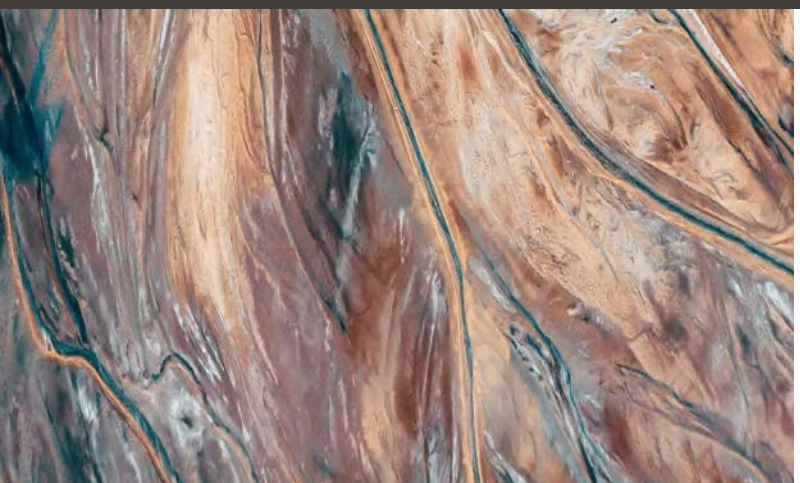
# White Patch Causeway Reconstruction

## Options Analysis Report

Moreton Bay Regional Council

Revision A



17 August 2022

Red Fox Advisory

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## Document Control

| Project | | | |
|---|---|---|---|
| **Document Title** | Options Analysis Report | **Document No.** | 01016-RFA-00PM00-RPT-OA-01 |
| **Prepared by:** | Geoff Blundstone | **Signature:** | |
| **Reviewed by:** | Miles Vass | **Signature:** | |
| **Approved by:** | Michael Price | **Signature:** | |

## Issue Summary

| Revision | Date | Issue Description | Distribution |
|---|---|---|---|
| **A** | 17/08/22 | Issued for Review | MBRC Design Team |
| **B** | | | |
| **C** | | | |

# Contents

# 1 Introduction

## 1.1 Scope of Project

The project location is situated at White Patch Esplanade, Bellara with the structure crossing Wrights Creek. The site is located on the North-western side of Bribe Island, North of the Bribie Island township.

The proposed upgrade will see the existing crossing demolished and replaced with an option that is selected through the following planning and options analysis. White Patch Esplanade is the only formalised road link that connects Bribie Island west of Banksia place to the main community. This road services approximately 75 residential dwellings as well as being the access to many 4x4 tracks on Bribie Island.


Figure 1 - Project location (Google Maps)

## 1.2 Purpose of the Report

This document has been prepared to summarise the assessment of the options that were developed for White Patch Esplanade Causeway Reconstruction project. Moreton Bay Regional Council (MBRC) have commissioned Red Fox Advisory (RFA) to undertake planning and design of the White Patch Esplanade Causeway Reconstruction including all necessary associated works and approvals in accordance with the Specification for Services.

The works include rectification of the existing causeway structure that has been washed away during 2 separate flood events in the past 15 years. The most recent was in February 2022, which completely washed out the centre of the bridge. Under State and Local Authority schemes, build back from natural disaster is to be completed within 24 months of the event occurring, which has driven the compressed timeline to undertake design and approvals for the project.

The purpose of the Options Analysis report is to document the design options that were considered to address the project objectives. The report also documents the selection of the preferred option through a process of Multi-Criteria Assessment (MCA) Workshop in collaboration with RFA and MBRC.

The Project Objectives as outlined in the Specification of Services (refer Appendix A) are listed below:

- Improve road safety for the community
- Improve reliability of road network
- Increase resilience to natural conditions
- Minimise impact to environmental corridors and waterways
- Reduce ongoing maintenance requirements for local authority

# 2 Options to be Assessed

The options to be assessed were developed to specifically achieve the project objectives defined in Section 1 of this report. Each option is required to increase the resilience of the existing causeway while minimising the impact to the environmental corridors and waterways.

The options development considered the following key constraints:

- Highly sensitive environmental conditions identified in the project area including adjacent mangroves and fish passages within the Pumicestone Passage to Wrights Creek. Options developed must limit unnecessary disturbance to these areas.
- Each option must provide connectivity for pedestrians and cyclists travelling across Wrights Creek.
- Options are to consider constructability requirements including staging, temporary side tracks, temporary drainage structures, plant requirements and potential need to install cofferdams.
- Hydraulic implications associated with each option due to raising the immunity level such as afflux, outlet velocities and velocities at the causeway during overtopping events.

The development of horizontal alignment options to manage negative impacts to the key constraints identified two feasible horizontal alignments. These options include an 'online' alignment which maintains the horizontal placement of the crossing at the existing location and an 'offline' option which relocates the crossing south of the existing, transitioning back to the existing road immediately west and east of the crossing. Following the identification of the two horizontal alignment options, four design options were identified to progress to assessment.

The options developed included:

- Option 1 – Online Culvert, full reuse of the existing road alignment, upgrading the existing causeway with new culverts and improved flood immunity. Significant temporary works required.
- Option 2 – Online Bridge, full reuse of the existing road alignment, upgrading the existing causeway with a bridge structure and improved flood immunity. Significant temporary works required.
- Option 3 – Offline Culvert, horizontal shift in the crossing location to the south, upgrading the existing causeway with new culverts and improved flood immunity. New permanent formation with demolition of existing causeway.
- Option 4 – Offline Bridge, horizontal shift in the crossing location to the south, upgrading the existing causeway with a bridge structure and improved flood immunity. New permanent formation with demolition of existing causeway.

For the Basis of Design Report refer to Appendix B. For design drawings of the options progressed for analysis, refer Appendix C.

# 3 Options Analysis including MCA

The options were assessed using a Multi Criteria Assessment (MCA) framework. The assessment criteria were established to consider the key distinguishable features across the developed options. The primary considerations were Environmental and Cultural Heritage impacts, Constructability, Value for Money, Stakeholder / Community impacts and the ability to meet identified Project Milestones.

In order to rank the solutions being assessed, it was necessary to assign a score to each of the primary considerations and a relative weighting for each score. The weighting the scores received were reflective of the relative importance to the achievement of the project objectives.

A summary of the criteria and the weighting assigned to the criteria is detailed in Section 3.1 of this report.

Once the options were documented and the MCA framework was established, a workshop was held between key RFA and MBRC team members to collaboratively agree on the outcome of each option. For a summary of the outcomes of this workshop refer Appendix E.

## 3.1 Assessment Criteria

| Criteria | Weighting |
|---|---|
| **Value for Money** | 20% |
| **Constructability** | 25% |
| **Environment & Cultural Heritage** | 25% |
| **Stakeholder and Community** | 15% |
| **Meeting Project Milestones** | 15% |

### 3.1.1 Value for Money

Value for Money was divided into 5 sub-elements

- **Cost**
  - > *Objective: Lowest overall cost including risk*
    - This included the high-level construction estimates of certain elements associated with each of the four options, i.e., causeway embankment, bridge/culvert, scour protection, temporary side tracks, and coffer dams. Infrastructure items that were similar across each option were not included, i.e., general earthworks, pavement, drainage, signs and lines, lighting, public utility and plant.

> *Summary*

- While the offline culvert option was the lowest comparative cost, subsequent feedback from regulatory agencies was that it was highly unlikely that they would accept the culvert option with the currently proposed waterway opening. The costs are indicative and only developed for comparison only.

- **Improved asset**
  > *Objective: Improved road user safety and functionality*
    - This element relates to an improvement of sub-standard items, i.e., horizontal geometry, and shared path connectivity. It is also considered the safe operational use for all future users during and after construction completion.
  > *Summary*
    - All options will improve road safety because of the increased roadway widths, horizontal geometry and pedestrian/ cyclist separation. They will also increase the asset functionality due to the separate cyclist/pedestrian path across the causeway and the greater flood immunity and resilience of the causeway to flood damage. Both offline options also have the potential to have a safer road user environment due to an improved horizontal alignment on the northern end of the project.

- **Funding**
  > *Objective: Best alignment to funding guidelines.*
    - Primarily this refers to the reconstructed essential public asset to be eligible for cost assessment and payment. Both Federal and State funding guidelines require the asset to provide Value for Money.
  > *Summary*
    - All options align to the MBRC planning scheme policy. This conforms to the QRA funding guideline of restoring the asset to current engineering guidelines and therefore fully eligible for DRFA.

- **Infrastructure Damage in Major Event**
  > *Objective: Sustainability of the permanent solution*
    - The resilience of the new asset to withstand future major flood events.
  > *Summary*
    - The whole causeway will be designed with erosion protection to withstand a major flooding event.
    - The abutment protection works in an extreme event will also be less liable to damage because of the clearer waterway area.

- **Long-term Maintenance Requirement**
  - > *Objective: Minimise longer-term maintenance needs*
    - The future maintenance regime of the asset is evaluated, i.e., bridge superstructure, and culvert siltation.
  - > *Summary*
    - All options will have a lower maintenance requirement as they will be built to current engineering standards. The bridge option will likely require less maintenance than the culvert option due to sedimentation and scour issues.

### 3.1.2 Constructability

- **Wet Weather Risk**
  - > *Objective: Lowest risk in waterway*
    - Construction activities that increase the duration of the works in the waterway are scored lower, i.e. culvert base slab, scour protection, and side tracks.
  - > *Summary*
    - Both culvert options will have a high risk of wet weather damage and delay due to the construction of the base slab being under the standing water level in all tides. The online option will also be a higher risk due to the need to construct a full side track as well as fully reconstruct the existing embankment in the waterway.

- **Ensure all weather access for residents**
  - > *Objective:* Minimise risk to residents
    - Access across Wrights Creek must be maintained at all times
  - > *Summary*
    - With a fit-for-purpose side track specified and constructed for the online options, all options provide a high degree of certainty of access for residents except in an extreme event.

- **Limit Early Works**
  - > *Objective: Maximise efficiency of works*
    - Activities performed prior to the main construction works in particular, geotechnical ground investigation.
  - > *Summary*
    - As currently proposed no option will require early work prior to the Principal Contractor being established on site due to the approach proposed for the geotechnical investigation. It is proposed to use small spud leg barge and appropriately sized drive on a drilling rig which could be loaded at a nearby boat ramp.

- **Supply chain issues during construction**
  - > *Objective: Minimise delays during construction*
    - This evaluates the availability of precast concrete elements, specialist contractors and other materials.
  - > *Summary*
    - All options will have some supply chain issues in the current supply industry environment. They may be mitigated utilising an Early Contractor Involvement form of contract or Client Supplied Materials.

- **Worker Safety**
  - > *Objective: Amount of exposure to risk*
    - The exposure can be reduced by limiting the construction time within the waterway and heavy cranage operations.
  - > *Summary*
    - Both online options will be safer due to limited interaction with road traffic. The bridge option also should provide for safer cranage operations.

### 3.1.3 Environment & Cultural Heritage

- **Minimum Footprint of Construction & Storage Areas**
  - > *Objective: Minimise approvals required and minimise remedial works*
    - Significant temporary works requirements, such as large volumes of rock fill for a side track may require more area to stockpile materials. Both online and offline options are likely to have similar footprints.
  - > *Summary*
    - The offline options will require less project footprint due to a new side track to be constructed and removed. The new side track will probably be wider than the existing causeway and may need some temporary stockpiling on site when being constructed and removed.

- **Environmental and Cultural Heritage Approvals**
  - > *Objective: Time required for approvals and conditions from approvals*
    - Regulator requirements prefer bridge over culvert structures. A culvert structure could result in longer approval and review periods and more onerous conditions.
  - > *Summary*
    - Both bridge options are favoured by the regulators due to the clearer waterway for the movement of fish and other marine animals. The offline options are also favoured due to the lower likelihood of sediment discharge into the Moreton Bay Marine Park due to only having to construct one embankment.

- **Environmental and Cultural Heritage Impact**
  - > *Objective: Risk of environmental and cultural heritage damage during construction and long-term adverse effects to the ecosystem*
    - Influenced by the duration of the works within the waterway and whether the solution has benefits for the environment.
  - > *Summary*
    - The offline bridge option enables the least working time in the waterway resulting in a lower risk of discharge and could cause less scour and changes to the waterway over time.

### 3.1.4 Stakeholder and Community

- **Contractor Performance during Construction**
  - > *Objective: No delays or major issues*
    - Assesses the ability for the works to be delivered as per the final contract documentation.
  - > *Summary*
    - The preferred option gives the contractor the best opportunity to achieve this objective through competent and effective project delivery. It is recommended for these criteria to be incorporated into the construction works procurement process.

- **Stakeholder Expectations (preconstruction and construction)**
  - > *Objective: Meet Stakeholder expectations (State, MBRC, Utility authorities, other groups).*
    - Assesses the ability of the works to deliver a solution that meets the needs required by all relevant stakeholders.
  - > *Summary*
    - The bridge options are seen as an improved option by all stakeholders and the offline option is seen as a less complex and lower risk option by the regulators.

- **Community expectations**
  - > *Objective: Meet community expectations (road safety, connectivity, final solution)*
    - Defined by a solution that provides a positive community outcome. Understanding the community expectations of the selected option. Reduces impact on the community, i.e. construction traffic through the local road network, noise, and pedestrian connectivity.
  - > *Summary*
    - The community will expect to see a different solution to that which has been substantially damaged a number of times previously resulting in loss of all access for a number of days.
    - The offline options will also create the least increase in construction traffic due to having to build and fully remove the side track and fully rebuild the existing embankment in the online option.

### 3.1.5 Meeting Project Milestones

- **Funding Milestones –**
  - > *Objective: Meet Stage 1 & 2 QRA milestones.*
    - Considers the pathway for environmental approvals, contractor engagement, and temporary works.
  - > *Summary*
    - The preferred option has the greatest potential to meet the approvals schedule to allow the funding submission to be submitted to QRA by the March 2023 phase 1 milestone deadline. The offline bridge option has been assessed as having the least construction risk that could delay the project completion beyond the June 2024 QRA phase 2 project completion milestone.
- **Approval Milestones**
  - > *Objective: Achieve required statutory approvals in preconstruction phase.*
    - The ability for the solution to achieve all approvals prior to Contractor engagement.
  - > *Summary*
    - The bridge options are strongly favoured by the regulatory and approval authorities due to the clear waterway flow area and how these options enable the better environment and ecosystem outcomes. The offline bridge option enables the least amount of construction time in the waterway area resulting in less risk of sediment discharge in the Moreton Bay Marine Park.

## 3.2 Options Cost Comparison

A cost comparison of the developed options was conducted as part of the multi-criteria assessment and the results were presented at the options analysis workshop. The costings were based on conceptual design information and early feedback from most approval agencies. Due to the limited available level of design detail and data consistent with conceptual designs, RFA agreed to develop relative difference costings, which excluded permanent approach embankment works, pavements and surfacing, road furniture and cycle/pedestrian facilities on the approaches to the crossings. The costings were developed using historical unit rates and similar schedule items sourced from similar projects.

### 3.2.1 Cost Comparison Assumptions

The assumptions made in the relative costings were as follows:

- The bridge options were developed assuming a plank bridge, driven piles and a single 17m span.
- The culvert options were developed assuming 4 cell 2.4m x 1.2m RCBCs.
- Allowance made for complete removal of the side track in both online options.
- Allowance made for complete removal of the existing crossing in the damaged area and removal to a depth of lowest astronomical tide level for the remainder of the waterway in the offline options.
- Additional temporary culverts required for both the offline and online culvert options. This is due to the waterway opening at the proposed culvert locations likely being blocked during construction by a cofferdam.

- Guidance received from the pre-lodgement meeting with SARA indicated that all culvert options would require culverts to span across the majority of the waterway, resulting in a large quantity of culverts being necessary to satisfy requirements. This condition had a significant relative cost impact for the culvert options, which resulted in both options being unviable from a cost perspective.

### 3.2.2 Cost Comparison Work Items

The work items that were costed in order to develop the cost differential for the developed options were as follows:

- Permanent Works
  - > Causeway earthworks
  - > Bridge structures
  - > Culvert structures
  - > Scour protection
  - > Removal of existing causeway

- Temporary Works
  - > Construct side track and drainage
  - > Removal of side track and drainage
  - > Coffer dam (sheet piles)
  - > Utilities diversion into side track
  - > Additional temporary drainage

# 4 Options Analysis Outcomes

The Options Analysis Workshop was held on the 15th of July 2022 at RFA offices in Brisbane City.

Attendees included:

Table 4.1 - MCA Workshop Attendees

| Name | Role | Contact Information |
|---|---|---|
| **Joel Chapman** | Project Director | [redacted] |
| **Sarah Carroll** | Project Manager | [redacted] |
| **Andrew Schoenmaker** | Coordinator Program Management & Delivery | [redacted] |
| **Boyan Trifonov** | Planning - Principal Engineer | [redacted] |
| **Sam Carlile** | Program Manager | [redacted] |
| **Alex Wisniowiecka** | Cultural Heritage Planning Officer | [redacted] |
| **Michael Price** | Project Director | [redacted] |
| **Miles Vass** | Project Lead | [redacted] |
| **Michael Dixon** | Environmental | [redacted] |
| **Peter Kastrup** | Structural | [redacted] |

The purpose of the workshop was for attendees to collaboratively discuss the options developed by RFA and assess the options against the defined criteria, resulting in a quantitative score assigned for each element. The initial proposed weightings which would be applied to the element scores were also assessed and were updated as a result of discussions.

Refer to Appendix E for the outcomes of the Options Analysis workshop including updated MCA weightings, scores and commentary. The outcomes of the workshop were then used to determine the preferred option which would progress to Preliminary Design.

Refer Table 4.2 for a summary of the outcomes from the Options Analysis Workshop.

| | | | | Option 1 - Online Culvert | | Option 2 - Online Bridge | | Option 3 - Offline Culvert | | Option 4 - Offline Bridge | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Criteria** | **Element** | **Objective** | **Weighting** | **Criteria Score** | **Element Score** | **Criteria Score** | **Element Score** | **Criteria Score** | **Element Score** | **Criteria Score** | **Element Score** |
| Value for Money | Cost | Lowest cost of selected elements (structure, scour protection, coffer dams, side track, causeway rock fill). This is not the total cost. | 20% | 3.20 | 3 | 3.60 | 2 | 3.80 | 5 | 4.20 | 4 |
| | Improved asset | Improved road user safety and functionality | | | 3 | | 3 | | 4 | | 4 |
| | Funding | Best alignment to funding guidelines | | | 4 | | 4 | | 4 | | 4 |
| | Infrastructure Damage in Major Event | Sustainability of the permanent solution | | | 3 | | 5 | | 3 | | 5 |
| | Longterm Maintenance Requirement | Minimise longer term maintenance needs | | | 3 | | 4 | | 3 | | 4 |
| Constructability | Wet Weather Risk | Lowest risk in waterway | 25% | 2.40 | 1 | 3.40 | 2 | 2.40 | 2 | 3.60 | 4 |
| | Ensure all weather access for residents | Minimum risk | | | 3 | | 4 | | 3 | | 4 |
| | Limit Early Works | Maximise efficiency of works | | | 4 | | 4 | | 3 | | 3 |
| | Supply chain issues during construction | Minimise delays during construction | | | 2 | | 3 | | 2 | | 3 |
| | Worker Safety | Amount of exposure to risk | | | 2 | | 4 | | 2 | | 4 |
| Environment & Cultural Heritage | Minimum Footprint of Construction & Storage Areas | Minimise approvals required | 25% | 1.33 | 2 | 2.67 | 2 | 2.50 | 3 | 4.17 | 3 |
| | | Minimise remedial works | | | 1 | | 2 | | 3 | | 4 |
| | Environmental and Cultural Heritage Approvals | Time required for approvals | | | 1 | | 3 | | 2 | | 5 |
| | | Conditions from approvals | | | 1 | | 3 | | 2 | | 5 |
| | Environmental and Cultural Heritage Impact | Risk of environmental and cultural heritage damage during construction | | | 1 | | 2 | | 3 | | 4 |
| | | Longterm adverse effects to the eco system | | | 2 | | 4 | | 2 | | 4 |
| Stakeholder and Community | Contracted Performance during Construction | No delays or major issues | 15% | 1.33 | 1 | 3.00 | 3 | 1.67 | 1 | 4.33 | 5 |
| | Stakeholder Expectations (preconstruction and construction) | Meet Stakeholder expectations (State, MBRC, Utility authorities, other groups). | | | 2 | | 4 | | 2 | | 4 |
| | Community expectations | Meet community expectations (road safety, connectivity, final solution) | | | 1 | | 2 | | 2 | | 4 |
| Meeting Project Milestones | Funding Milestones | Meet Stage 1 & 2 QRA milestones. | 15% | 2.00 | 2 | 3.00 | 4 | 2.50 | 2 | 4.00 | 4 |
| | Approval Milestones | Achieve required statutory approvals in preconstruction phase | | | 2 | | 2 | | 3 | | 4 |
| | | | Option Rating | 2.07 | | 3.14 | | 2.61 | | 4.03 | |

Table 4.2 - MCA Workshop Outcomes Summary

# 5 Recommendation

The developed options assessed each have their advantages and disadvantages. The primary disadvantage of the online options was the requirement to construct two embankments, for the side track and reconstructing the existing embankment. This condition was determined following a technical assessment whereby RFA agreed the existing embankment could not be incorporated into the proposed online embankment due to the limited detailed As-Constructed information. Both culvert options have the issue of having to construct a waterproof cofferdam together with the associated high level of risk. The culvert options also require an additional set of temporary culverts to be installed to allow the tidal flow and movement of marine animals during construction. They culverts are also less favoured by regulatory authorities for ease of maintaining an effective fish passage. A key regulatory authority also advised RFA during a subsequent pre-lodgement meeting that if a culvert option were to be proposed, it would need to be three to four times longer than that proposed in the options analysis, therefore removing any cost advantage over a bridge. The offline bridge option is the safest and lowest risk during construction, most favoured by stakeholders and community and is also the most effective long-term option.

Based on the outputs of the constructability workshop, the Options Analysis workshop including the MCA comparative scoring and the feedback to date from the regulatory and approval authorities, the recommended option to proceed through to the preliminary design phase is the Offline Bridge option with a single span structure.

# Appendix A – MBRC Specification for Services

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# Appendix B – Basis of Design Report

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# Appendix C – Design Options Drawings

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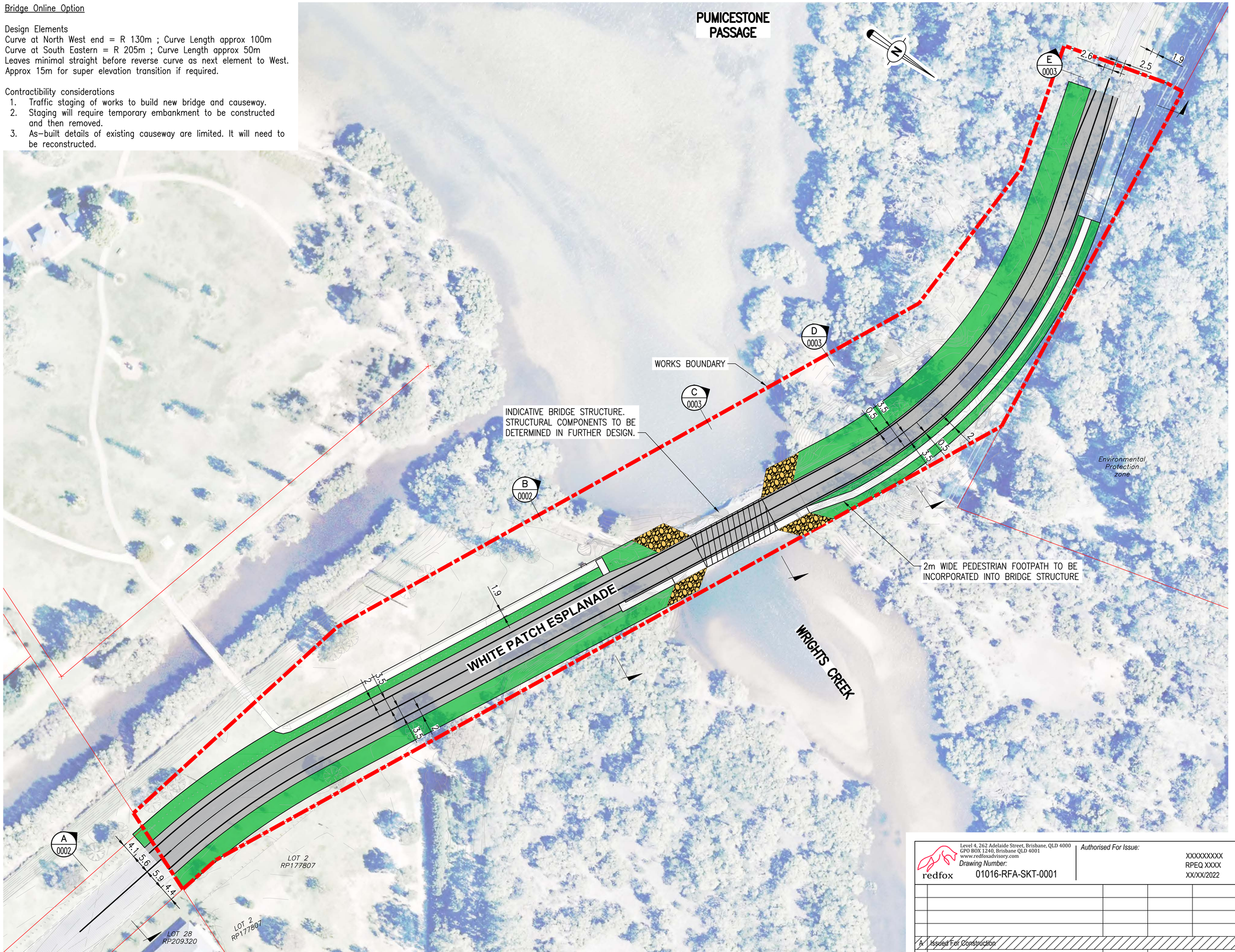
Bridge Online Option

Design Elements
Curve at North West end = R 130m ; Curve Length approx 100m
Curve at South Eastern = R 205m ; Curve Length approx 50m
Leaves minimal straight before reverse curve as next element to West.
Approx 15m for super elevation transition if required.

Contractibility considerations
1. Traffic staging of works to build new bridge and causeway.
2. Staging will require temporary embankment to be constructed and then removed.
3. As–built details of existing causeway are limited. It will need to be reconstructed.




Moreton Bay Regional Council

**ENGINEERING, CONSTRUCTION & MAINTENANCE**

**AUTHORISATION**

*Delivery Manager* *Date*

*Project Owner / Manager* *Date*

*Program Responsible Officer* *Date*

**PROJECT INFORMATION**

*Project Number* MBRC BUDGET NUMBER

*Coordinator* *Team Leader*

*Designer* *Checked*

N.M (GMC) *Surveyor* | 15/03/2022 *Survey Date / Ref. No.*

*Survey Datum*

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**ISSUE**

*Revisions*

*Original Issue* *Date:* ??/??/??

**PROJECT DESCRIPTION**

WHITE PATCH, WHITE PATCH ESPLANADE

CAUSEWAY UPGRADE

Option 1A
Online Bridge Structure
Plan Layout

**DRAWING NUMBER**

0001

*Drawing Number* *Rev.*

*Drawing* 01 *of* 12 | *Original Plan Size* **A1**


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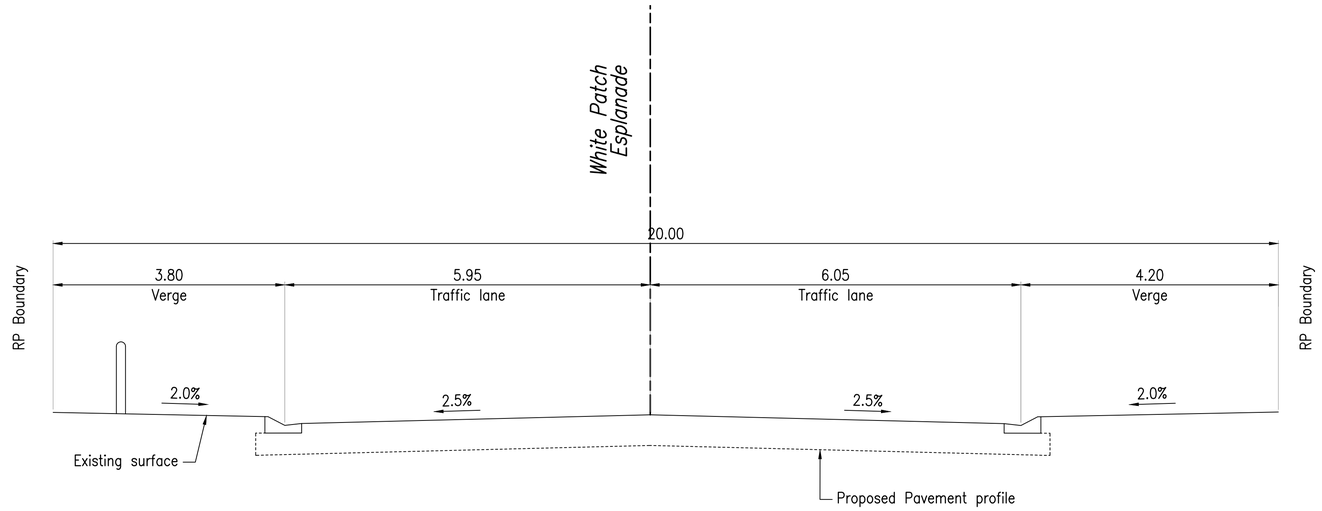
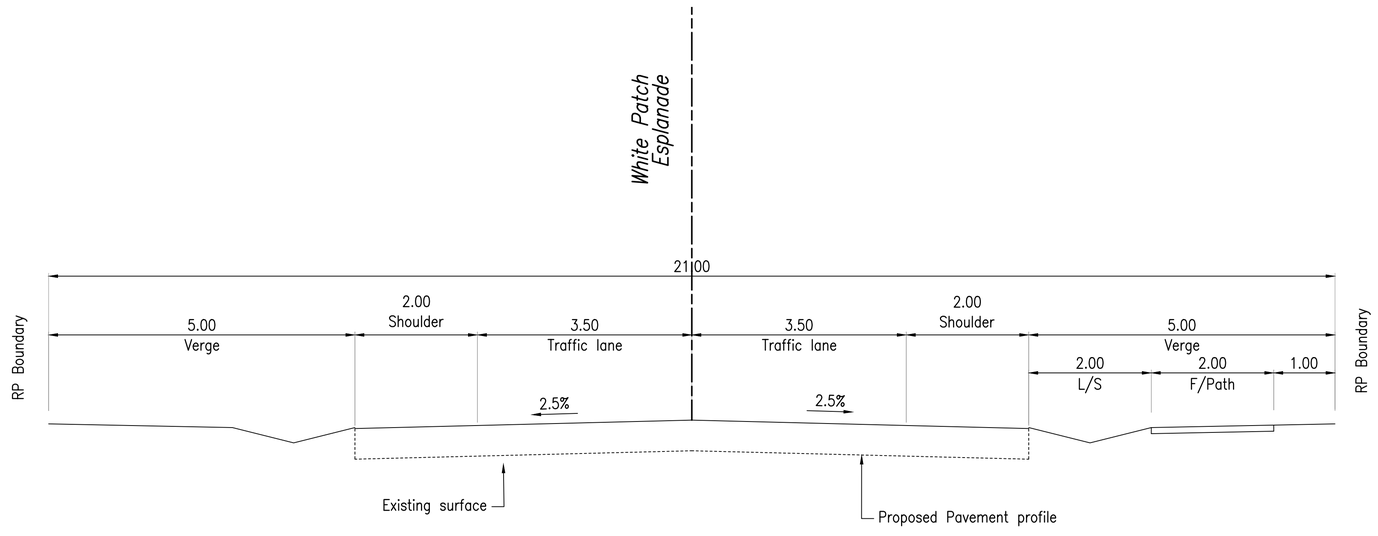



SECTION A
EXISTING WHITE PATCH ESPLANADE (SOUTH-EAST)
Scale 1:100




SECTION B
WHITE PATCH ESPLANADE (EAST)
Scale 1:100

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*Designer* *Checked*

N.M (GMC) *Surveyor* | 15/03/2022 *Survey Date / Ref. No.*

*Survey Datum*

MGA (GDA94) ZONE 56 *Horizontal* | AHD Derived *Vertical*

A1 / A3 1:100 / 1:200 0 1 2 3 4m *Scales*

**ISSUE**

*Revisions*

*Original Issue* *Date:* ??/??/??

**PROJECT DESCRIPTION**

# WHITE PATCH, WHITE PATCH ESPLANADE

CAUSEWAY UPGRADE

Option 1A
Online Bridge Structure
Section Layout

**DRAWING NUMBER**

**0002**

*Drawing Number* *Rev.*

*Drawing* 02 *of* 12 | *Original Plan Size* **A1**

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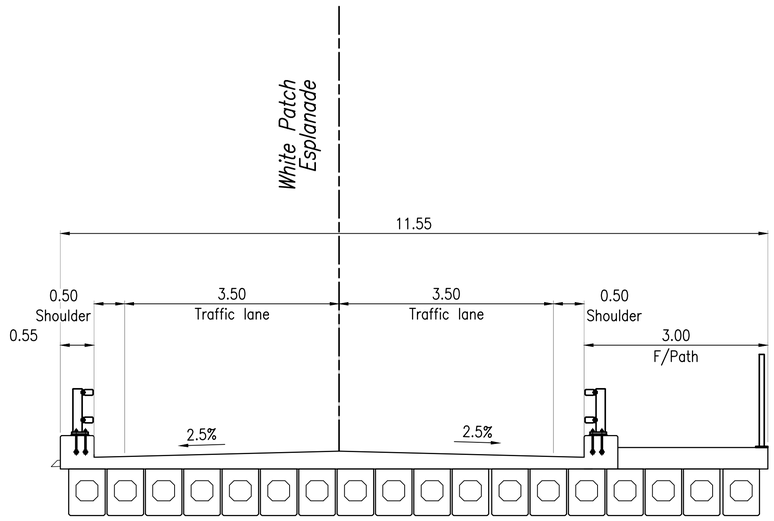


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TYPICAL BRIDGE SECTION
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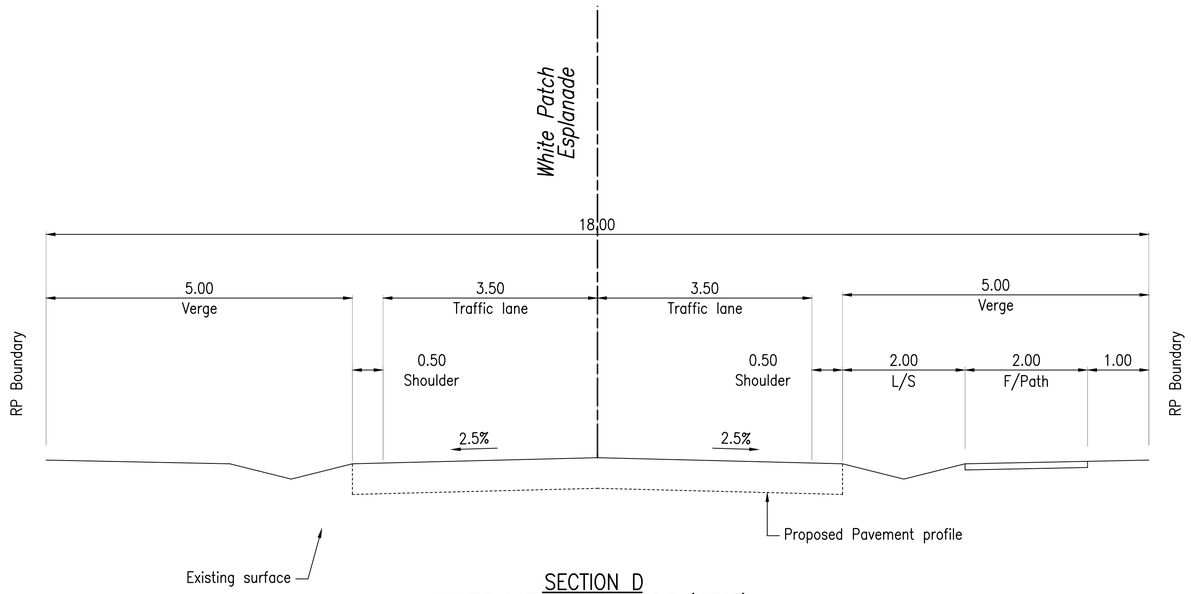
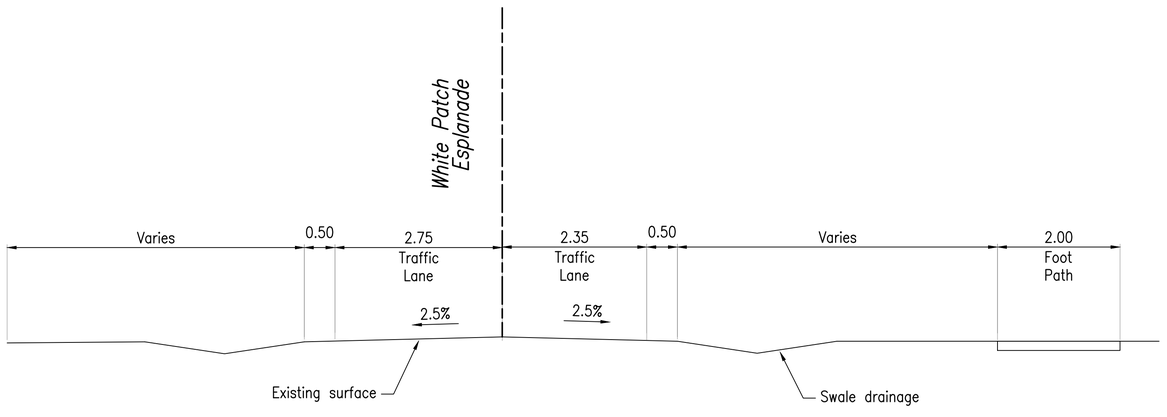



SECTION D
WHITE PATCH ESPLANADE (WEST)
Scale 1:100




SECTION E
EXISTING WHITE PATCH ESPLANADE (NORTH WEST)
Scale 1:100

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| A | Issued For Construction | | | |

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*Coordinator* *Team Leader*

*Designer* *Checked*

N.M (GMC) *Surveyor* | 15/03/2022 *Survey Date / Ref. No.*

*Survey Datum*

MGA (GDA94) ZONE 56 *Horizontal* | AHD Derived *Vertical*

A1 / A3 1:100 / 1:200 0 1 2 3 4m

*Scales*

**ISSUE**

*Revisions*

*Original Issue* *Date:* ??/??/??

**PROJECT DESCRIPTION**

# WHITE PATCH, WHITE PATCH ESPLANADE

CAUSEWAY UPGRADE

Option 1A
Online Bridge Structure
Section Layout

**DRAWING NUMBER**

**0003**

*Drawing Number* *Rev.*

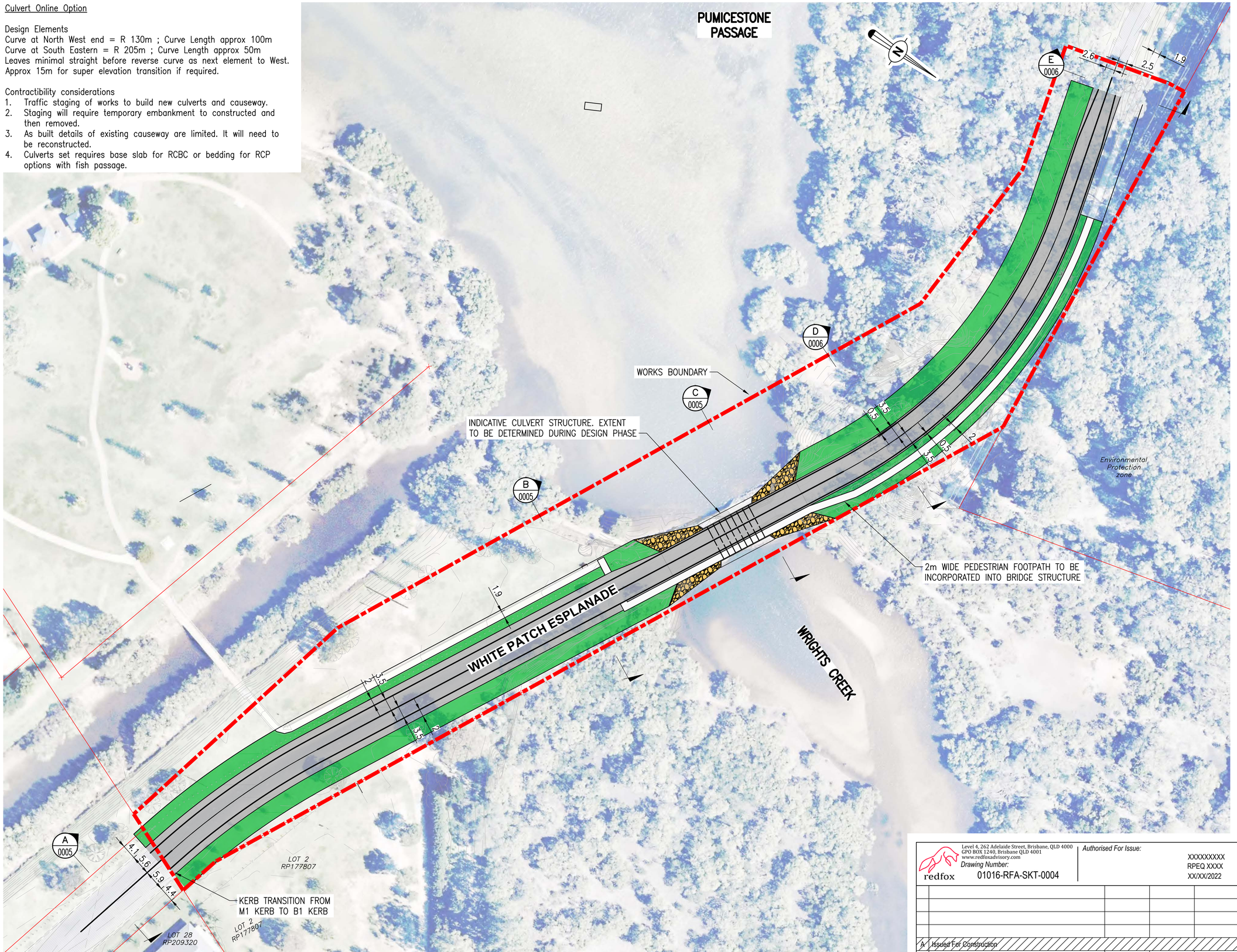
*Drawing* 03 *of* 12 | *Original Plan Size* **A1**

File name: C:\users\vikrantpratap\appdata\local\bentley\projectwise\pwservername_datasourcename\dms199095\01016-RFA-BR-DWG-0003.dwg
Date: Jun 16, 2022 - 3:53pm

Culvert Online Option

Design Elements
Curve at North West end = R 130m ; Curve Length approx 100m
Curve at South Eastern = R 205m ; Curve Length approx 50m
Leaves minimal straight before reverse curve as next element to West.
Approx 15m for super elevation transition if required.

Contractibility considerations
1. Traffic staging of works to build new culverts and causeway.
2. Staging will require temporary embankment to constructed and then removed.
3. As built details of existing causeway are limited. It will need to be reconstructed.
4. Culverts set requires base slab for RCBC or bedding for RCP options with fish passage.





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*Drawing Number:* 01016-RFA-SKT-0004

*Authorised For Issue:*
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RPEQ XXXX
XX/XX/2022

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*Coordinator* *Team Leader*

*Designer* *Checked*

N.M (GMC) *Surveyor* | 15/03/2022 *Survey Date / Ref. No.*

*Survey Datum*

MGA (GDA94) ZONE 56 *Horizontal* | AHD Derived *Vertical*

*Scales* A1 / A3 1:500 / 1:1000 0 5 10 15 20m

**ISSUE**

*Revisions*

*Original Issue* *Date:* ??/??/??

**PROJECT DESCRIPTION**

# WHITE PATCH, WHITE PATCH ESPLANADE

CAUSEWAY UPGRADE

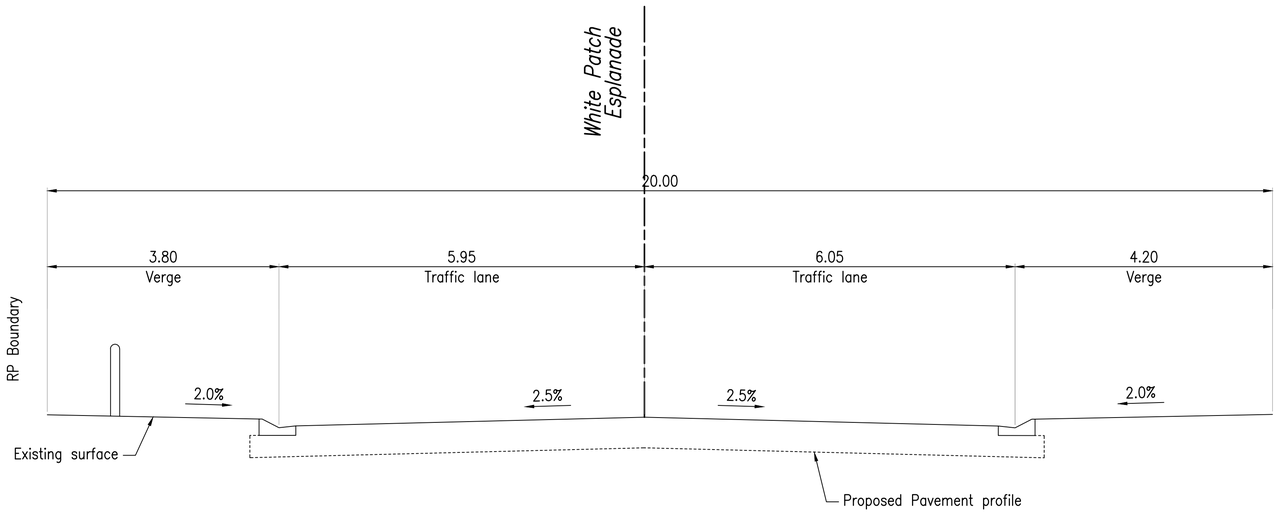
Option 1B
Online Culvert Structure
Plan Layout

**DRAWING NUMBER**

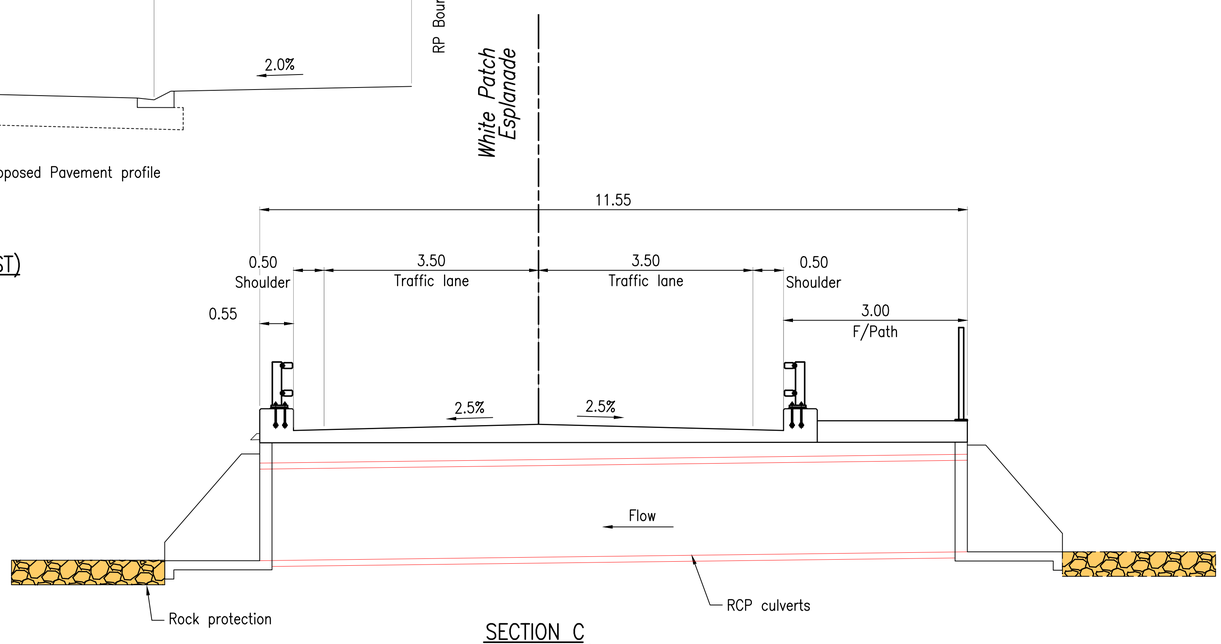
**0004**

*Drawing Number* *Rev.*

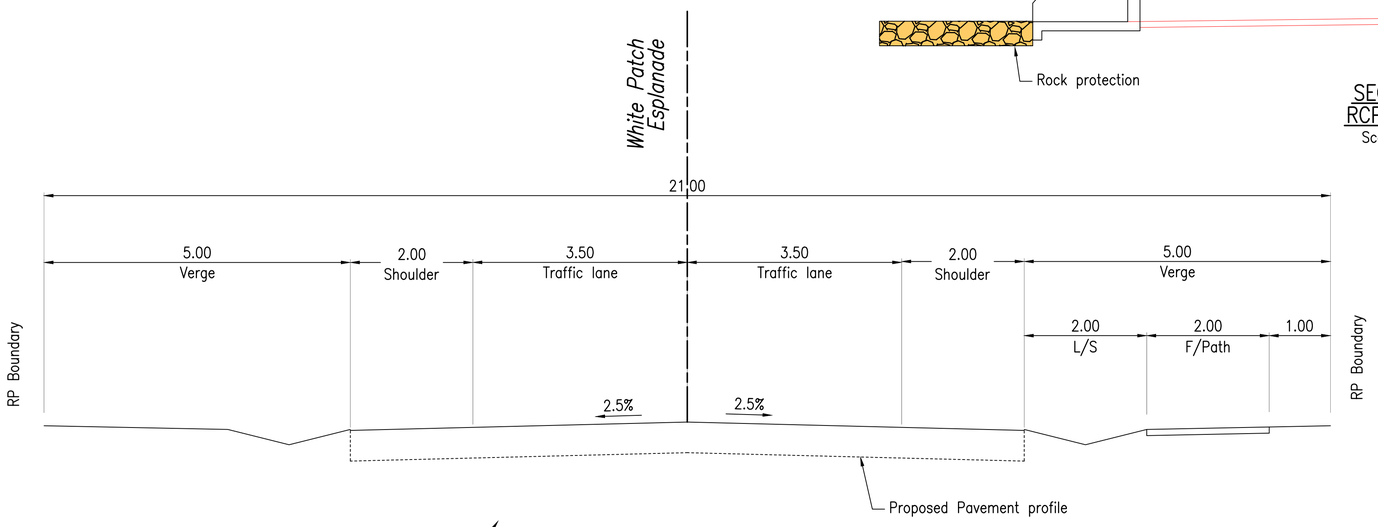
*Drawing* 04 *of* 12 | *Original Plan Size* **A1**




SECTION A
EXISTING WHITE PATCH ESPLANADE (SOUTH–EAST)
Scale 1:100




SECTION C
RCP OPTION
Scale 1:100




SECTION B
WHITE PATCH ESPLANADE (EAST)
Scale 1:100

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|---|---|
| *Designer* | *Checked* |
| N.M (GMC) | 15/03/2022 |
| *Surveyor* | *Survey Date / Ref. No.* |

*Survey Datum*

| MGA (GDA94) ZONE 56 | AHD Derived |
|---|---|
| *Horizontal* | *Vertical* |

A1 / A3 1:100 / 1:200 0 1 2 3 4m

*Scales*

**ISSUE**

*Revisions*

*Original Issue* *Date:* ??/??/??

**PROJECT DESCRIPTION**

# WHITE PATCH, WHITE PATCH ESPLANADE

CAUSEWAY UPGRADE

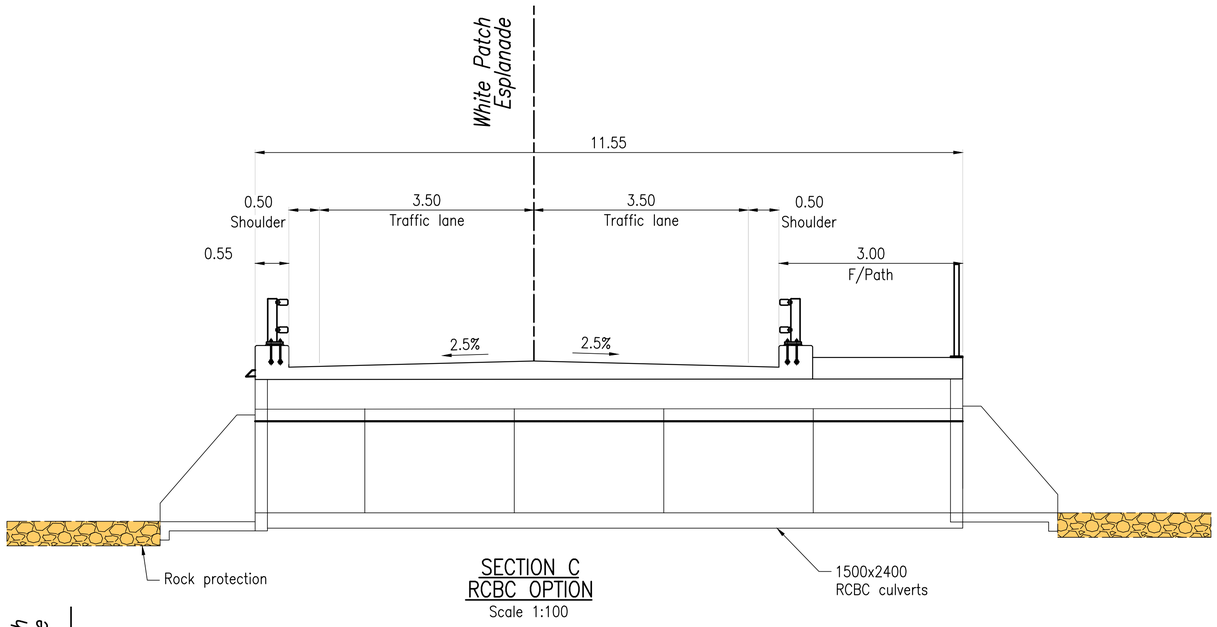
Option 1B
Online Culvert Structure
Section Layout

**DRAWING NUMBER**

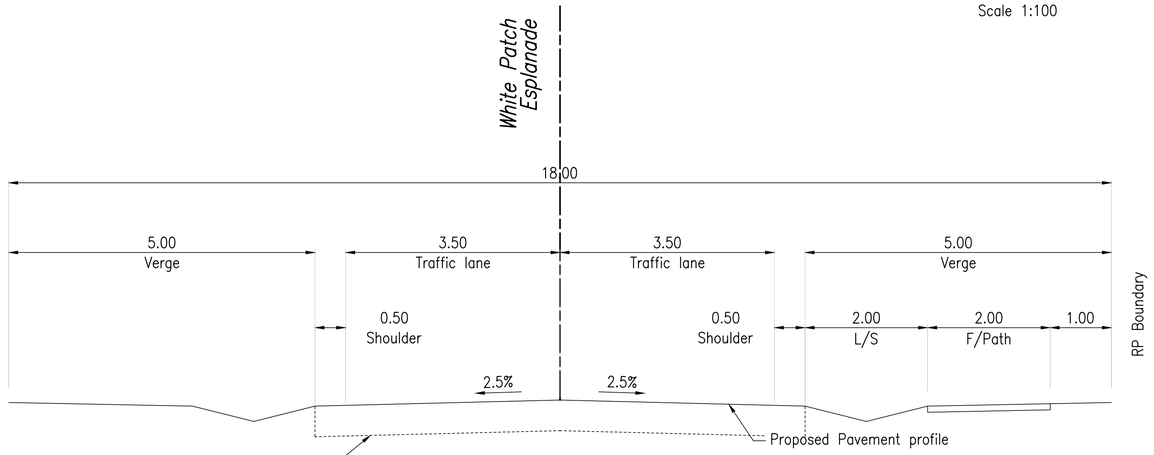
**0005**

*Drawing Number* *Rev.*

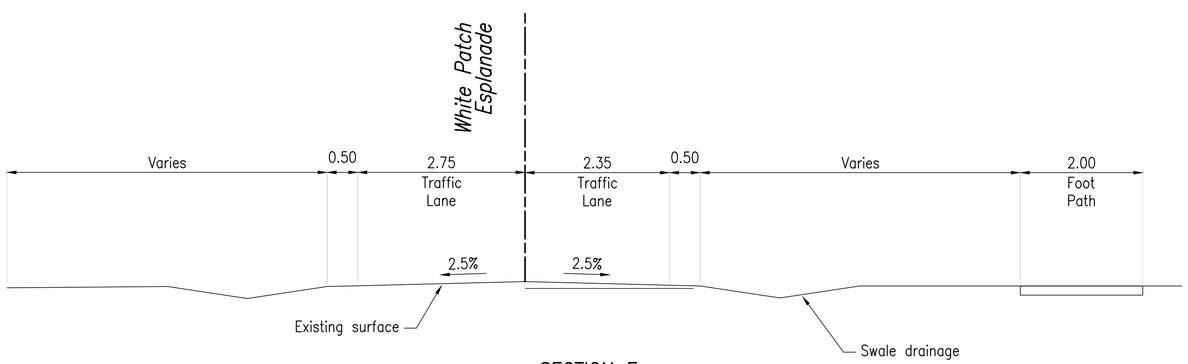
*Drawing* 05 *of* 12 | *Original Plan Size* **A1**




SECTION C
RCBC OPTION
Scale 1:100




SECTION D
WHITE PATCH ESPLANADE (WEST)
Scale 1:100




SECTION E
EXISTING WHITE PATCH ESPLANADE (NORTH-WEST)
Scale 1:100

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*Drawing Number:* 01016-RFA-SKT-0006

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*Project Number* MBRC BUDGET NUMBER

*Coordinator* / *Team Leader*

*Designer* / *Checked*

N.M (GMC) / 15/03/2022
*Surveyor* / *Survey Date / Ref. No.*

*Survey Datum*

MGA (GDA94) ZONE 56 / AHD Derived
*Horizontal* / *Vertical*

A1 / A3 1:100 / 1:200 0 1 2 3 4m
*Scales*

**ISSUE**

*Revisions*

*Original Issue* *Date:* ??/??/??

**PROJECT DESCRIPTION**

# WHITE PATCH, WHITE PATCH ESPLANADE

CAUSEWAY UPGRADE

Option 1B
Online Culvert Structure
Section Layout

**DRAWING NUMBER**

**0006**

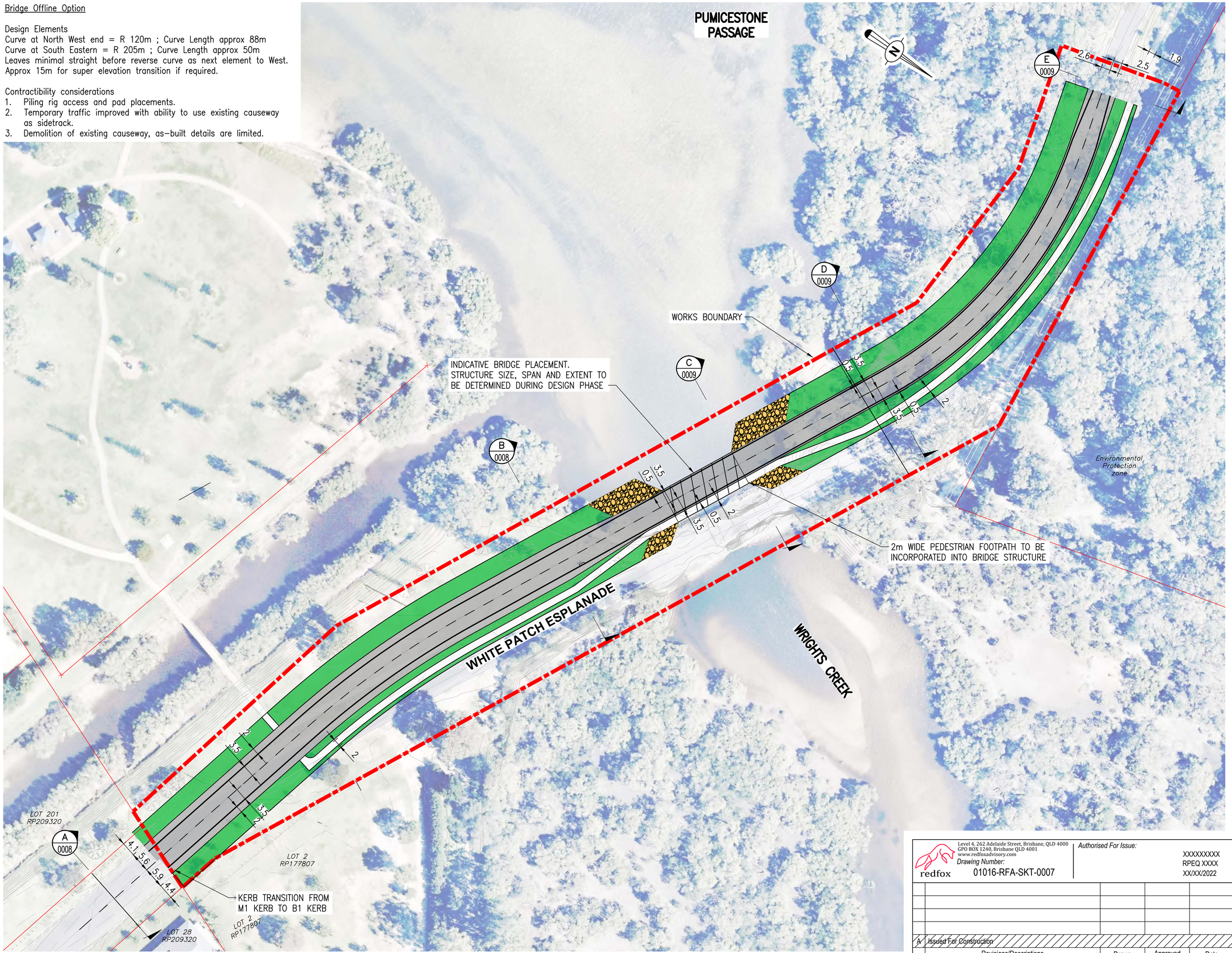
*Drawing Number* *Rev.*

*Drawing* 06 *of* 12 | *Original Plan Size* **A1**

Bridge Offline Option

Design Elements
Curve at North West end = R 120m ; Curve Length approx 88m
Curve at South Eastern = R 205m ; Curve Length approx 50m
Leaves minimal straight before reverse curve as next element to West.
Approx 15m for super elevation transition if required.

Contractibility considerations
1. Piling rig access and pad placements.
2. Temporary traffic improved with ability to use existing causeway as sidetrack.
3. Demolition of existing causeway, as–built details are limited.





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*Coordinator* / *Team Leader*

*Designer* / *Checked*

N.M (GMC) / 15/03/2022
*Surveyor* / *Survey Date / Ref. No.*

*Survey Datum*

MGA (GDA94) ZONE 56 / AHD Derived
*Horizontal* / *Vertical*

A1 / A3 1:500 / 1:1000 0 5 10 15 20m
*Scales*

**ISSUE**

*Revisions*

*Original Issue* *Date:* ??/??/??

**PROJECT DESCRIPTION**

# WHITE PATCH, WHITE PATCH ESPLANADE

CAUSEWAY UPGRADE

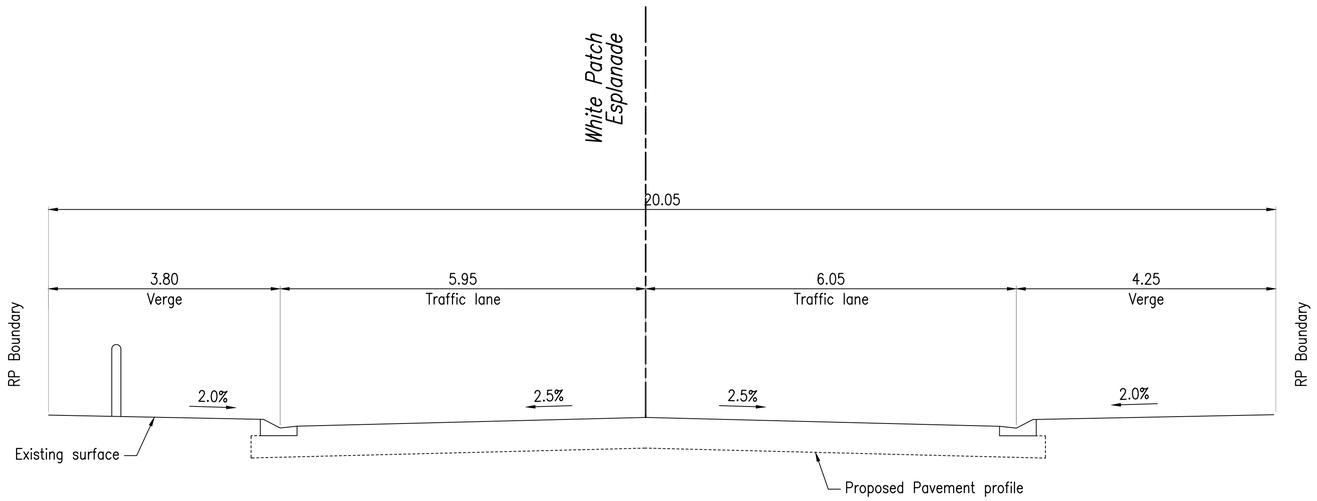
Option 2A
Offline Bridge Structrue
Plan Layout

**DRAWING NUMBER**

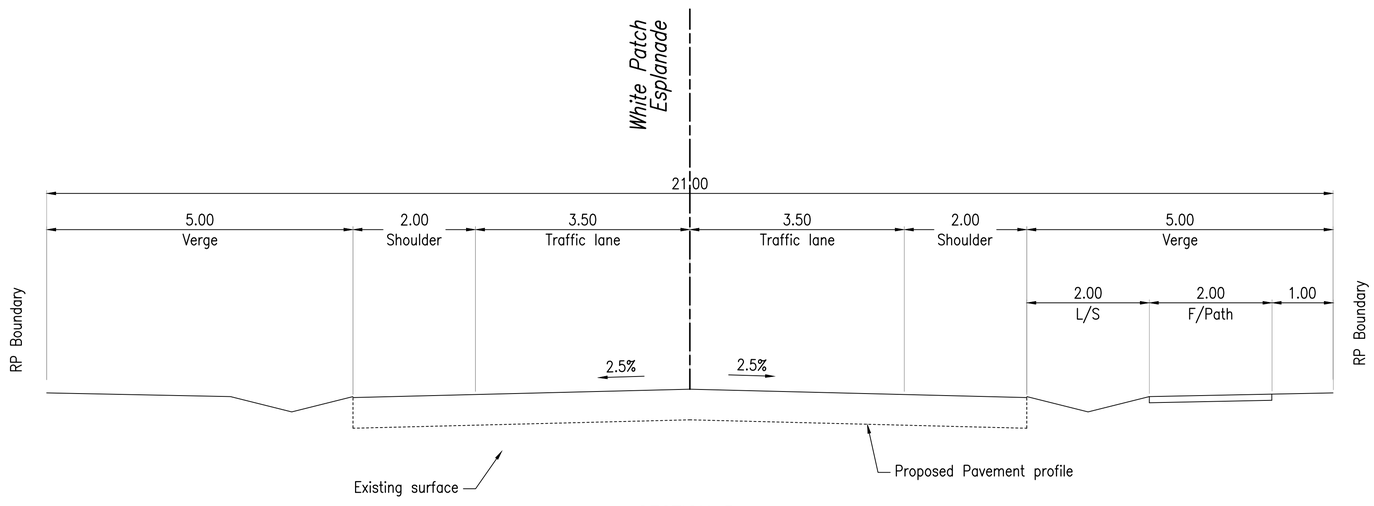
**0007**

*Drawing Number* *Rev.*

*Drawing* 07 *of* 12 | *Original Plan Size* **A1**




SECTION A
EXISTING WHITE PATCH ESPLANADE (SOUTH–EAST)
Scale 1:100




SECTION B
WHITE PATCH ESPLANADE (EAST)
Scale 1:100

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RPEQ XXXX
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*Coordinator* | *Team Leader*

*Designer* | *Checked*

N.M (GMC) | 15/03/2022
*Surveyor* | *Survey Date / Ref. No.*

*Survey Datum*

MGA (GDA94) ZONE 56 | AHD Derived
*Horizontal* | *Vertical*

A1 / A3 1:100 / 1:200 0 1 2 3 4m
*Scales*

**ISSUE**

*Revisions*

*Original Issue* *Date:* ??/??/??

**PROJECT DESCRIPTION**

# WHITE PATCH, WHITE PATCH ESPLANADE

CAUSEWAY UPGRADE

Option 2A
Offline Bridge Structrue
Section Layout

**DRAWING NUMBER**

**0008**

*Drawing Number* *Rev.*

*Drawing* 08 *of* 12 | *Original Plan Size* **A1**

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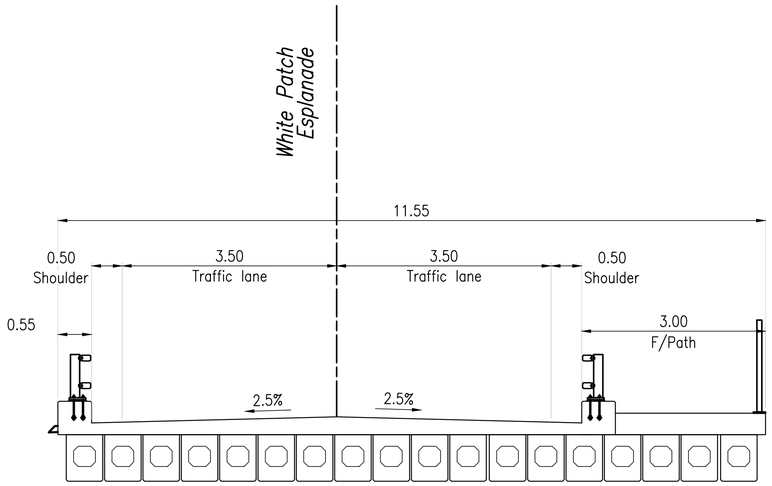
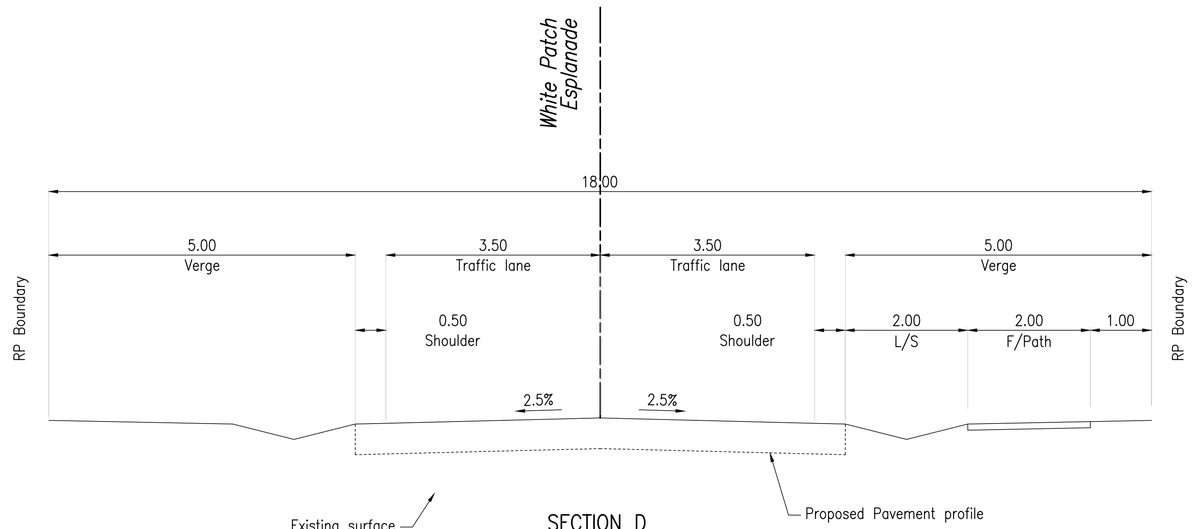
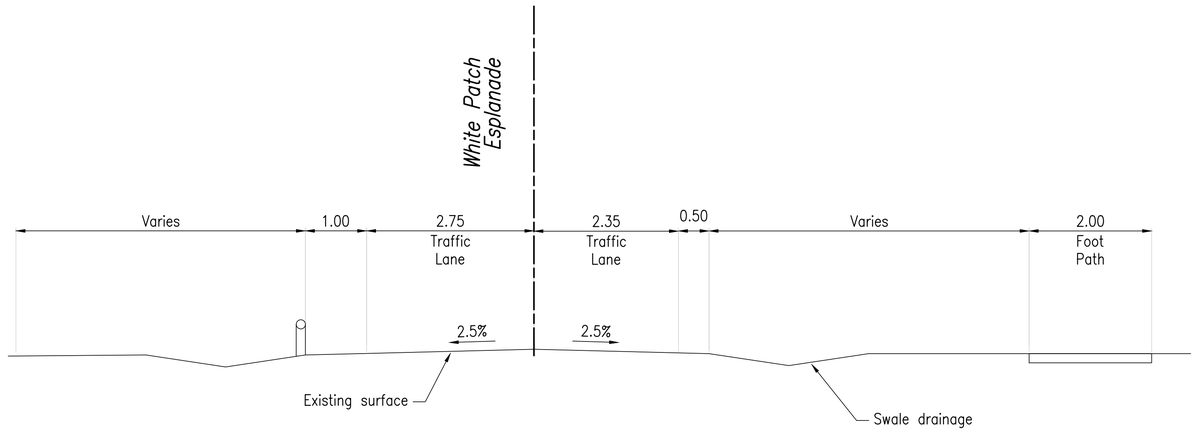
Date: Jun 16, 2022 – 4:04pm




SECTION C
TYPICAL BRIDGE SECTION
Scale 1:100




SECTION D
WHITE PATCH ESPLANADE (WEST)
Scale 1:100




SECTION E
EXISTING WHITE PATCH ESPLANADE (NORTH-WEST)
Scale 1:100

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*Coordinator* *Team Leader*

*Designer* *Checked*

N.M (GMC) *Surveyor* | 15/03/2022 *Survey Date / Ref. No.*

*Survey Datum*

MGA (GDA94) ZONE 56 *Horizontal* | AHD Derived *Vertical*

A1 / A3 1:100 / 1:200 0 1 2 3 4m
*Scales*

**ISSUE**

*Revisions*

*Original Issue* *Date:* ??/??/??

**PROJECT DESCRIPTION**

# WHITE PATCH, WHITE PATCH ESPLANADE

CAUSEWAY UPGRADE

Option 2A
Offline Bridge Structrue
Section Layout

**DRAWING NUMBER**

**0009**

*Drawing Number* *Rev.*

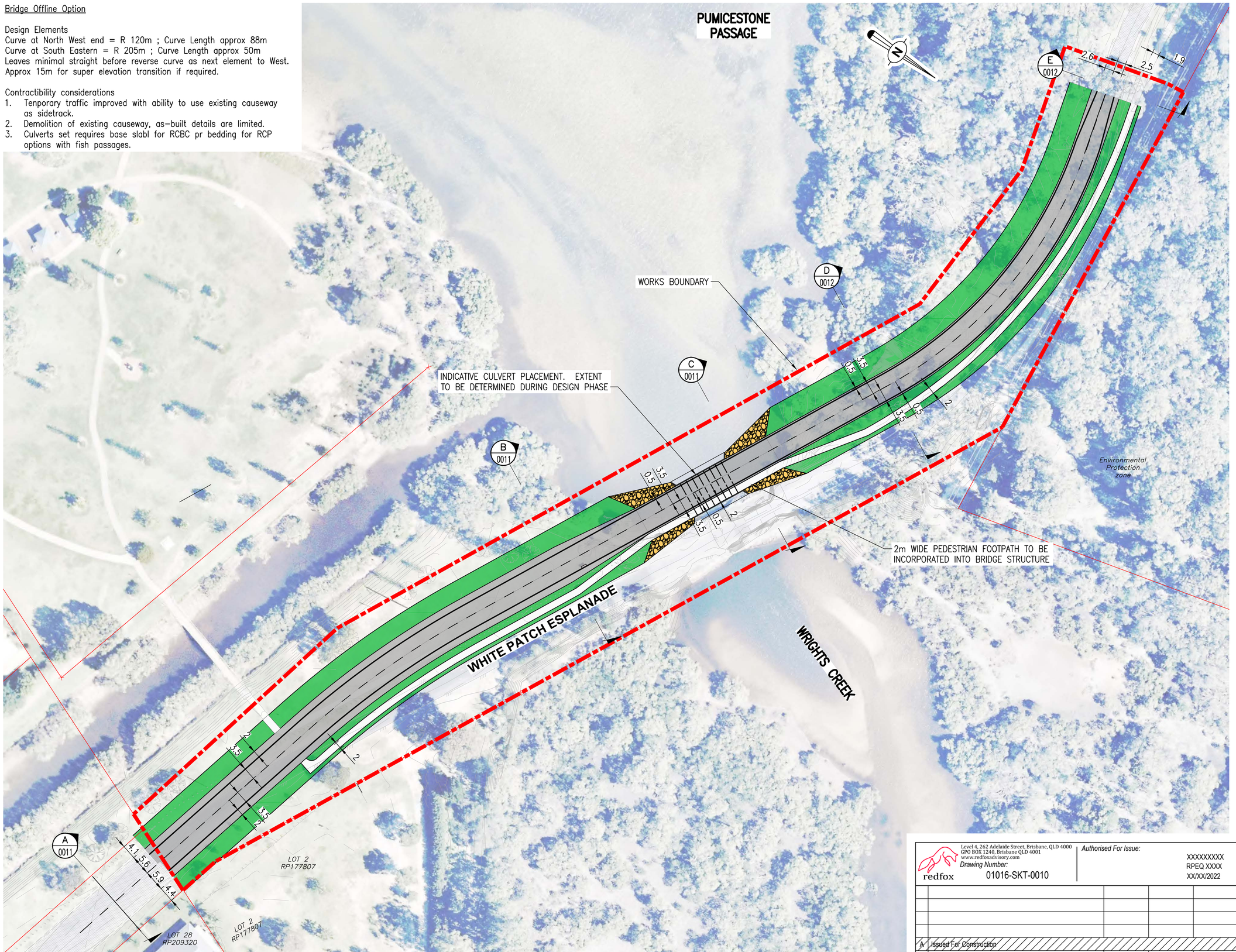
*Drawing* 09 *of* 12 | *Original Plan Size* **A1**

File name: C:\Users\vikrantpratap\appdata\local\bentley\projectwise\pwservername_datasourcename\dms199095\01016-RFA-SKT-0009.dwg
Date: Jun 16, 2022 - 4:04pm

Bridge Offline Option

Design Elements
Curve at North West end = R 120m ; Curve Length approx 88m
Curve at South Eastern = R 205m ; Curve Length approx 50m
Leaves minimal straight before reverse curve as next element to West.
Approx 15m for super elevation transition if required.

Contractibility considerations
1. Tenporary traffic improved with ability to use existing causeway as sidetrack.
2. Demolition of existing causeway, as–built details are limited.
3. Culverts set requires base slabl for RCBC pr bedding for RCP options with fish passages.

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|---|---|
| *Designer* | *Checked* |
| N.M (GMC) *Surveyor* | 15/03/2022 *Survey Date / Ref. No.* |

*Survey Datum*

| MGA (GDA94) ZONE 56 *Horizontal* | AHD Derived *Vertical* |
|---|---|

A1 / A3 1:500 / 1:1000 0 5 10 15 20m

*Scales*

**ISSUE**

*Revisions*

*Original Issue* *Date:* ??/??/??

**PROJECT DESCRIPTION**

# WHITE PATCH, WHITE PATCH ESPLANADE

CAUSEWAY UPGRADE

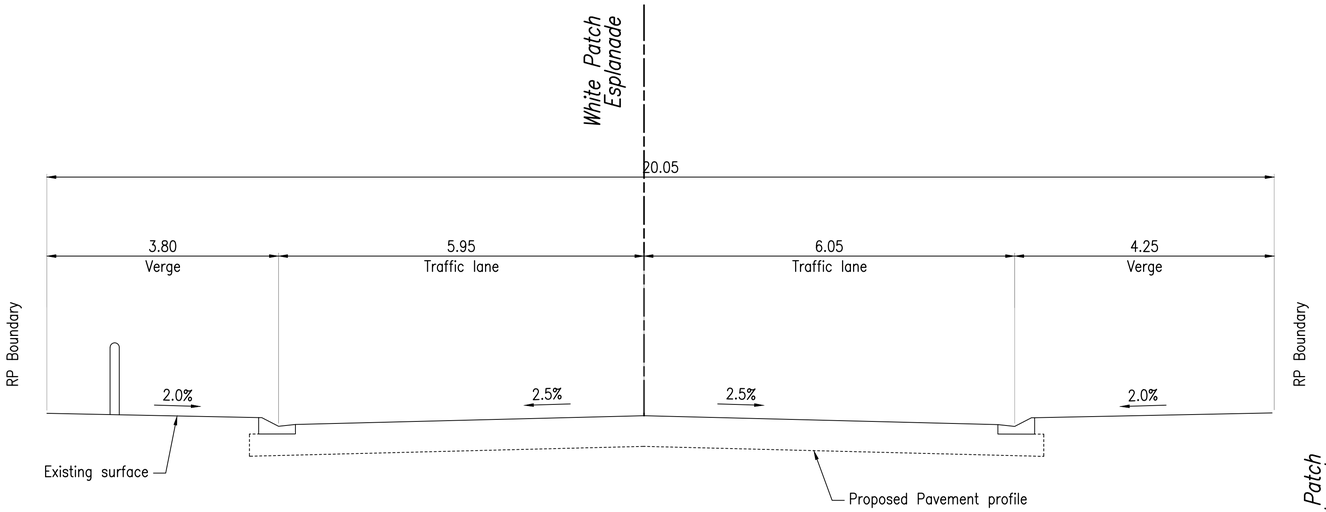
Option 2B
Offline Culvert Structure
Plan Layout

**DRAWING NUMBER**

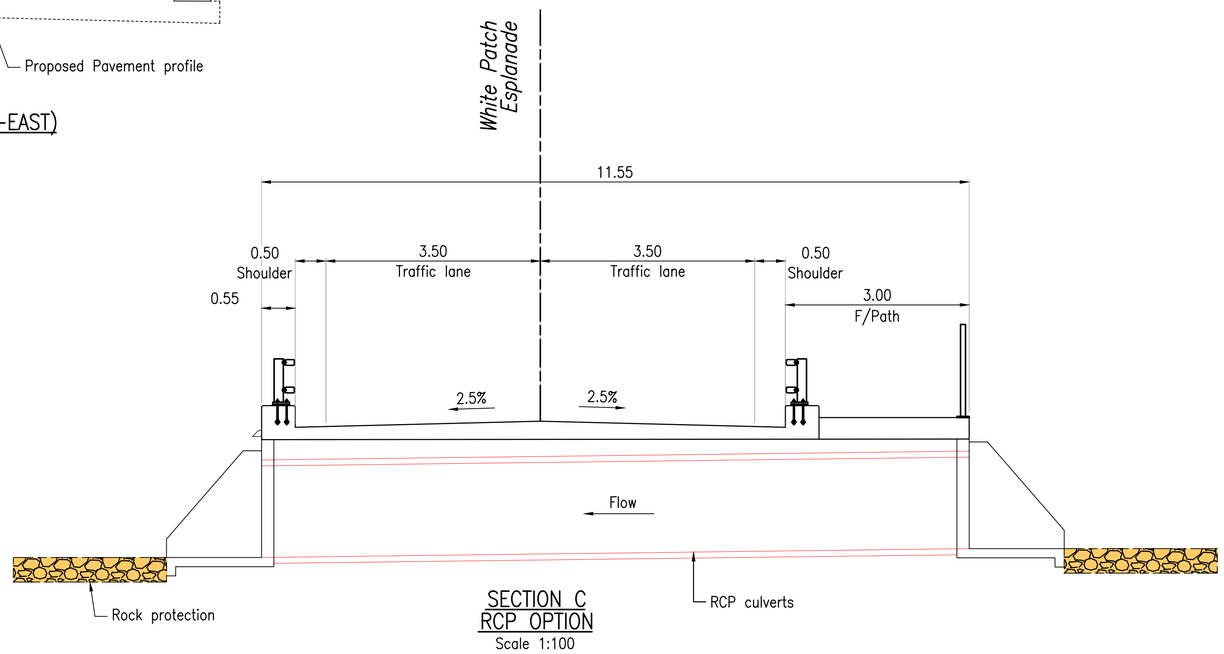
**0010**

*Drawing Number* *Rev.*

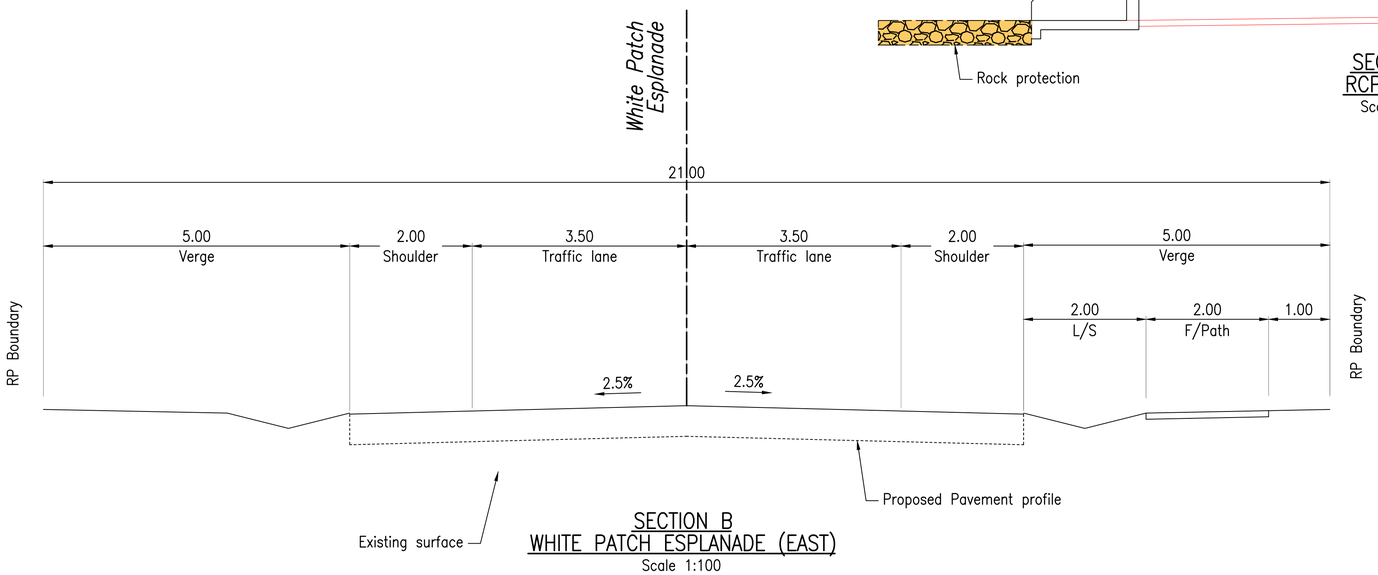
*Drawing* 10 *of* 12 | *Original Plan Size* **A1**




SECTION A
EXISTING WHITE PATCH ESPLANADE (SOUTH-EAST)
Scale 1:100




SECTION C
RCP OPTION
Scale 1:100




SECTION B
WHITE PATCH ESPLANADE (EAST)
Scale 1:100

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N.M (GMC) | 15/03/2022
*Surveyor* | *Survey Date / Ref. No.*

*Survey Datum*
MGA (GDA94) ZONE 56 | AHD Derived
*Horizontal* | *Vertical*

*Scales* A1 / A3 1:100 / 1:200 0 1 2 3 4m

**ISSUE**

*Revisions*

*Original Issue* *Date:* ??/??/??

**PROJECT DESCRIPTION**

# WHITE PATCH, WHITE PATCH ESPLANADE

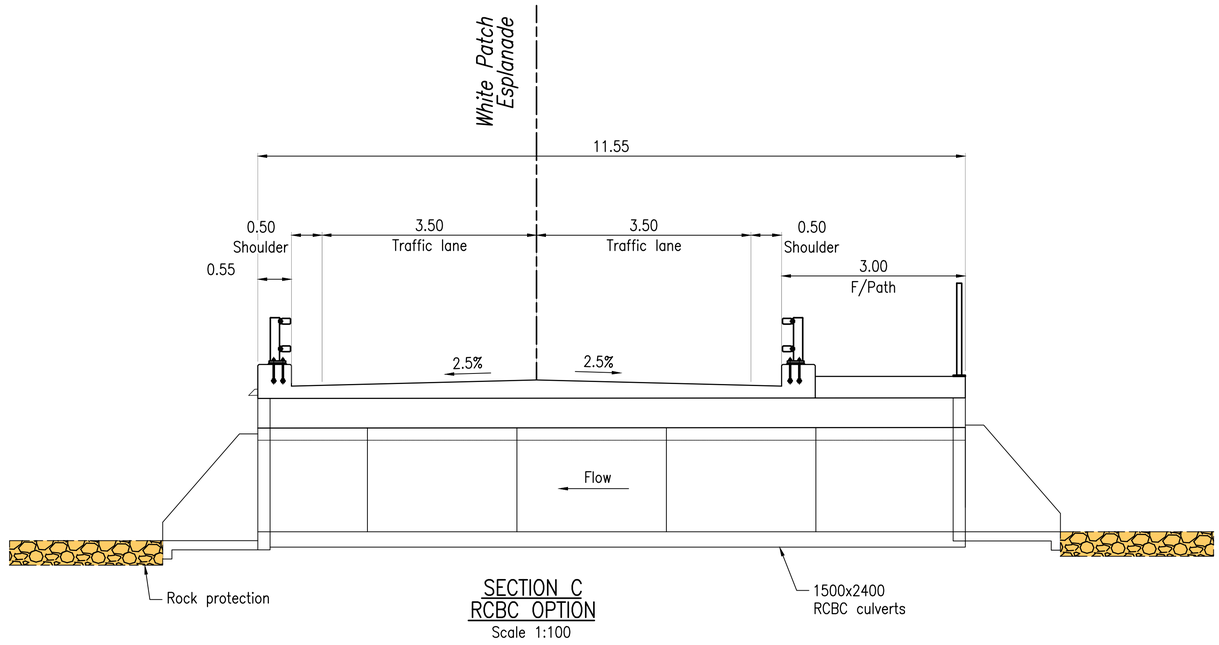
CAUSEWAY UPGRADE

Option 2B
Offline Culvert Structure
Section Layout

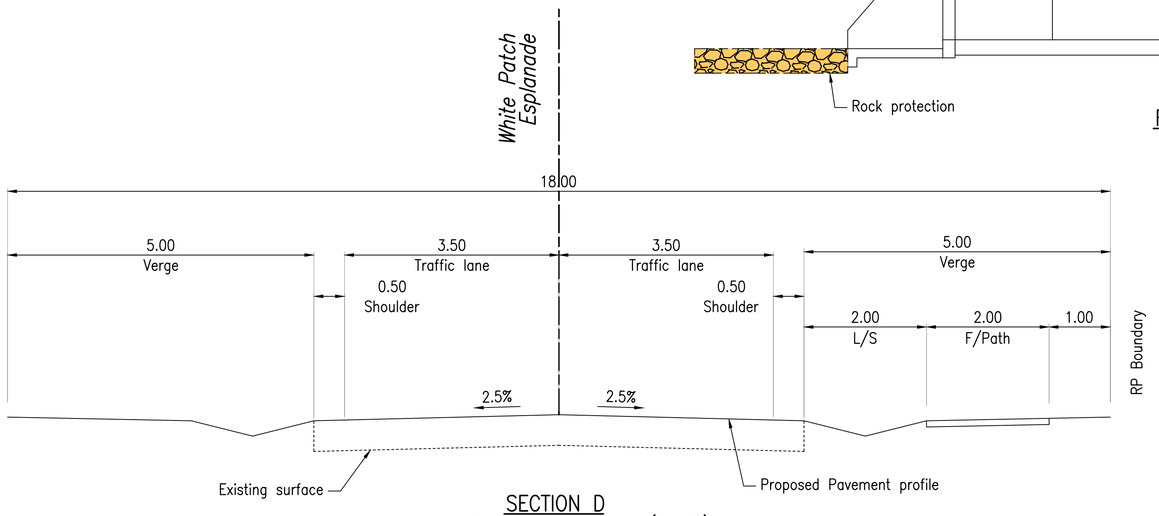
**DRAWING NUMBER**

**0011**
*Drawing Number* *Rev.*

*Drawing* 11 *of* 12 | *Original Plan Size* **A1**




SECTION C
RCBC OPTION
Scale 1:100




SECTION D
WHITE PATCH ESPLANADE (WEST)
Scale 1:100


SECTION E
EXISTING WHITE PATCH ESPLANADE (NORTH WEST)
Scale 1:100

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*Drawing Number:* 01016-SKT-0012

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*Designer* | *Checked*

N.M (GMC) | 15/03/2022
*Surveyor* | *Survey Date / Ref. No.*

*Survey Datum*

MGA (GDA94) ZONE 56 | AHD Derived
*Horizontal* | *Vertical*

A1 / A3 1:100 / 1:200 0 1 2 3 4m
*Scales*

**ISSUE**

*Revisions*

*Original Issue* *Date:* ??/??/??

**PROJECT DESCRIPTION**

# WHITE PATCH, WHITE PATCH ESPLANADE

CAUSEWAY UPGRADE

Option 2B
Offline Culvert Structure
Section Layout

**DRAWING NUMBER**

**0012**
*Drawing Number* *Rev.*

*Drawing* 12 *of* 12 | *Original Plan Size* **A1**

# Appendix D – Outputs of Constructability Workshop

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# Whitepatch Causeway Reconstruction

Constructability and Design Update

07/07/2022

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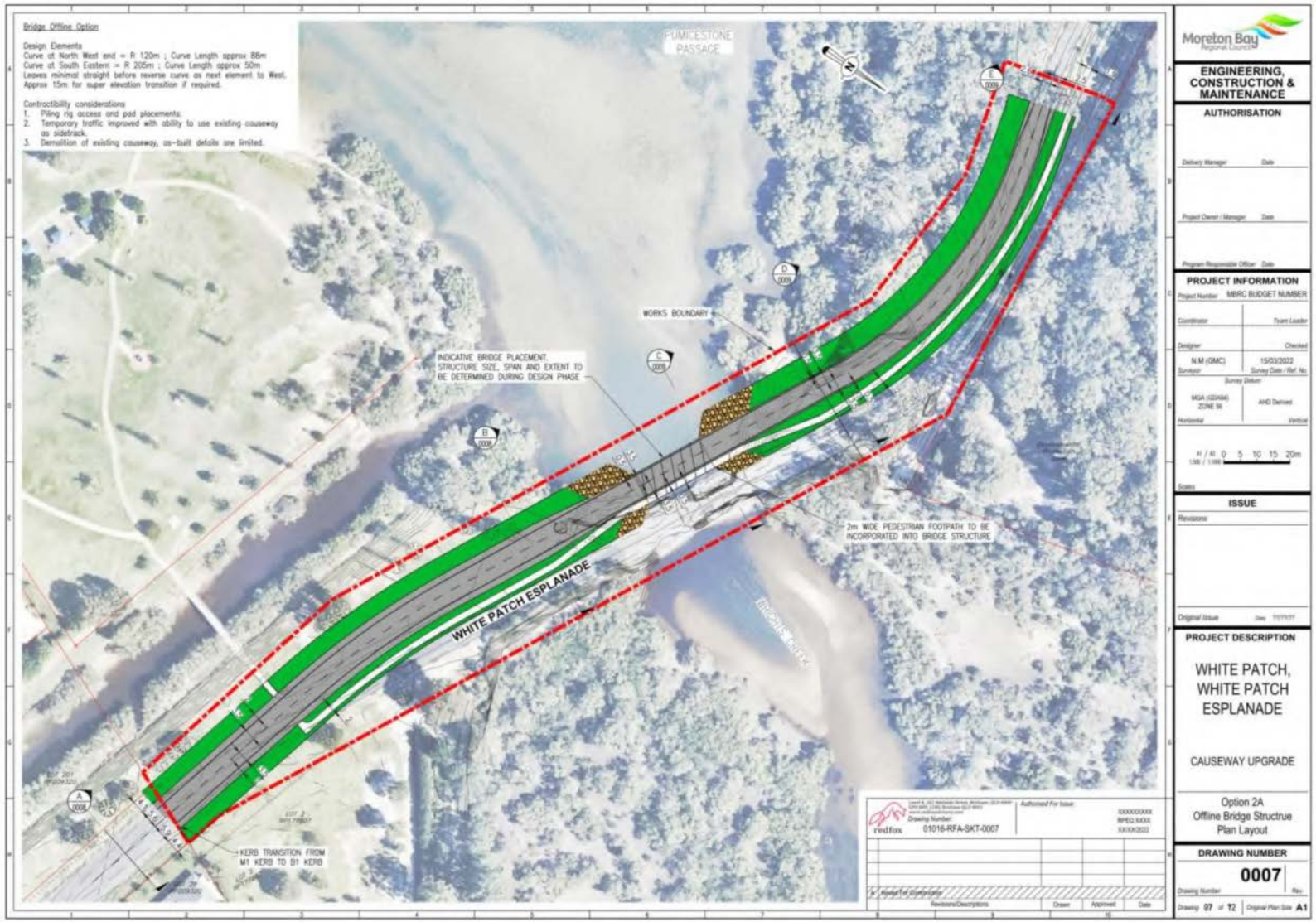
# Agenda

- Basis of Design
- Environmental Update
- Constructability Workshop Outcomes
- Options Analysis Criteria

# BoD - Alignment

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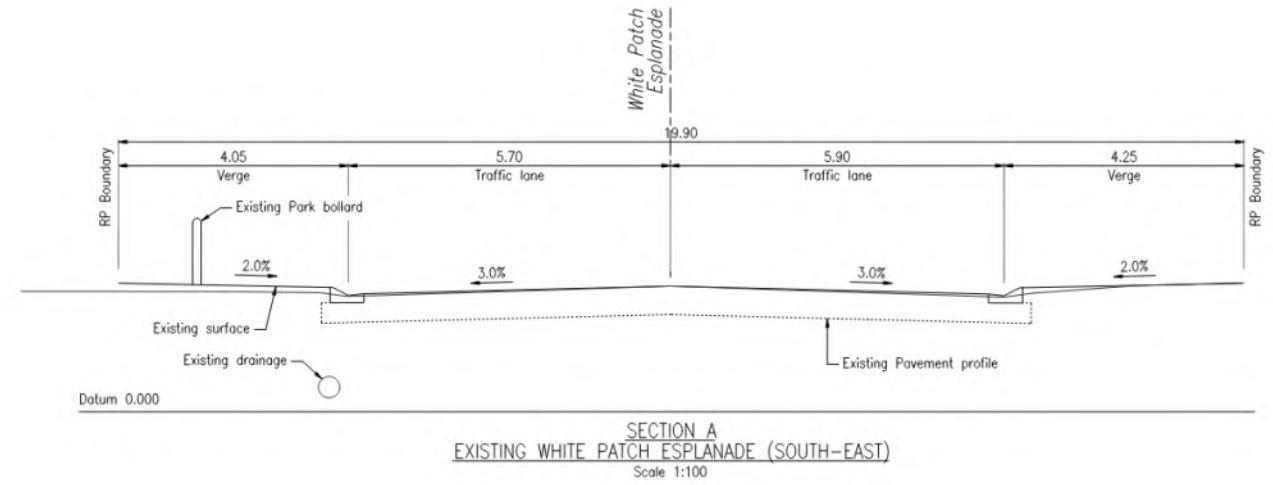
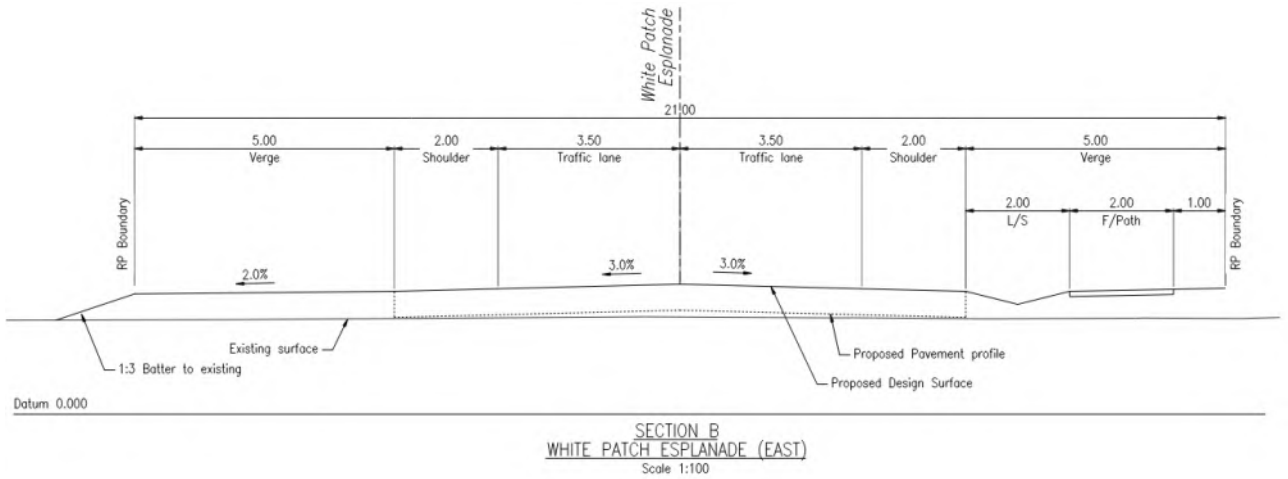
# BoD – Road Alignment (east)




SECTION A
EXISTING WHITE PATCH ESPLANADE (SOUTH-EAST)
Scale 1:100




SECTION B
WHITE PATCH ESPLANADE (EAST)
Scale 1:100

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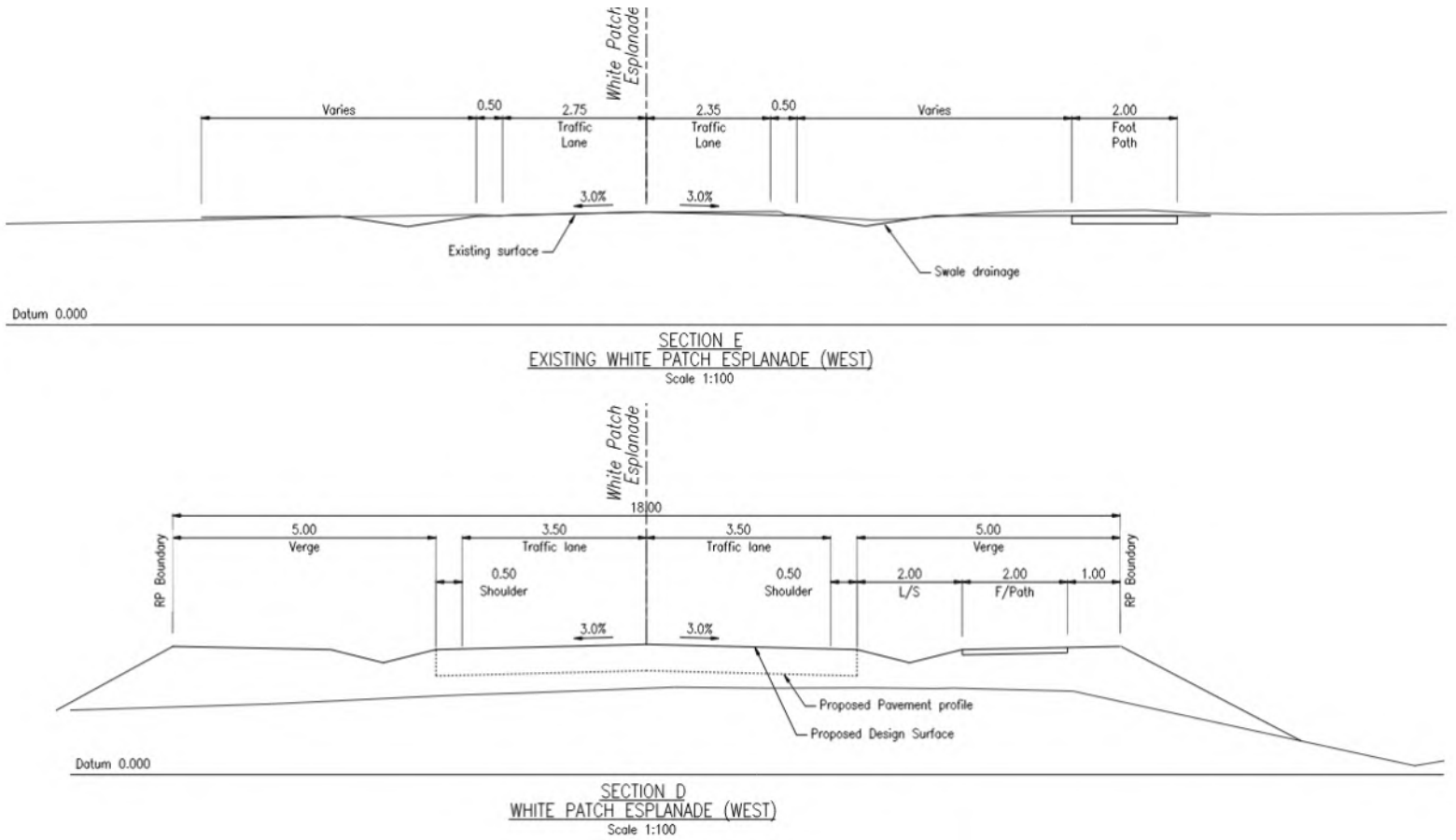
# BoD – Road Alignment (west)

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# BoD – Structure and Scour Protection

- 1% AEP passing through
- 0.05% AEP ultimate limit state
- Bridge Structure - 100yr design life
- Traffic Load – SM1600 with HLP400
- BEDC – to be nominated by MBRC
- Climate Change – 0.8m
- Exposure Classification - C2

# BoD – Structure and Scour Protection

Storm Surge – from 2018 Cardno Report

| Parameter | ULS (1000/2000 Year ARI) | SLS (20 Year ARI) |
|---|---|---|
| **Storm Surge Level** | +2.44 m AHD | +1.70 m AHD |

- Water and Tidal Levels – Maritime Safety Qld (Toorbul)

# BoD - Geotechnical

Unitywater – underbore ground investigation

- Medium to dense alluvial sands to cemented coffee rock
- ASS present, treatment required
- Scoping up further investigation

# Environmental Update

- Moreton Bay Marine Park – prelodgement held 22nd June
- SARA, DAF, Dept of Env – prelodgement meeting 19th July
- REF Comments received and working through
- EPBC self assessment – close to complete

# Constructability Workshop

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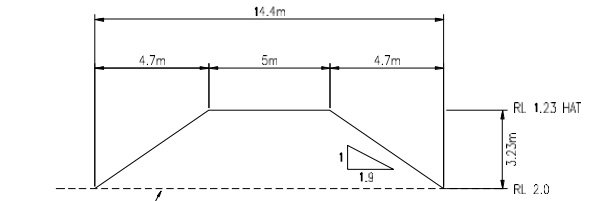
# Key Site Issues

- Probability of flooding during construction
- Flood damage during construction is not insurable
- 18 tonne limit on causeway which could be a major issue during construction
- Extent of laydown area and works required for environmental approvals
- Quality information required as early as possible for approval engagement with relevant authorities
- Sustainability of temporary works during construction
- Reputational risk of reinstating with previously constructed solutions and the approach during construction
- Managing runoff and sedimentation during construction

# Online bridge option

1. Construct sidetrack
2. Remove causeway in bridge location
3. Construction platform to drive central pier pile and construct headstock
4. Remove remainder of existing causeway




Sidetrack Section
White Patch Esplanade
N.T.S




Moreton Bay Regional Council

**ENGINEERING, CONSTRUCTION & MAINTENANCE**

**AUTHORISATION**

Delivery Manager — Date

Project Owner / Manager — Date

Program Responsible Officer — Date

**PROJECT INFORMATION**

Project Number: MBRC BUDGET NUMBER

Coordinator — Team Leader

Designer — Checked: 15/03/2022

Surveyor: N.M (GMC) — Survey Date / Ref. No.

Survey Datum: MGA (GDA94) ZONE 56 — AHD Derived

Horizontal — Vertical

Scales: A1 / A3 1:250 / 1:500 0 2 4 6 8 10m

**ISSUE**

Revisions

Original Issue — Date: ??/??/??

**PROJECT DESCRIPTION**

WHITE PATCH, WHITE PATCH ESPLANADE

CAUSEWAY UPGRADE

-

Online Bridge Option Plan Layout

**DRAWING NUMBER**

0102

Drawing Number — Rev.

Drawing 2 of 8 — Original Plan Size A1


Level 4, 262 Adelaide Street, Brisbane, QLD 4000
GPO BOX 1240, Brisbane QLD 4001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Drawing Number: 01016-RFA-SKT-0102

Authorised For Issue: XXXXXXXXX RPEQ XXXX XX/XX/2022

| Revisions/Descriptions | Drawn | Approved | Date |
|---|---|---|---|
| Issued For Construction | | | |

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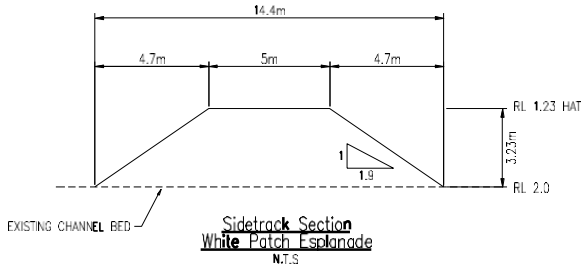
# Online culvert option

1. Build sidetrack with 4x2.5m steel pipes or 8x1.5m steel pipes
2. Remove existing culverts and Northern Abutment
3. Rebuilt Northern abutment with temporary drainage
4. Build coffer dam and construct culverts




Sidetrack Section
White Patch Esplanade
N.T.S

CONSTRUCTION PHASE
ONLINE CULVERT OPTION

SIDETRACK

REMOVE CULVERTS

REBUILT NORTHERN ABUTMENT

COFFER DAM

WHITE PATCH ESPLANADE

WRIGHTS CREEK

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Level 4, 262 Addiade Street, Brisbane, QLD 4000
GPO BOX 1240, Brisbane QLD 4001
Drawing Number: 01016-RFA-SKT-0104
Authorised For Issue: XXXXXXXXX RPEQ XXXX XX/XX/2022
Issued For Construction
Revisions/Descriptions | Drawn | Approved | Date

Moreton Bay Regional Council

ENGINEERING, CONSTRUCTION & MAINTENANCE

AUTHORISATION

Delivery Manager Date

Project Owner / Manager Date

Program Responsible Officer Date

PROJECT INFORMATION

Project Number MBRC BUDGET NUMBER

Coordinator Team Leader

Designer N.M (GMC) Checked 15/03/2022

Survey Date / Ref. No.

Surveyor Survey Datum

MGA (GDA94) ZONE 56 Horizontal

AHD Derived Vertical

A1 / A3 1:250 / 1:500 0 2 4 6 8 10m

Scales

ISSUE

Revisions

Original Issue Date: ??/??/??

PROJECT DESCRIPTION

WHITE PATCH, WHITE PATCH ESPLANADE

CAUSEWAY UPGRADE

-

Online Culvert Option Plan Layout

DRAWING NUMBER

0104

Drawing Number Rev.

Drawing 4 of 8 Original Plan Size A1

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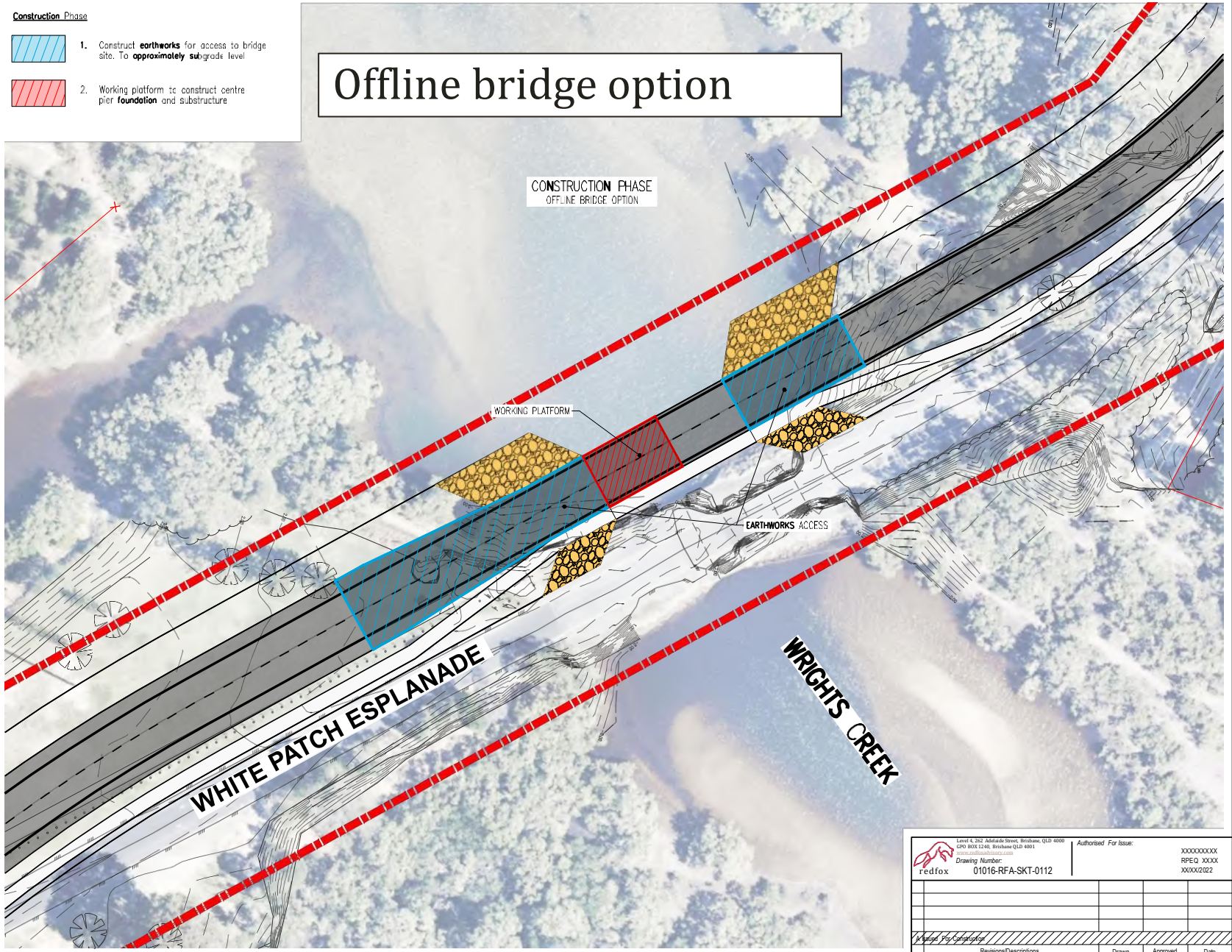
# Offline bridge option

**Construction** Phase

1. Construct **earthworks** for access to bridge site. To **approximately su**bgrade level
2. Working platform to construct centre pier **foundation** and substructure




Level 4, 262 Adelaide Street, Brisbane, QLD 4000
GPO BOX 1240, Brisbane QLD 4001
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Drawing Number: 01016-RFA-SKT-0112

Authorised For Issue:
XXXXXXXXX
RPEQ XXXX
XX/XX/2022

| Revisions/Descriptions | Drawn | Approved | Date |
|---|---|---|---|
| Issued For Construction | | | |

Moreton Bay Regional Council

**ENGINEERING, CONSTRUCTION & MAINTENANCE**

**AUTHORISATION**

Delivery Manager Date

Project Owner / Manager Date

Program Responsible Officer Date

**PROJECT INFORMATION**

Project Number: MBRC BUDGET NUMBER

Coordinator / Team Leader

Designer / Checked: 15/03/2022

Surveyor: N.M (GMC) / Survey Date / Ref. No.

Survey Datum — Horizontal: MGA (GDA94) ZONE 56 / Vertical: AHD Derived

Scales: A1 / A3 1:250 / 1:500 0 2 4 6 8 10m

**ISSUE**

Revisions

Original Issue Date: ??/??/??

**PROJECT DESCRIPTION**

WHITE PATCH, WHITE PATCH ESPLANADE

CAUSEWAY UPGRADE

-

Offline Bridge Option Plan Layout

**DRAWING NUMBER**

0112

Drawing Number / Rev.

Drawing 6 of 8 | Original Plan Size A1

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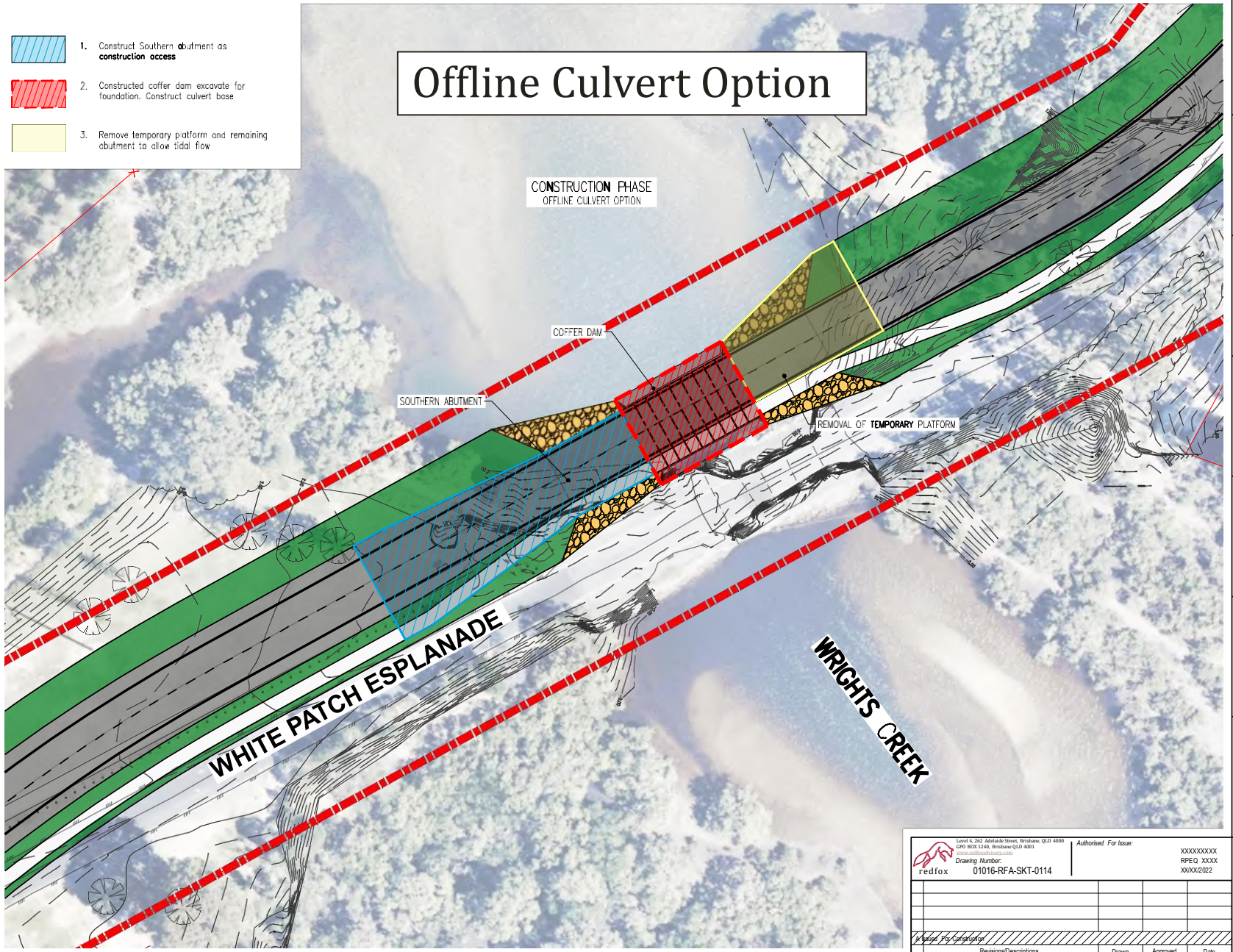


Level 4, 262 Adelaide Street, Brisbane, QLD 4000
GPO BOX 1240, Brisbane QLD 4001
Drawing Number: 01016-RFA-SKT-0114
Authorised For Issue: XXXXXXXXX RPEQ XXXX XX/XX/2022

| Issued For Construction | | | |
|---|---|---|---|
| Revisions/Descriptions | Drawn | Approved | Date |

Moreton Bay Regional Council

ENGINEERING, CONSTRUCTION & MAINTENANCE

AUTHORISATION

Delivery Manager Date

Project Owner / Manager Date

Program Responsible Officer Date

PROJECT INFORMATION

Project Number: MBRC BUDGET NUMBER

Coordinator | Team Leader

Designer | Checked

Surveyor: N.M (GMC) | Survey Date / Ref. No.: 15/03/2022

Survey Datum: MGA (GDA94) ZONE 56 (Horizontal) | AHD Derived (Vertical)

Scales: A1 / A3 1:250 / 1:500 0 2 4 6 8 10m

ISSUE

Revisions

Original Issue Date: ??/??/??

PROJECT DESCRIPTION

WHITE PATCH, WHITE PATCH ESPLANADE

CAUSEWAY UPGRADE

-

Online Culvert Option Plan Layout

DRAWING NUMBER

0114

Drawing Number Rev.

Drawing 8 of 8 Original Plan Size A1

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# Project options for discussion

- Similar footprint for all options
- Not able to build online without constructing high standard sidetrack
- Quality of existing causeway construction is unknown and not able to be relied on as part of any permanent works.
- The offline option may result in a slightly better horizontal alignment
- Could look at alternative geotechnical testing options as well as on water sampling options
- The sidetrack would need to include existing services for the online option
- Given the lack of engineering knowledge of the existing causeway there is a high probability that the existing causeway would need to be removed and reconstructed in an online option

# Recommendations

- Proving value for money will be a key attribute to the recommended option.
- Construction completion by June 2024 is a mandatory requirement.
- Key difference between online and offline options is that the online option will most likely require construction of 2 embankments (one temporary and one permanent) in water which results in a higher level of risk.
- The construction time spent in the tidal zone should be minimised as far as possible.
- The general view was that the offline bridge option showed the least risk during construction and best able to meet the project criteria that were discussed.

# Options Analysis Criteria

**Constructability criteria:**

- Construction weather risk in the creek
- Minimum footprint to construction and holding/storage areas
- Ensuring all weather access across causeway for local residents at all times
- Timing for environmental and other approvals to meet funding approval milestones
- Community impact of construction
- Resilience of temporary works during construction
- Limit early works

**The other criteria for the options analysis that were proposed were:**

- Value for Money
- Resilience
- Reputation
- Environment
- Customer and stakeholder expectations
- Ability to meet approval and funding milestones

# Appendix E – Options Review Workshop

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| | | | | | Option 1 - Online Culvert | | | Option 2 - Online Bridge | | | Option 3 - Offline Culvert | | | Option 4 - Offline Bridge | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Criteria** | **Element** | **Objective** | **Measurement** | **Weighting** | **Criteria Score** | **Element Score** | **Comments** | **Criteria Score** | **Element Score** | **Comments** | **Criteria Score** | **Element Score** | **Comments** | **Criteria Score** | **Element Score** | **Comments** |
| Value for Money | Cost | Lowest cost of selected elements (structure, scour protection, coffer dams, sidetrack, causeway rock fill). This is not the total cost. | $ | 20% | 3.20 | 3 | $1.4M difference | 3.60 | 2 | $1.9M difference | 3.80 | 5 | $700k difference | 4.20 | 4 | $1M difference |
| | Improved asset | Improved road user safety and functionality | RSA | | | 3 | Improved from existing | | 3 | Improved from existing | | 4 | Improved from existing. Better horiz. Geometry. | | 4 | Improved from existing. Better horiz. Geometry. |
| | Funding | Best alignment to funding guidelines | Assessment against QRA | | | 4 | All options as per MBRC planning scheme policy and eligible. | | 4 | All options as per MBRC planning scheme policy and eligible. | | 4 | All options as per MBRC planning scheme policy and eligible. | | 4 | All options as per MBRC planning scheme policy and eligible. |
| | Infrastructure Damage in Major Event | Sustainability of the permanent solution | Assess | | | 3 | Similar solution to pre-existing that was damaged. | | 5 | Larger open with bridge, ability to reduce upstream hydrualic loads. JC - consider constructability | | 3 | Same solution as existing which washed away previously. | | 5 | Larger open with bridge, ability to reduce upstream hydrualic loads. |
| | Longterm Maintenance Requirement | Minimise longer term maintenance needs | $ | | | 3 | Sedimentation of culverts. Scour and apron repairs. | | 4 | Bridge will require regular inspection and maintenance. | | 3 | Sedimentation of culverts | | 4 | Bridge will require regular inspection and maintenance. |
| Constructability | Wet Weather Risk | Lowest risk in waterway | Risk score | 25% | 2.40 | 1 | Most time in waterway | 3.40 | 2 | Less time in waterway when compared to option 1. | 2.40 | 2 | Improved on option 2, but with culvert base slab there would still be a considerable time in the waterway. Still have coffer dams | 3.60 | 4 | New causeway embankment could be constructed upto abutments, piled. |
| | Ensure all weather access for residents | Minimum risk | Risk score | | | 3 | With a sidetrack this would mitigate this risk | | 4 | With a sidetrack this would mitigate this risk | | 3 | Existing causeway used for access | | 4 | Existing causeway used for access |
| | Limit Early Works | Maximise efficiency of works | Assess | | | 4 | No requirement for embankment works for GI | | 4 | No requirement for embankment works for GI | | 3 | May need temporary works for GI | | 3 | May need temporary works for GI |
| | Supply chain issues during construction | Minimise delays during construction | Assess | | | 2 | Marine class culverts are special orders | | 3 | Engagement of piling contractors | | 2 | Marine class culverts are special orders | | 3 | Engagement of piling contractors |
| | Worker Safety | Amount of exposure to risk | Assess | | | 2 | More works in waterway, dealing with existing causeway | | 4 | Improved on option 1. | | 2 | Similar to option 1, however less time in creek with reduced temporary works and staging. | | 4 | Least work in waterway, working from new causeway platform. |
| Environment & Cultural Heritage | Minimum Footprint of Construction & Storage Areas | Minimise approvals required | Number | 25% | 1.33 | 2 | Approvals pathway could be longer | 2.67 | 2 | Impoved on option, still has sidetrack which may not been seen as favourable with regulators. | 2.50 | 3 | No sidetrack. Culverts may be seen as less favourable than bridge. Would require fish passage. | 4.17 | 3 | No sidetrack. Solution seen as most favourable with regulators. Improved long term environmental benefits. |
| | | Minimise remedial works | Cost | | | 1 | Reconstruction of existing causeway and new sidetrack required, | | 2 | Reconstruction of existing causeway and new sidetrack required, | | 3 | Existing causeway not used in permanent solution. | | 4 | Existing causeway not used in permanent solution. |
| | Environmental and Cultural Heritage Approvals | Time required for approvals | Days | | | 1 | Less favoured by DAF, fish passage required. Demonstrate that risk is managed, more detail and cycle through information requests. | | 3 | Improved on option 1, but with sidetrack it may not been seen favourably with regulators. | | 2 | No sidetrack. Culverts may be seen as less favourable than bridge. Would require fish passage. | | 5 | No sidetrack. Solution seen as most favourable with regulators. Improved long term environmental benefits. |
| | | Conditions from approvals | Complexity | | | 1 | Less favoured by DAF, fish passage required. | | 3 | Still reasonably complex with sidetrack | | 2 | Culverts may attract more conditions. | | 5 | Bridge with no sidetrack may attract less conditions. |
| | Environmental and Cultural Heritage Impact | Risk of environmental and cultural heritage damage during construction | Assess | | | 1 | More time in waterway, greater chance of damage during construction. More invasive works with coffer dam and scour protection. | | 2 | Still a long time in waterway with reconstruction of existing causeway. | | 3 | More time in waterway, greater chance of damage during construction. More invasive works with coffer dam and scour protection. | | 4 | Most efficient program, less chance of damage. |
| | | Longterm adverse effects to the eco system | Assess | | | 2 | Scour holes would remain | | 4 | Likely will ultimately provide improve benefit with larger opening. | | 2 | Scour holes would remain | | 4 | Greater opening may remove scour holes and revert back to existing channel profile. |
| Stakeholder and Community | Contracted Performance during Construction | No delays or major issues | Assess risk | 15% | 1.33 | 1 | Longest construction time. Need to construct sidetrack and divert services prior to main works. | 3.00 | 3 | Less time in waterway when compared to option 1. Lead times for pre-cast bridge elements to be considered. | 1.67 | 1 | Long construction time. Improved on option 1 with slightly less construction duration. | 4.33 | 5 | Improved on option 2. Lead times for pre-cast bridge elements. |
| | Stakeholder Expectations (preconstruction and construction) | Meet Stakeholder expectations (State, MBRC, Utility authorities, other groups). | Assess | | | 2 | Most complex and unlikely to meet expectations, ie time, cost. Sidetrack construct then removal would be seen as waste. | | 4 | A bridge is an improved solution, the methodology may not. | | 2 | Improved on option 1 with no sidetrack. | | 4 | Bridge is an improved solution. Offline is better methodology. |
| | Community expectations | Meet community expectations (road safety, connectivity, final solution) | Survey | | | 1 | Greatest impact on community. Increase volume of construction traffic (to build sidetrack) through community impacting local roads (noise, safety, degradation of pavement) | | 2 | Improved on option 1 | | 2 | Same solution as existing which washed away previously. | | 4 | Improved solution for stakeholders. Constructed offline with no sidetrack would be seen as a better solution than option 2. |
| Meeting Project Milestones | Funding Milestones | Meet Stage 1 & 2 QRA milestones. | Dates | 15% | 2.00 | 2 | Approvals pathway could be longer, wet risk and delays could impact construction completion. | 3.00 | 4 | Less cofferdam works and improved construction program. Assume single span bridge, multi-span might score lower. | 2.50 | 2 | Culvert approval pathway could be longer, more time in tidal zone. | 4.00 | 4 | Improved approvals pathway with no sidetrack. |
| | Approval Milestones | Achieve required statutory approvals in preconstruction phase | Dates | | | 2 | Approvals pathway could be longer, wet risk and delays could impact construction completion. Fish passage with temp culverts. Contractor may change side track solution. | | 2 | Approvals pathway could be longer, wet risk and delays could impact construction completion. | | 3 | Approvals pathway could be longer, wet risk and delays could impact construction completion. | | 4 | Regulators may see this solution as most favourable with minimal info requests. |
| | | | **Post Workshop Option Rating** | | 2.07 | | | 3.14 | | | 2.61 | | | 4.03 | | |
| | | **Workshop scoring prior to combining criteria, elements and objectives and revising weightings** | | | **2.26** | | | **3.22** | | | **2.82** | | | **4.09** | | |

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