p>Excavation works within the existing Adelong Ave Reserve to increase flood storage, integrate with existing Adelong Ave culvert and road embankment.</p>                                                                                                                                                                                                                                                            |
| <b>8. Levee Embankment</b>                             | Provision of fill and levee flood protection works along future linear corridor/development to east of Evans Road Reserve.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

### 1.5.3 Rosewood Catchments

Similar to Thagoona Catchments, Rosewood catchments are constrained by rail corridor and associated cross-drainage. However, catchment slope is minimal and practicality for storage and conveyance is limited. Accordingly, it is assumed that a site-based approach to conveyance and storage will be adopted for individual development sites.

Table 1-5 provides a combined summary of the Rosewood catchment strategic objectives. Refer to Plan 2 (enclosed) for layout details concerning the location of suggested management tools.

Table 1-5 – Rosewood Catchments (Combined)

| Strategy Element                             | Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1. Constructed Open Channel - Natural</b> | <p>Site based drainage corridors to be fully reconstructed as naturalised open channel for ultimate upstream flow regime<sup>1</sup>. Realignment may occur but maintain existing bed slope where practical.</p> <p>Habitable land use areas must be free from medium to extreme flood risk areas under the development ultimate scenario. Further compensatory earthworks not required as they accounted for in the appropriately designed open channel.</p> <p>Maintain aquatic life passage.</p> |
| <b>2. Grade control structures</b>           | Provision of rock chutes to control erosion where constructed waterway bed slope is excessive.                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>3. Land Type 2(a) and 2(b)</b>            | Fill placement provision within the overland flows/floodplain / Road orientation / flood immune road crossings to link with land located above the PMF.                                                                                                                                                                                                                                                                                                                                             |
| <b>4. Dry Detention Basin</b>                | Provision of specific online mitigation measures to ensure no adverse impact to offsite flooding parameters. Existing Rosewood Detention Basin – Adjoining Peace Park.                                                                                                                                                                                                                                                                                                                              |
| <b>5. Roadside Swale and cross-drainage</b>  | Provision of conveyance swale along Haigslea-Amberley Road and cross-drainage. DFE Flood immune access to future Western Bypass interchange to link with land located above the PMF.                                                                                                                                                                                                                                                                                                                |
| <b>6. Fill Floodplain (Bremer River)</b>     | Limited extent provision of fill within high and extreme flood risk areas (William Street and Royal George Lane) to provide flood immunity to habitable land use areas. Compensatory excavation (where practical) within the adjoining recreation open space corridor subject to environmental consideration.                                                                                                                                                                                       |

## 2 THAGOONA FLOOD STUDY

To assess the feasibility and effectiveness of the floodplain management options outlined in Section 1.5 Integrated Floodplain Management Options, further investigations will be required to be undertaken to demonstrate validity and feasibility. These investigations will focus on refinement to the understanding of potential flood impacts and optimising the proposed measures within the existing modelling framework.

Key areas of further investigation include:

- **Model Testing and Validation**
  - Use the existing TUFLOW models developed for each catchment to assess the performance of the floodplain management options.
  - Maintain the current hydrological assumptions, including rainfall-runoff relationships and development density projections.
  - Test combinations of different floodplain management measures to evaluate their collective impact and identify the most effective strategies.
- **Flood Behaviour Analysis**
  - Assess any changes in flood behaviour, including water levels, velocities, and extents, under the proposed management options.
  - Compare model results to the baseline conditions to determine improvements or potential adverse impacts.
- **Infrastructure and Constraints Considerations**
  - Assume that the existing constriction point within the QLD rail corridor remains unchanged, maintaining current downstream flood conditions.
  - No interactions with or modifications to the broader floodplain management strategy are envisaged at this stage.
  - Sensitivity analysis of Bremer River floodplain fill (minor extents – Walloon and Rosewood catchments) to demonstrate no adverse impacts.

Arcadis has prepared a master planned flood study for the portion of the Thagoona suburb situated within the Western Corridor Growth Area, referencing the Urbis Draft Structure Plan (August 2025) which has been enclosed for further reference. This study has been prepared to develop a unified strategy to be employed across the Thagoona catchment (refer to section 0) and can be used to support further, more detailed flood investigations.

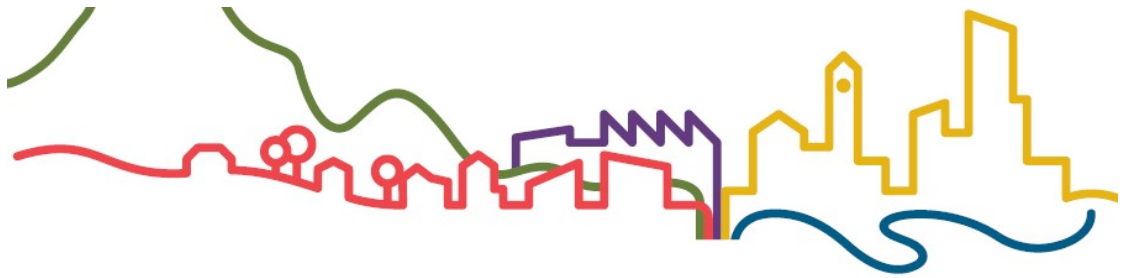
Yours sincerely,



**Gary Ellis** – RPEQ  
Technical Director - Urban Development &  
Regeneration

**Darlan Castro** – RPEQ  
Associate Technical Director - Urban  
Development & Regeneration

Enclosures: Plan 1  
Plan 2  
Arcadis Thagoona Flood Study (30250700-EFE-001)



## Legend

Approved DA

DA Under Assessment

Suburb Boundary

Future Road Cross Drainage 1% immunity

Road Cross Drainage 1% immunity

Online Detention Basin

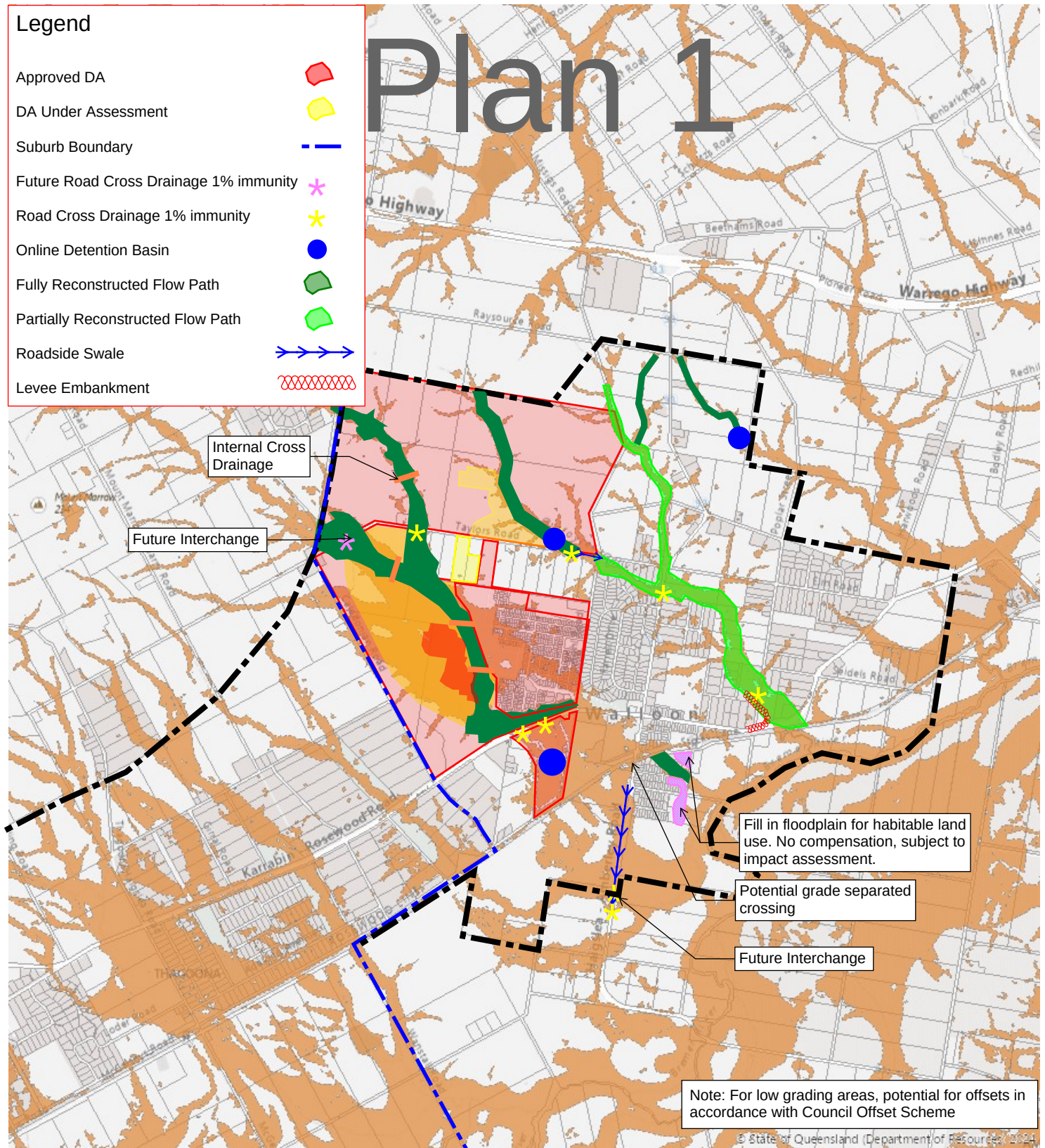
Fully Reconstructed Flow Path

Partially Reconstructed Flow Path

Roadside Swale

Levee Embankment

# Plan 1





# Plan 2

## Legend

- Approved DA ■
- DA Under Assessment ■
- Suburb Boundary ---
- Road Cross Drainage 1% immunity ✱
- Existing Online Detention Basin ●
- Future Online Detention Basin / Sport field / Rec ■
- Future Offline Dry Detention Basin ●
- Fully Reconstructed Waterway ■
- Partially Reconstructed Waterway ■
- Roadside Swale →→→→
- Levee Embankment ⊘⊘⊘⊘

