7 Adjourned Items - Nil
10 Confidential Items

10.1 Coastal Walkway Gullies Report for Construction	
Report Reference	GC221213F10.1
Originating Officer	Project Manager - Infrastructure – Alex Cortes
Corporate Manager	Manager City Activation – Charmaine Hughes
General Manager	General Manager City Development – Tony Lines

CONFIDENTIAL MOTION

That pursuant to Section 90(2) and (3)(k) of the Local Government Act 1999, the Council orders that all persons present, with the exception of the following persons: Chief Executive Officer, General Manager City Development, General Manager Corporate Services, General Manager City Services, Manager of the Office of the Chief Executive, Chief Financial Officer, Manager City Activation, Project Manager Infrastructure, Unit Manager Governance and Council Support and Governance Officer, be excluded from the meeting as the Council receives and considers information relating to Coastal Walkway Gullies Report for Construction, upon the basis that the Council is satisfied that the requirement for the meeting to be conducted in a place open to the public has been outweighed by the need to keep consideration of the matter confidential given the information relates to commercial expenditure.

REPORT HISTORY

Report Reference	Report Title
GC220524F11.3	Coastal Walkway Gullies Report for Construction
SFRAC220426F8.1	Coastal Walkway – Prudential Report
GC220308F18.4	Coastal Walkway Update
GC220222F11.3	Coastal Walkway Update
GC211214F18.3	Coastal Walkway Update
GC211026R10.5	Coastal Walkway Concept Design Update
GC210622F03	Coastal Walkway Update – Field River
GC201124R10	Coastal Walkway Concept Design & Outcomes of Community Engagement
GC191126R07	Coastal Walkway Project

REPORT OBJECTIVE

To provide Council with an update on the Coastal Walkway Project for Grey Gully (Segment 5) and Kurnabinna Gully (Segment 6).

To recommend Council endorsement for additional funding and approval to proceed with construction.

EXECUTIVE SUMMARY

The Coastal Walkway Project for Grey Gully (Segment 5), Kurnabinna Gully (Segment 6), and Field River (Segment 10) was endorsed as part of Council's 2019-2023 Business Plan aligned to Council's Coastal Walkway Asset Management Plan 2020- 2030.

In November 2019, Council committed $2.44 million for the reconstruction of these Segments. In June 2020, through the Open Space and Places for People grant funding application, State Government matched Council's funding commitment of $2.44 million bringing the total budget to $4.88 million.

The project is currently funded over three financial years (2019-2020 to 2022-2023) and in accordance with the State Government funding agreement requires all Segments to be completed by December 2023.

In November 2020, Council endorsed Administration to advance engineering designs for Segments 5, 6 & 10. Recognising Field River (Segment 10) having less engineering complexities to Segments 5 & 6, in June 2021 Council endorsed the construction of Segment 10 and supported an Early Contractor Involvement (ECI) procurement model to finalise design documentation for Segments 5 & 6.

The Field River (Segment 10) was completed earlier this year in March 2022.

The use of an Early Contractor Involvement (ECI) procurement model was selected as providing best procurement practice for Segments 5 & 6. This allowed dual contractors to work collaboratively with the design consultants on this complex project, providing sound construction methodology with respect to geology and environmental consideration throughout the design development phase, importantly reviewing the options for the Segments. The ECI procurement process for Segments 5 & 6 commenced in July 2021. The process recommended that bridges would provide a more suitable alternate to the boardwalks. A report to GC was provided 22 March 2022 and Council resolved for a Section 48 Prudential Report to be developed.

At the General Council meeting 24 May 2022, Council endorsed a Section 48 Prudential Report, endorsed suspension bridges, approved required budget and authorised contract execution for construction.

The contract was subsequently executed with the construction contractor on 23 June 2022. As per standard process for a highly complex construction project, the design consultants then commenced preparation of the final Issue for Construction (IFC) drawings. Through the IFC process, the lead design consultant advised that an error in the engineering loads had been made by their sub-consultant. The lead design consultant had been notified by their sub-consultant of the error on 4 July 2022. CoM officers were notified of the issue on 3 August 2022 via email, however the magnitude and implications of the design issue were not known. Officers and the head contractor identified and progressed the resolution of 28-week supply chain issues. High level updates were provided to the Council due to the Caretaker period.

The IFC documents were finalised on 16 September 2022, enabling the construction contractor to price the revised design – incorporating the remedied design error and the alternative anchor products, also resolving the supply chain issue.

The Administration were notified of an additional cost requirement of [redacted] on 10th November 2022 (held for 15 days) and engaged the cost adviser, North Projects, to rigorously assess the additional cost, including the verification of quantities, rates and identification of potential duplication in material.

[redacted]

[redacted]

Due to the anchors supplier's terms (holding the price for 15 days only), and the timeframes to attend GC, the head contractor has advised that the materials have now increased in cost by [redacted] resulting in the project cost increase to [redacted]. However, North Projects have completed the verification of the cost assessment process and have confirmed a possible reduction of [redacted] against the revised [redacted] variation submission subject to agreement and confirmation with the head construction contractor. This could result in the overall project increasing in cost by an amount of [redacted]

On 6 December 2022, a report was provided to the Elected Members Forum providing an update.

The external project Superintendent has provided a high-level cost analysis of the boardwalk versus bridge option, drawing on the same logic applied for the bridges from a scope and escalation perspective (20%). Advice from both North Projects and the Head of Procurement confirms that the market is typically experiencing escalation rates between 15% - 25%, hence the adoption of 20% for purposes of the high-level cost analysis. This high-level analysis demonstrates that the bridges still provide a more cost-effective solution at [redacted] compared with [redacted] for the boardwalks (see High-Level Option Evaluation).

The Principal Geotechnical Engineer has confirmed that the bridges provide a more durable and stable option than the boardwalks due to the potential for corrosion to the boardwalk's shallower footings, which are more open to coastal erosion. This would impact on the durability of the boardwalk as a solution, increasing maintenance costs and reducing design life. The Council's Senior Environmental Planner also verifies concerns around the location's vulnerability to erosion and notes that high tides at the location reach the cliff face, which would further impact on erosion, especially to elements of the boardwalk on the beach (see Geological Considerations).

Additionally, the structural assessments undertaken through 2018/19 confirm that the boardwalks are at end of life. No documentation exists as to the construction of the boardwalks or associated footings. The Engineer has confirmed that should boardwalks have been the preferred option, significant Geotech analysis would have been required to understand the exact geology of the area to identify where to place footings.

[redacted] have confirmed that the bridge design provides the best option from a vegetation perspective (see Vegetation).

Administration therefore recommends that Council endorse the additional required funding of [redacted]. This variation will enable the ordering of the remaining materials and site mobilisation to commence mid to late January 2023. The Administration will immediately commence negotiations with the Superintendent, North Projects, and head construction contractor to agree the variation sum, securing a reduction of [redacted]. It should be noted that the prices for the additional materials will be held by the supplier until 21 December 2022.

Administration will update the Making Marion website with construction updates and provide notification to nearby residents adjacent to the works.

For perspectives and images please refer to **Attachment 8**.

RECOMMENDATION

That Council:

1. **Notes the Report for the Coastal Walkway Gullies (Segments 5 and 6).**
2. **Endorses the final construction costs for Coastal Walkway Gullies Segment 5 (Grey Road Gully) and Segment 6 (Kurnabinna Gully).**
3. **Allocates additional funding of [redacted] as part of the 2023/24 Annual Business Plan for Coastal Walkway Gullies Segment 5 (Grey Road Gully) and Segment 6 (Kurnabinna Gully), to be funded by way of loan.**
4. **Resolves to write to the State Government and the Federal Government for additional**

funding for the Coastal Walkway Project.

5. [redacted]
6. **Resolves for officers to update the community information on the Making Marion site and provide notification to nearby residents adjacent to the works.**
7. **In accordance with Section 91(7) and (9) of the *Local Government Act 1999*, orders that this report, Coastal Walkway Gullies Report for Construction, any attachments and the minutes arising from this report having been considered in confidence under Section 90(2) and (3)(k) of the Act, except when required to effect or comply with Council's resolution(s) regarding this matter, be kept confidential and not available for public inspection until a construction contract has been executed. At this time the information will be released in its entirety. This confidentiality order will be reviewed at the General Council Meeting in December 2023.**

BACKGROUND

The City of Marion Coastal Walkway from Marino to Hallett Cove is a highly valued and important community asset that attracts visitors and contributes to the liveability of the city.

The original boardwalks were designed and delivered in the mid 1990's by the State Government. Due to the age of the existing boardwalks, few records are available for review. The boardwalks were constructed utilising materials and technology which are now superseded.

In early 2019 Council engaged an engineering consultancy firm to undertake a structural audit of all the structures associated with the Coastal Walkway. The audit created a database classifying condition and defects for this group of assets. This information then informed the development of Council's Coastal Walkway Asset Management Plan.

At the conclusion of the structural audit, it was identified that certain segments of the Coastal Walkway were deemed high risk of failure due to the inadequacy of the footings and concerns with safety to users. Subsequently, Grey Gully (Segment 5) and Kurnabinna Gully (Segment 6) was closed off to the public.

In November 2019, Council committed $2.44 million for the re-construction of these segments including a new connection for Field River (Segment 10). The State Government provided matched funding through the 2020 Department for Infrastructure & Transport (DIT) open space funding stimulus bringing the total budget to $4.88 million.

Field River (Segment 10) has been fully constructed. A well-attended opening ceremony was held Saturday 9 April 2022. The total cost of construction was $1.126 million.

At the General Council meeting on 26 October 2021 (GC211026R10.5) Council endorsed the cable bridge concept designs for Grey and Kurnabinna Gullies, following consideration of community feedback.

Council's procurement team initially engaged with five contractors for the delivery of Grey and Kurnabinna Gullies. Procurement recommended the use of a best practice Early Contractor Involvement (ECI) procurement model. At the General Council meeting 14 December 2021 (GC211214F18.3), Council noted the ECI procurement model with a preferred contractor working collaboratively with the design team to finalise all aspects of the final construction design, construction methodology and value management opportunities.

Through the ECI process, it was determined that the original boardwalk option should be superseded by two suspension bridges due to the associated benefits. The proposed design comprised suspension bridges consisting of galvanized steel structures, supported by pillars at each end, connected by steel wire rope, with a fibre reinforced plastic (FRP) enviro walk mini-mesh decking.

The preferred contractor then worked collaboratively with the design team to finalise all aspects of the final construction design, construction methodology and potential value management opportunities.

At the General Council meeting on 8 March 2022 (GC220308F18.4) Council noted the project's status and an Evaluation report on the bridge versus boardwalk approach. This report explored the benefits of the bridges over the original boardwalk solution. It confirmed that whilst the bridges provided a more cost-effective solution, this was backed up by the significant improved accessibility, minimised environmental impact, reduced future maintenance liabilities as well as reduced construction risk. For Bridge & Boardwalk evaluation report, refer to **Attachment 2.**

It should be noted that an average annual maintenance allocation of $20k was recommended for the bridges in the North report. However, further to feedback from [redacted] Prudential Report and comments received from the Finance Risk and Audit Committee (FRAC) on 26 April 2022. The Administration increased this allocation by 50% to $30k to ensure that sufficient budget provision is available for the maintenance regime throughout the asset life cycle.

BRIDGE DESIGN

This section of the report focusses on the approved design solution and particular relating to the bridge.

Approved Design Solution

The Council endorsed ECI design solution comprises two suspension bridges consisting of galvanized steel structures, supported by portals at each end, connected by steel wire rope, with a fibre reinforced plastic (FRP) enviro walk mini-mesh decking.

A series of exploratory investigative (geotechnical) works were undertaken from 70% to 100% design by the team of specialists informing the final bridge design with consideration to practical and visual sensitivities.

The extensive geotechnical investigations included:

- Detailed survey works for accuracy of proposed bridge footing locations.
- Engagement of a specialist contractor to drill into bedrock with exploratory boreholes at each bridge abutment.
- Engagement of specialist geotechnical engineer providing direction and supervision for borehole testing.
- Creating temporary access tracks to allow drilling rigs and equipment to the proposed bridge abutment areas.
- Installation of trial anchors located adjacent to proposed bridge alignment.
- Load and pull testing for each anchor location in accordance with design and anticipated bridge loadings.

Following improvements from the design investigative process, and in line with feedback from residents through the community consultation process, the Grey Gully (Segment 5) bridge span was reduced from 50m to 39m and Kurnabinna Gully (Segment 6) bridge span reduced from 50m to 41m. The portal heights were also reduced from the original concept designs. For Civil and Structural Drawings including Bridge Renders, refer to **Attachments 4, 5 & 6.**

Bridge Design Particulars

The bridges have been designed in accordance with the Australian Standards, AS5100 for Bridge Design. The design has been completed by a competent bridge designer [redacted]), Proof Engineered by a competent bridge proof engineer ([redacted])

and further reviewed [redacted] on behalf of City of Marion. The Bridges have been thoroughly reviewed and design meets the required standard without 'over engineering'.

Live loads for each bridge have been designed in accordance with AS5100 Australian Standard for Bridge Design for "Pedestrian Loads".

In accordance with the requirements of the Australian Standard, the bridges have been designed for the minimum applicable pedestrian live loadings acceptable under the bridge standard, which is equivalent to 500kg/m2. This cannot be directly correlated to a maximum capacity of users. This is generally considered to be equivalent to a "crowd loaded" area.

There is no option to reduce the loads under the standard.

The bridge standard does not permit a reduction below 500kg/m2 in pedestrian live loadings excepting for structural elements supporting an area greater than 85m2.

The design loads within the Australian Standards are based on International best practice, research, review of bridge failures, statistical assessments and acceptable risk profiles with respect to a range of load combinations not specifically limited to just personnel loadings and any reduction in the acceptable load would come at significant risk to Council for departing from the minimum requirements of Australian Standard.

The footing geotechnical conditions substantially vary between the gullies. For example, The Kurnabinna Gully has substantially shallower rock than Grey Gully, and footing designs have been customised accordingly.

For loads applicable to the bridge footings, please refer to **Attachment 9.**

ENVIRONMENT CONSIDERATIONS

This section provides further detail on several key issues around geology, vegetation and consultation with Kaurna representatives and summary of consultation with groups.

Geological Considerations

The Principal Geotechnical Engineer has confirmed that the Kurnabinna and Grey Gully site's ground conditions vary from exposed rock to reactive near surface clay. At the concept level through to design and construction, the subsurface conditions beneath the foundation of a structure (that is soil and rock strengths) need to consider the impact of seasonal weather changes and climate. Also, in consideration is the topography (surface water flows) and chemistry of groundwater (at this site salinity is the key item). These variable elements have the greatest change in the near surface soils or bedrock and become less prone to weathering and change, during the design life, at depth. As such where possible, deep anchored foundations (piles, concrete footings, embedded anchors) are preferential and mitigation measures to limit corrosion are to be implemented and maintained. The Engineer has therefore advised that the Bridge are therefore the bridges provide a more durable and stable option than the boardwalks due to the potential for corrosion to the shallower footings, which are more open to coastal erosion and that this would impact on the longevity of the design life.

A structural audit of the structures was undertaken in 2019, confirming that certain segments of the Coastal Walkway were deemed high risk of failure due to the inadequacy of the footings and concerns with safety to users - confirming that the boardwalks are at end of life. No documentation exists as to the construction of the boardwalks or associated footings. The Engineer has confirmed that should boardwalks have been the preferred option, significant Geotech analysis would have been required to understand the exact geology of the area to identify where to place footings. From a safety perspective, it would not therefore be possible to reuse the existing boardwalk footings. The Planner also notes that high tides at this location can already reach the cliff base which would impact on the integrity of a boardwalk in this location.

The Administration's Senior Environmental Planner is currently awaiting the receipt of an updated Coastal Climate Change Study for the cells, however they advise that it is expected that the information for this cell will be largely the same as the 2018 report which was used to inform the project. The Planner has advised that from a coastal climate risk perspective the surface is covered with undifferentiated material with current evidence of surface erosion. This cell has therefore been assessed as "likely vulnerable" to erosion and that the proposed bridges will have piling connected to the deeper geology and would be less vulnerable to the surface erosion indicated below. Project consultants have advised that due to the above factors, especially around erosion, that the Bridges would have a longer design life.

Vegetation:

[redacted] completed an Environmental report which informed the design and recommendations for construction. Recommendations included weed and vegetation management and advice from Birdlife Australia to minimise the impact to local bird species.

CoM requested additional commentary from [redacted] regarding the Bridge design solution specifically to the environmental assessment. [redacted] have provided the following advice:

- *Bridge portal locations – Impact on vegetation specifically at these locations.*
  Impact to native vegetation can only be avoided if a 'do nothing' approach is taken. However, impact can be minimised by taking the approach with the smallest construction footprint. Building a new boardwalk through the gullies, even over the current alignment, would involve a larger construction footprint than a bridge over the gullies, since many additional footings would be required requiring additional machinery access. Thus, a boardwalk would impact a greater extent of vegetation than a bridge.

- *Bridge alignment (portal locations) compared to the current boardwalk alignment.*
  Building the bridge further inland still impacts some vegetation. However, it avoids other potential impacts such as increased erosion caused by increased proximity to the cliffs edge. Vegetation condition improves closer to the cliff and shoreline since it is less impacted by weeds and garden escapes. Impact to better condition vegetation is also minimised by building the structure further inland.

[redacted] professional opinion, as far as impact to flora and fauna is concerned, is that the bridge design is the best option.

Administration commissioned [redacted] to undertake a consolidation of associated reports. This report reviews and summaries previous work undertaken to evaluate the environmental impacts of the project. A copy is provided in **Attachment 3.**

Kaurna Consultation

Consultation been undertaken with Kaurna representatives. On 16 September 2020, the Administration and design consultants engaged with Kaurna representatives and shared the Marion Coastal Walkway Aboriginal Cultural Heritage Report **(Attachment 10).** The report demonstrated that the area was not of cultural significance.

Consultation Groups

A wide range of consultation has been undertaken over the last 3 years. Community groups include but are not limited to Friends of the Lower Field River, Friends of the Hallett Cove Conservation Park, Hallett Headland Bush for Life Group and Hooded Plover Volunteers. Extensive engagement has been undertaken with State Government during this period including Department for Environment and Water, Coastal Protection Board, Environment Protection and Biodiversity

Conservation, Attorney Generals Department – Planning and Land Use Services. Department Transport and Infrastructure – Open Space and Property Directorate.

Summary of Construction Benefits

The Blue Built report dated 2 December 2022 has recommended that the design process for the footings should avoid the use of large machinery to minimise the need for temporary tracks. It supported a design with reduced number of footings to decrease disturbance to local flora and fauna. The bridge solution had significantly less impact on the environment with only eight footings instead of the hundreds of footings required to install the boardwalk as well as substantial reductions in the temporary access tracks down the embankments. In decreasing the overall footprint within the gullies, it significantly minimised the potential impact to the environment and eased the environmental management obligations of Council and the contractor. Importantly, due to the geology of the cliff faces, there were also concerns from the consultants that the selection of boardwalks with a significant increase in the number of footings, would result in significant future erosion issues.

In providing context as to why a bridge option was originally tabled during the ECI phase, several significant risks and environmental aspects were identified as key factors influencing investigation of bridge option, summarised below.

Risk/ Aspect	Boardwalk Negatives	Bridge Benefits
Existing topography, site access and logistical constraints	Inability to get larger plant to upper gully access locations and on existing embankments due to the steepness.	Localised anchor works are limited to upper embankment areas only. Some are accessible by larger equipment.
Structure collapse due to batter erosion / collapse –	Extensive erosion is evident and has impacted the structural integrity of the existing boardwalk. Likely to be recuring with no means to control overland/ embankment water flow.	Limiting the extent, founding deeper and relocating further away from the ocean facing cliffs reduces erosion risk in comparison to the multiple, shallower boardwalk anchors.
Personnel safety during construction	Extensive manual handling and construction works at height, requiring implementation of appropriate fall prevention systems.	Extensive works on the embankment face, at multiple locations is eliminated. Fall prevention system installation simplified.
Extensive environmental footprint associated with Concept Design (boardwalk/ stairs)	Construction of a new boardwalk requires boardwalk anchor, fall prevention anchors and general personnel access across the entire footprint of the proposed boardwalk.	Works limited to one area on each gully embankment. Boardwalk option potentially increases the risk of embankment erosion.

The report articulates that the bridges still provide a more robust option from a construction site accessibility perspective, general community accessibility, erosion prevention, safety during construction and reduced environmental footprint to the boardwalks. Refer Construction Contractors letter, **Attachment 7.**

FINANCIAL OVERVIEW

Approved Construction Costs

The Section 48 Prudential Report was provided to the Council on 24 May 2022. The Report concluded that all requirements of Section 48 had been met and that an appropriate level of due diligence had been applied to the project.

The associated Council report noted that the preferred contractor had submitted a project contract price of $6.855 million for Grey Gully (Segment 5) and Kurnabinna Gully (Segment 6).

The total construction cost for Segments 5, 6 and 10 (Field River) including professional fees and contingencies was estimated at $9.450 million. The original budget for the project was $4.880 million, leaving a funding gap of $4.570 million. The significant increase in project cost had resulted from extensive site investigations and construction costs increases resulting from Covid-19 and current global trends.

Market Conditions

The Head of Procurement has confirmed that current global market conditions have and will have an impact on project delivery. In addition to supply chain issues (namely the bridge anchor fabrication and supply). With the shortened price validity periods coupled with the month-on-month material price increase (most notable steel, concrete and timber), prices for materials associated with projects of this nature will continue to escalate if not locked in contractually.

Engineering Errors

Through the IFC process, the main lead Design Consultant identified that an error in the engineering load for the bridges had been made by a sub-contractor. At that point, the magnitude and full implications of the issue were unknown. The discovery of the error in the load footing values led to a review of the approved design. The review concluded that additional footings were necessary to meet the design requirements, requiring the clarification of further engineering and geotechnical matters.

Additionally, due to national and global market conditions, it was identified that significant supply chain issues had arisen for key construction materials, leading to a 28-week project delay.

Administration worked with the head construction contractor and sub-contractors to identify alternative solutions for the design to resolve the supply chain issues. High level update was provided to the Council during this period.

The IFC documents were finalised on 16 September 2022, enabling the construction contractor to price the revised design – incorporating the remedied design error and the alternative anchor products, also resolving the supply chain issue.

Variation Construction Costs

As a result of the lead design consultant making an error with the engineering load calculations, the construction contractor submitted a variation to cover the additional reinforcement elements, namely the bridge anchors and materials required to meet the design requirements. These updated costs have been confirmed and assessed by Council's cost consultant (North Projects).

North have assessed the variation of [redacted]. They believe the total claim to be in the order of [redacted], a reduction of [redacted] from the revised variation submission of [redacted]. North Projects are currently negotiating with the head construction contractor on this reduction.

For the purpose of the report and understanding the final price needs to be agreed, the original variation submission is the [redacted] price. See revised costings in Table 1.

Table 1:

Revised Construction costs for for Grey Gully (Segment 5) and Kurnabinna Gully (Segment 6) are tabled below:

Item	Description	
1.	Preliminaries	$748,515
2.	Segment 5	~~$3,076,907~~ [redacted]
3.	Segment 6	~~$2,910,200~~ [redacted]
4.	Provisional Sums	$120,000
	Total Construction Cost	~~**$6,855,622**~~ [redacted]

Total Project Costs

Total Project costs for Grey Gully (Segment 5), Kurnabinna Gully (Segment 6), **and** Field River (Segment 10) are tabled below:

Item	Description	
1.	Professional Services (Segments 5, 6 and 10)	$909,387
2.	Segment 10 – Field River Construction (Completed)	$1,125,910
3.	Segments 5 and 6 – Gullies Construction	~~$6,855,623~~ [redacted]
4.	Contingencies for Segments 5 and 6 (including $100k potential contingency for Nungamoora)	$560,000
	Total Construction Cost	~~**$9,450,920**~~ [redacted]

Variation Funding Summary

Additional funding requirement for Grey Gully (Segment 5) and Kurnabinna Gully (Segment 6) are tabled below:

Item	Description	
1.	Total Costs for Segments 5, 6 and 10	~~$9,450,920~~ [redacted]
2.	Original Budget Allocation for Cells 5, 6 and 10	$4,881,208

3.	Approved Funding (GC 24.5.22)	$4,569,712
	Additional Funding Required	[redacted]

An additional budget of $4.100 million was incorporated into the draft 2022/23 Annual Business Plan for public consultation endorsed by Council on 12 April 2022. A further additional budget of $0.470 million was endorsed by Council for inclusion within the 2022/23 Annual Business Plan.

Total additional budget required is now [redacted] with probable reduction of [redacted], providing the total project increasing in budget by [redacted].

It should be noted that the costings of [redacted] are predicated on the reinforcement material supplier holding prices for a period of 15 days, which expires on 21 December 2022. The reinforcement materials are highly in demand, being used extensively by the mining industry. The current lead times of 8-10 weeks are predicated on availability of stock. Usual mining industry procedures are for materials to be procured in December, therefore should Council resolve to support the additional construction costs, the Administration will move swiftly to secure the remaining materials, hence avoiding any further supply chain issues.

Through discussion at the Elected Members Forum on 22 November 2022, there is an opportunity for the Council to resolve to write to the State Government and the Federal Government for additional funding for the Coastal Walkway Project.

High-Level Option Evaluation

The external project Superintendent has provided a high-level cost analysis of the boardwalk versus bridge option, drawing on the same logic applied for the bridges from a scope and escalation perspective (20%). Advice from both North Projects and the Head of Procurement confirms that the market is typically experiencing escalation rates between 15% - 25%, hence the adoption of 20% for purposes of the high-level cost analysis.

This high-level analysis demonstrates that the bridges still provide a more cost-effective solution at [redacted] compared with [redacted] for the boardwalks.

Table 2

[redacted]

The Superintendent has confirmed that typical escalation rates for other projects are between 15% - 25%, hence the adoption of 20%.

The Administration's Head of Procurement has verified North's use of the 20% figure. confirming that market conditions currently being experienced globally have seen material costs increase dramatically for construction projects. Utilising market research from Rawlinson's (Industry Cost Surveying publications), the annualised increases for structural steel and timber has continued to be over 20% from a year-on-year perspective. In addition, there are emerging increases with associated labour costs (CPI and labour shortage) which has seen 8-10% increases experienced over recent months. The indication from all publications suggests these trends will continue throughout the 2023 calendar year.

[redacted]

[redacted]

[redacted]

- [redacted]
- [redacted]
- [redacted]

[redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

CONSTRUCTION PROGRAMME

Should Council support the additional construction cost, the Administration will immediately procure the remaining reinforcement materials to enable construction works to commence late January/February 2023 for an anticipated completion date of December 2023.

The following construction program identifying key dates has been submitted by the contractor.

1 SITE ESTABLISHMENT	January 2023
2 GREY GULLY	
2.1 Demolition	February 2023
2.2 Bridge Construction	March 2023
2.3 Boardwalk Construction	July 2023
2.4 General Landscaping	November 2023
3 KURNABINNA GULLY	

3.1 Demolition	February 2023
3.2 Bridge Construction	March 2023
3.4 Boardwalk Construction	July 2023
3.5 At-Grade Paths	October 2023
3.6 General Landscaping	November 2023
4 PRACTICAL COMPLETION	December 2023

RECOMMENDED NEXT STEPS

Project continuation

The above report articulates that the bridges still provide a stronger solution from many perspectives including cost, environment risks and safety in construction.

[redacted]

It should be noted that the deposits for materials were placed after contract execution and during development of IFC's to minimise the impact of issues with national and global supply chains.

Escalation of [redacted] for materials has occurred in recent weeks. Prices are held until 21 December 2022. Any further delay in endorsing the additional expenditure for the bridges will result in CoM incurring costs. Such increases would be applicable for either bridges or boardwalk solutions.

Whilst it is not possible to foresee unforeseen conditions such as latent conditions, the bridge solution provides limited touch points for the footings in contrast to the boardwalk option which would require hundreds of shallow footings across both gullies.

The Administration has previously achieved endorsement for an additional $560k project contingency in additional to construction contingencies and preliminaries.

Additional Budget Allocation and Grant Funding

Further to the Forum update on 22nd November 2022, North Projects have completed the verification of the revised cost assessment. North have assessed the variation and believe the total claim to be in the order of [redacted] a reduction of [redacted] from the revised variation submission of [redacted]. North Projects are progressing negotiations with the head construction contractor.

Therefore, the total construction cost of the project will require an additional [redacted] to be allocated within the 2023/24 Long-Term Financial Plan.

Administration recommend that Council endorse the additional required funding to approve the variation to enable the ordering of the remaining materials and site mobilisation to commence mid-late January 2023.

Additionally, in December 2021 the Council resolved (GC211214F18.3) that the Administration can seek opportunities to source more funding from the State and / or Federal Government. Given the

ongoing design and only recent determination of the final project cost, the seeking of additional funds has not yet been undertaken.

There is an opportunity for the Council to resolve to write to the State Government and the Federal Government for additional funding for the Coastal Walkway Project. This has been incorporated as a recommendation.

[redacted]

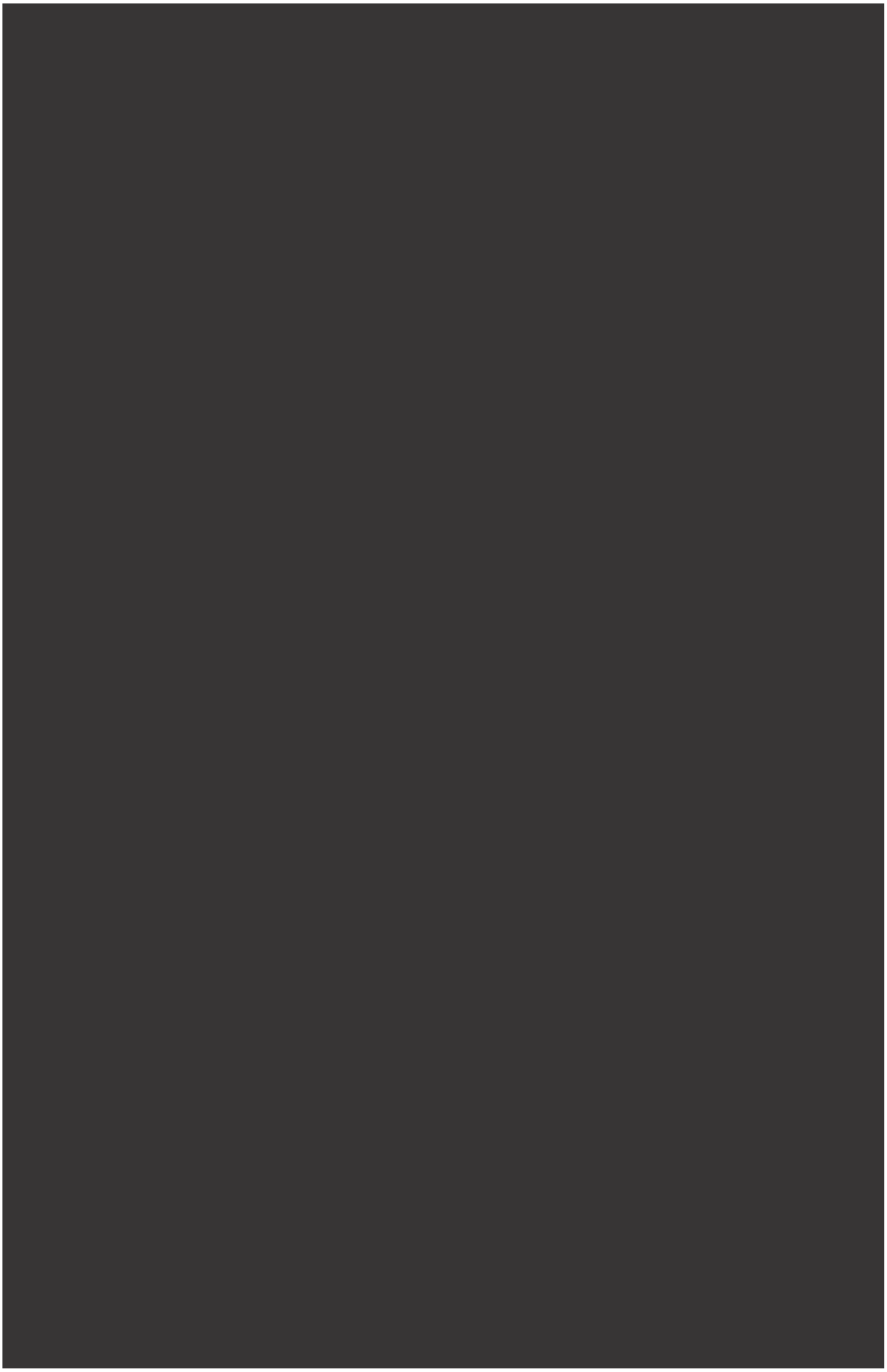
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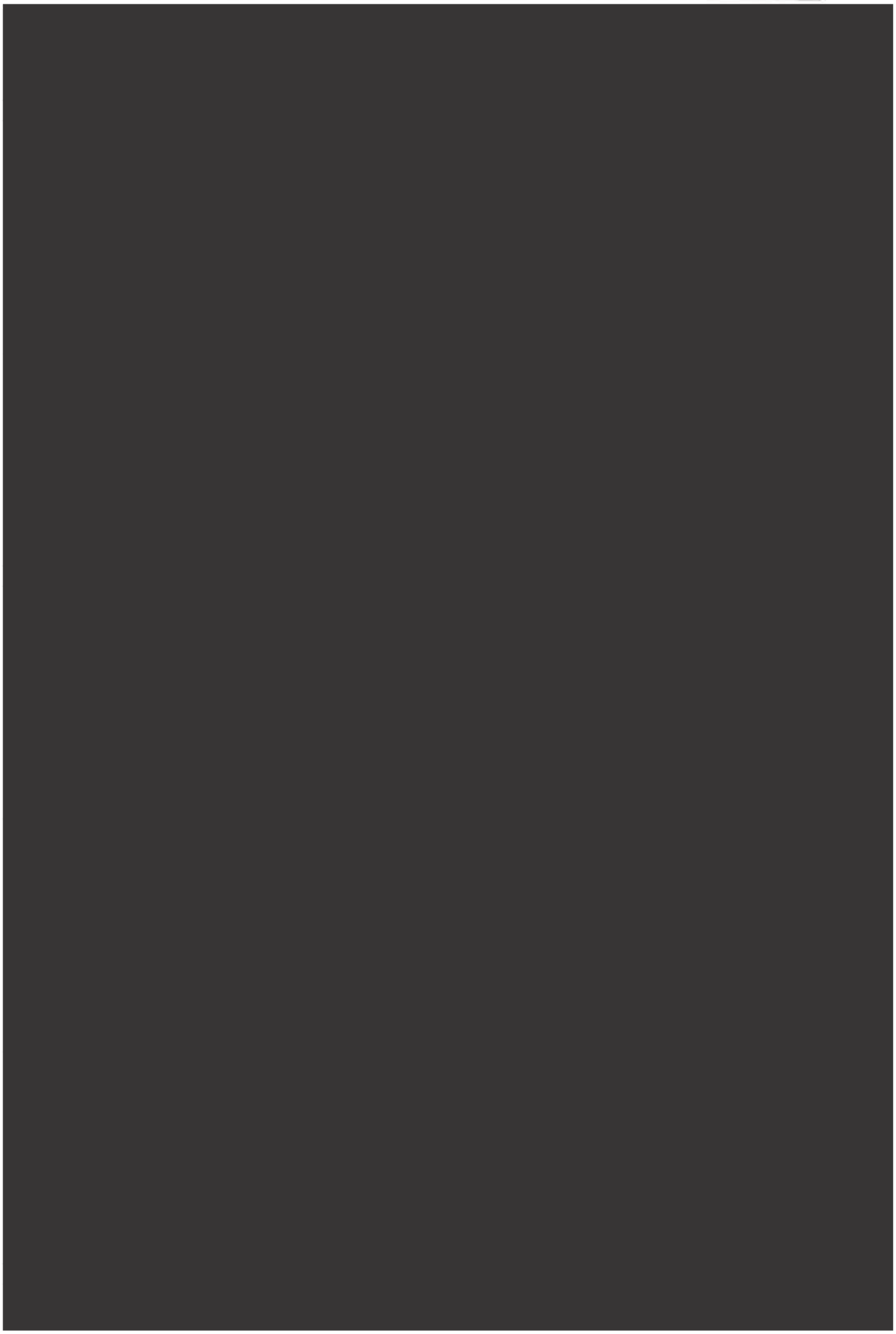
Communication

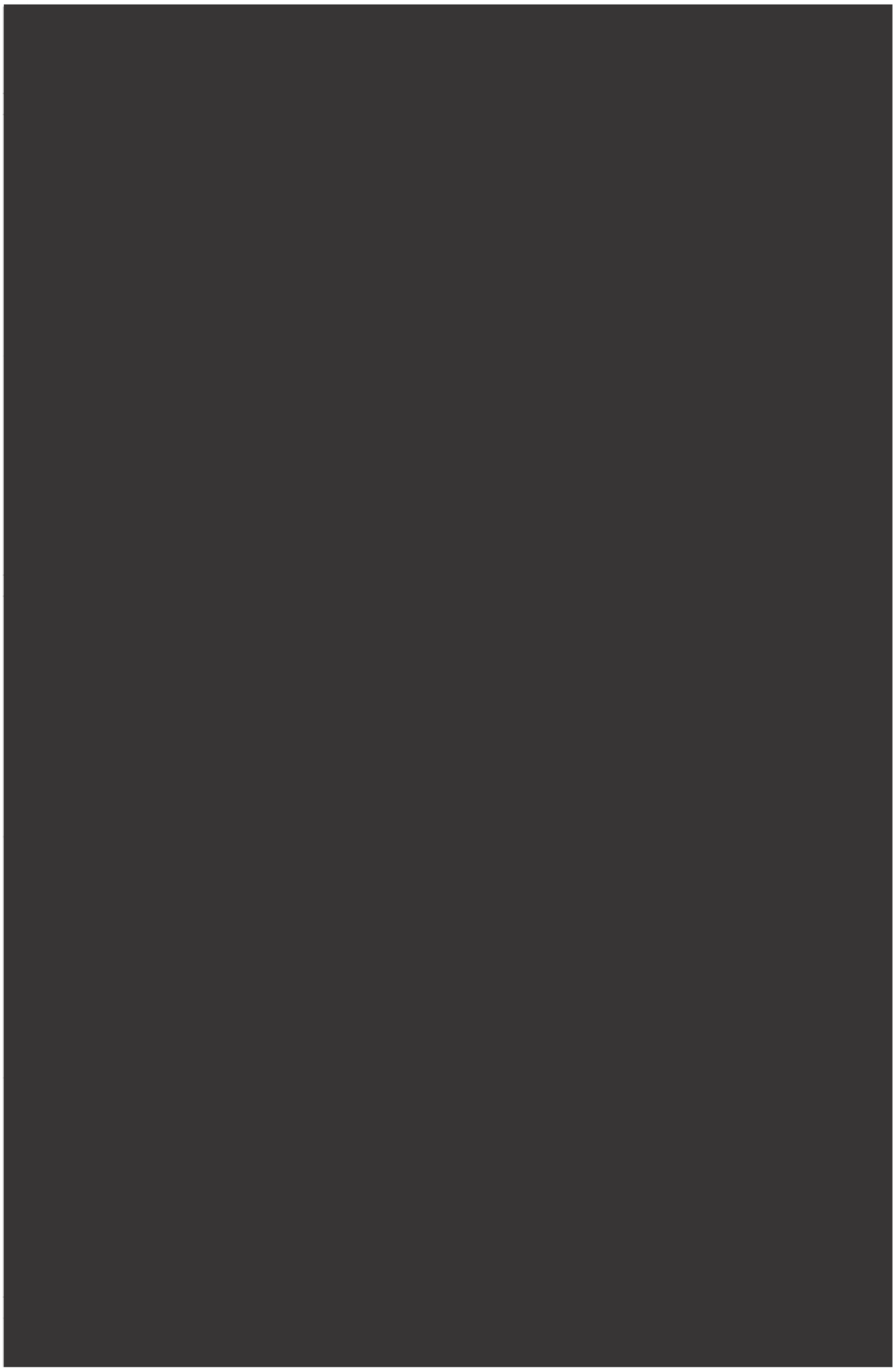
The Administration recommends that pending GC endorsement officers will update the community information on the Making Marion site and provide notification to nearby residents adjacent to the works.

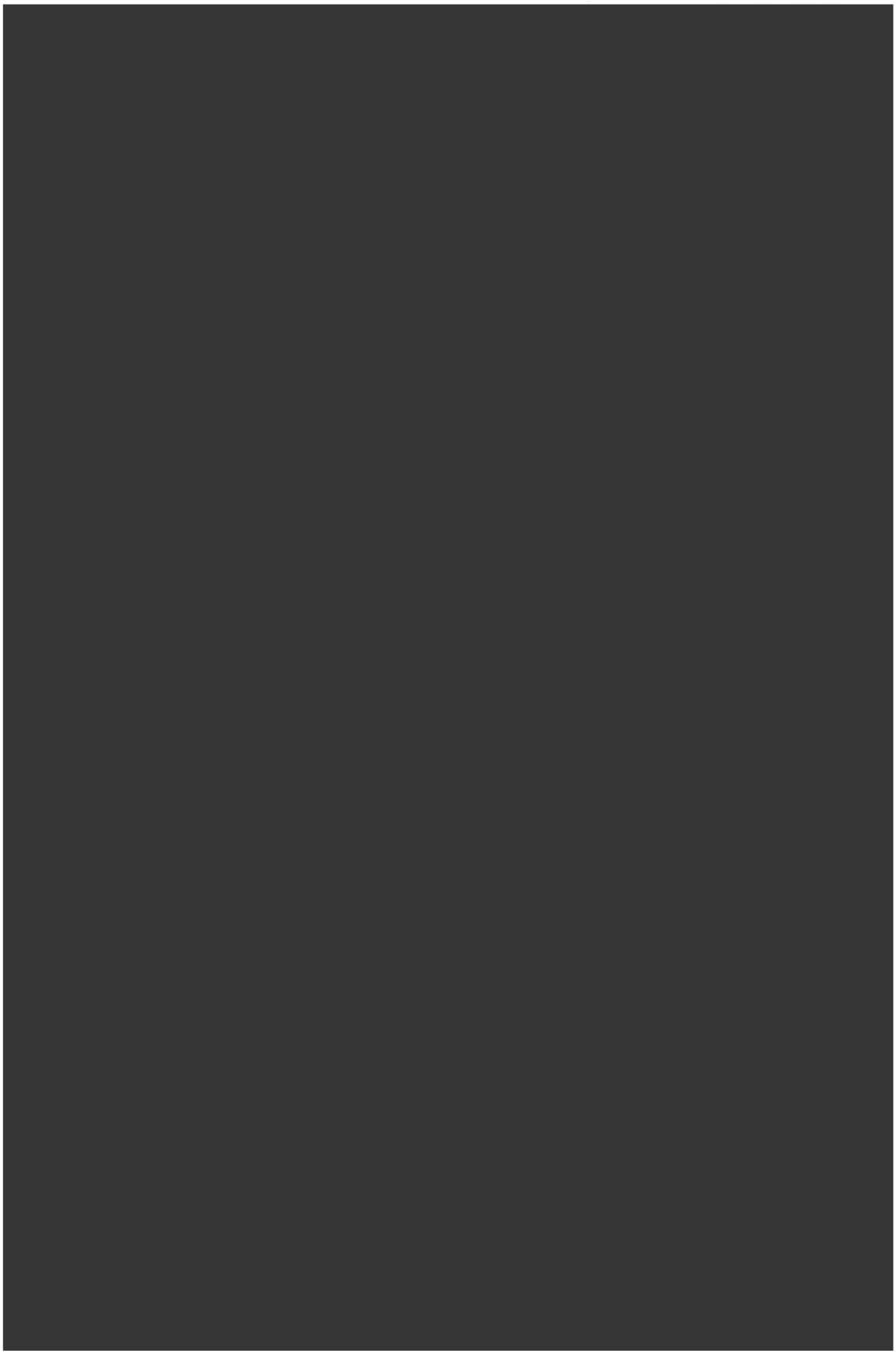
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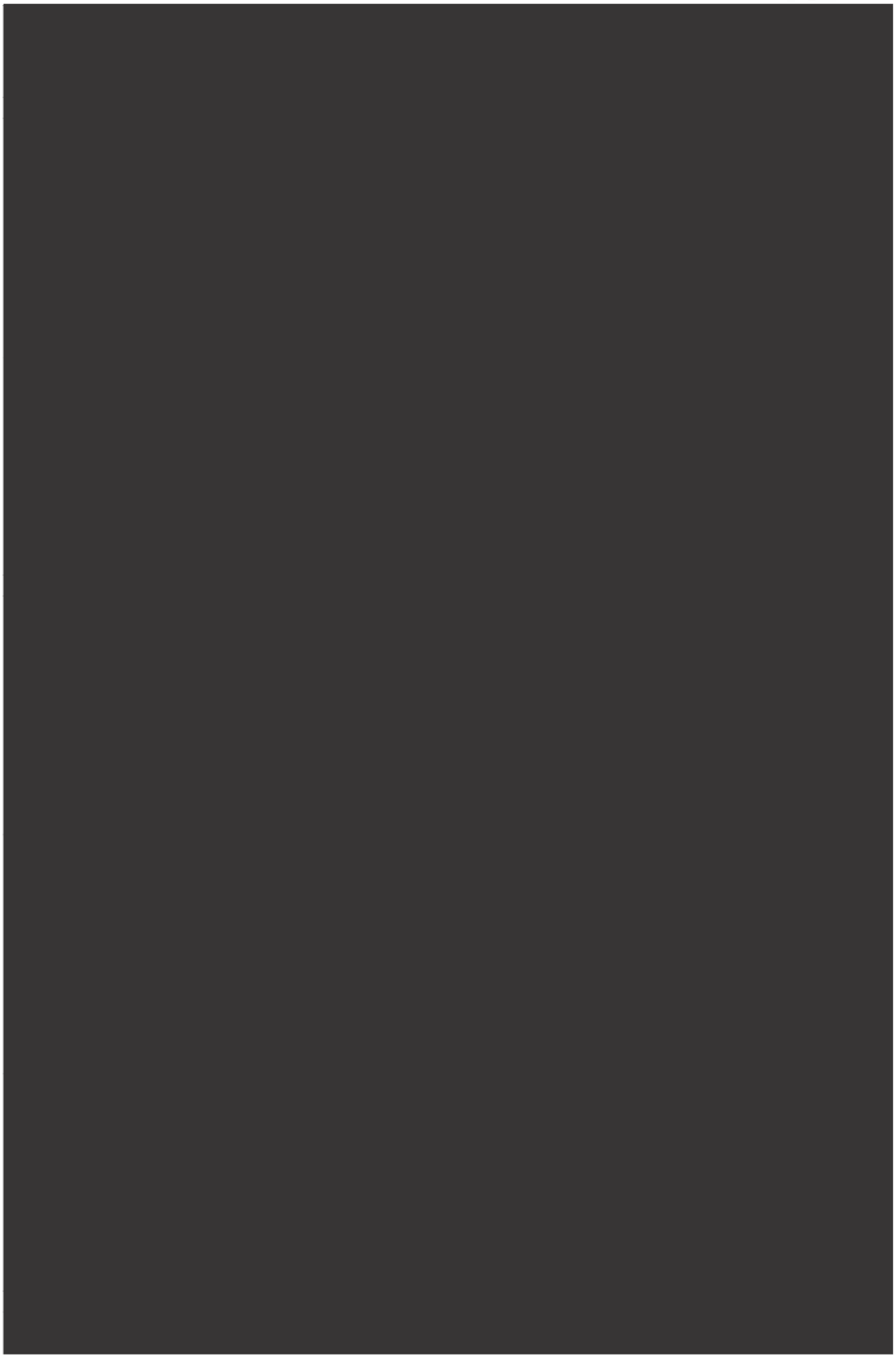
1. Letter to City of Marion - [redacted] [**10.1.1** - 15 pages]
2. Bridge & Walkway Evaluation Report [**10.1.2** - 22 pages]
3. Coastal Walkway Environmental Review - [redacted] [**10.1.3** - 28 pages]
4. Civil Drawings [**10.1.4** - 1 page]
5. Kurnabinna Gully - Drawing [**10.1.5** - 1 page]
6. Coastal Walkway - Civil - 13 December 2022 Attachment [**10.1.6** - 4 pages]
7. Contractor Construction Advise [**10.1.7** - 5 pages]
8. Perspectives and Images [**10.1.8** - 5 pages]
9. Bridge Foundation Loads [**10.1.9** - 2 pages]
10. H X 200701 Marion Coastal Walkway Upgrade Cultural Heritage Report FINAL [**10.1.10** - 35 pages]

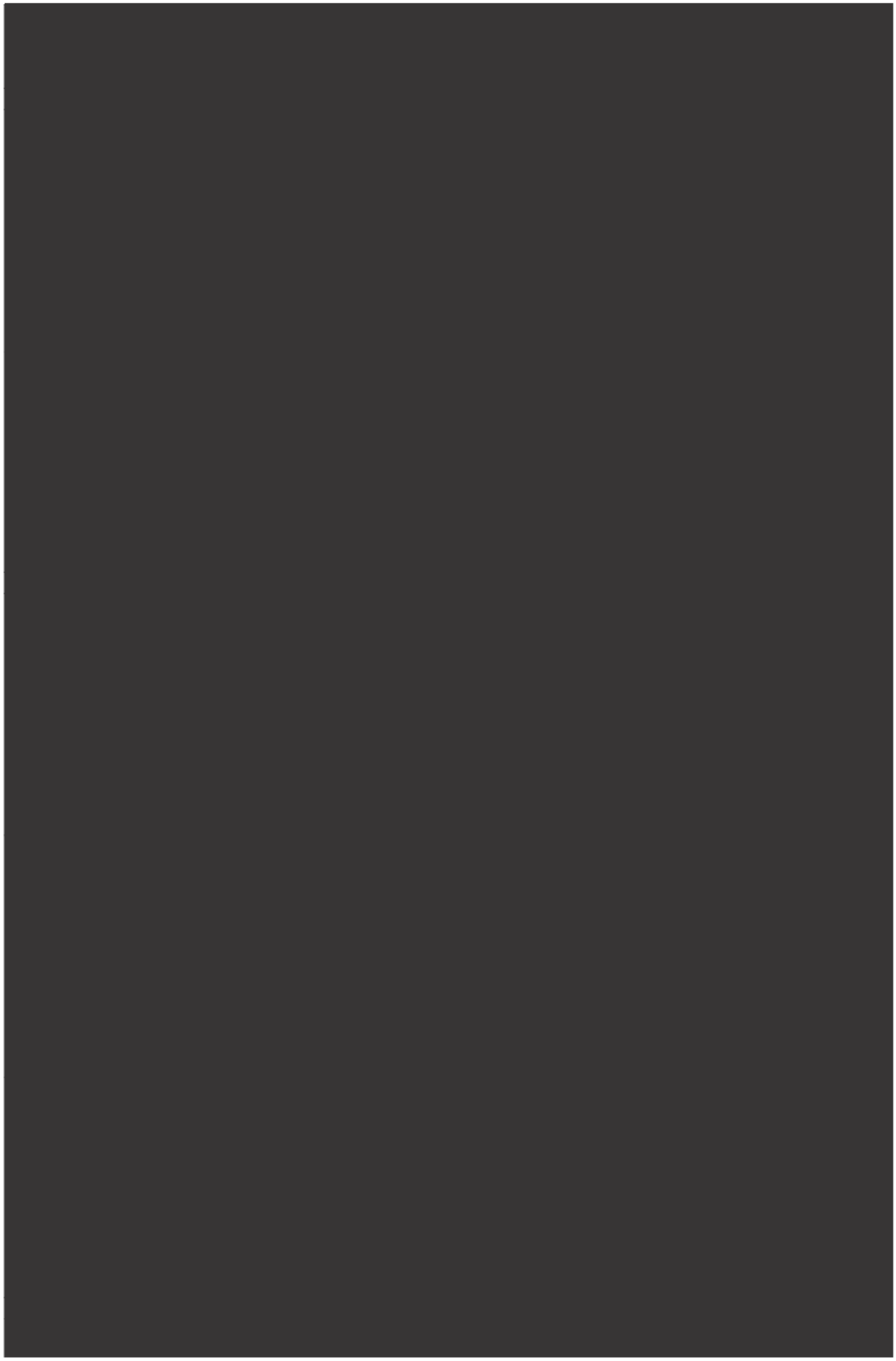


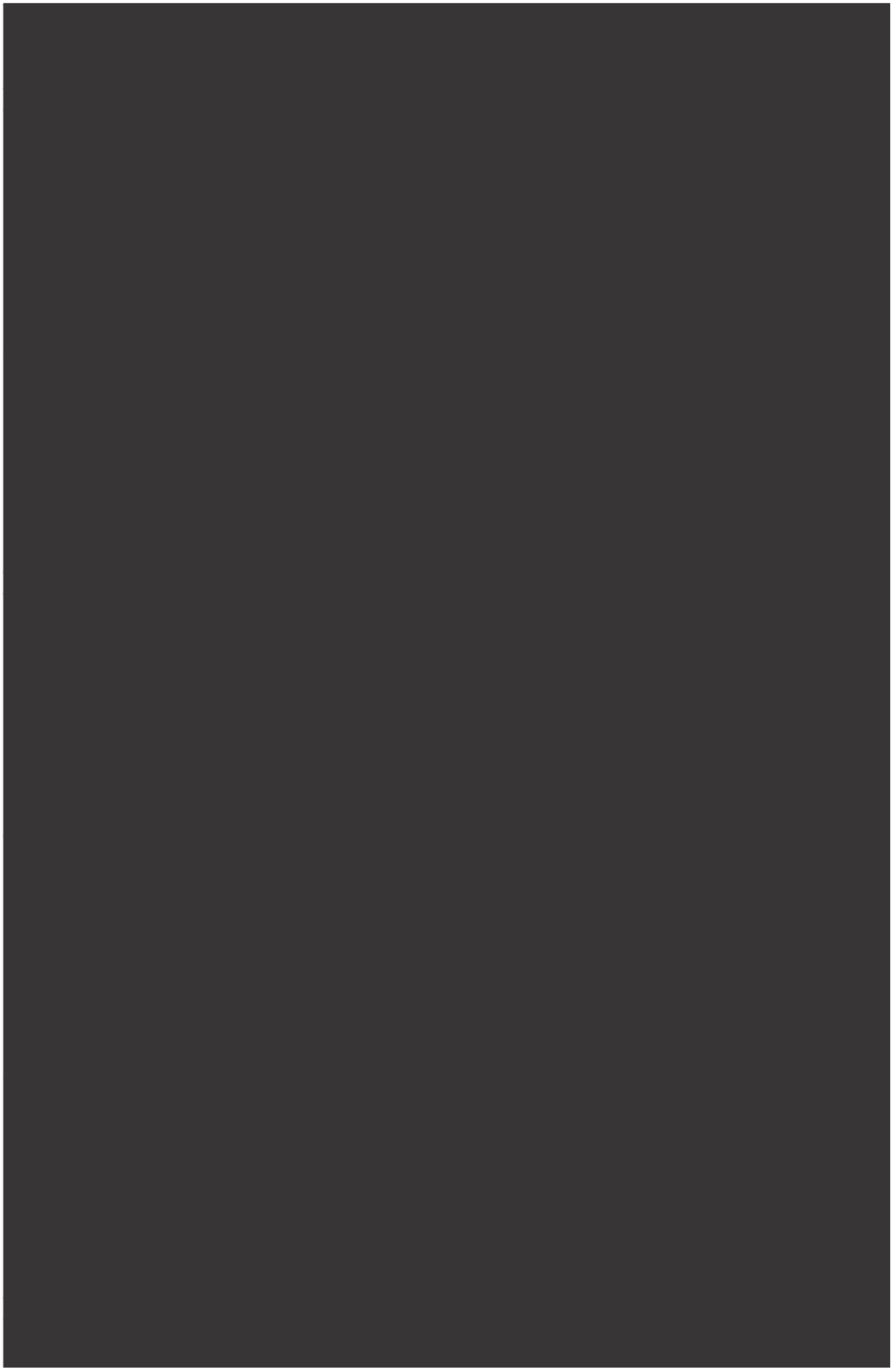


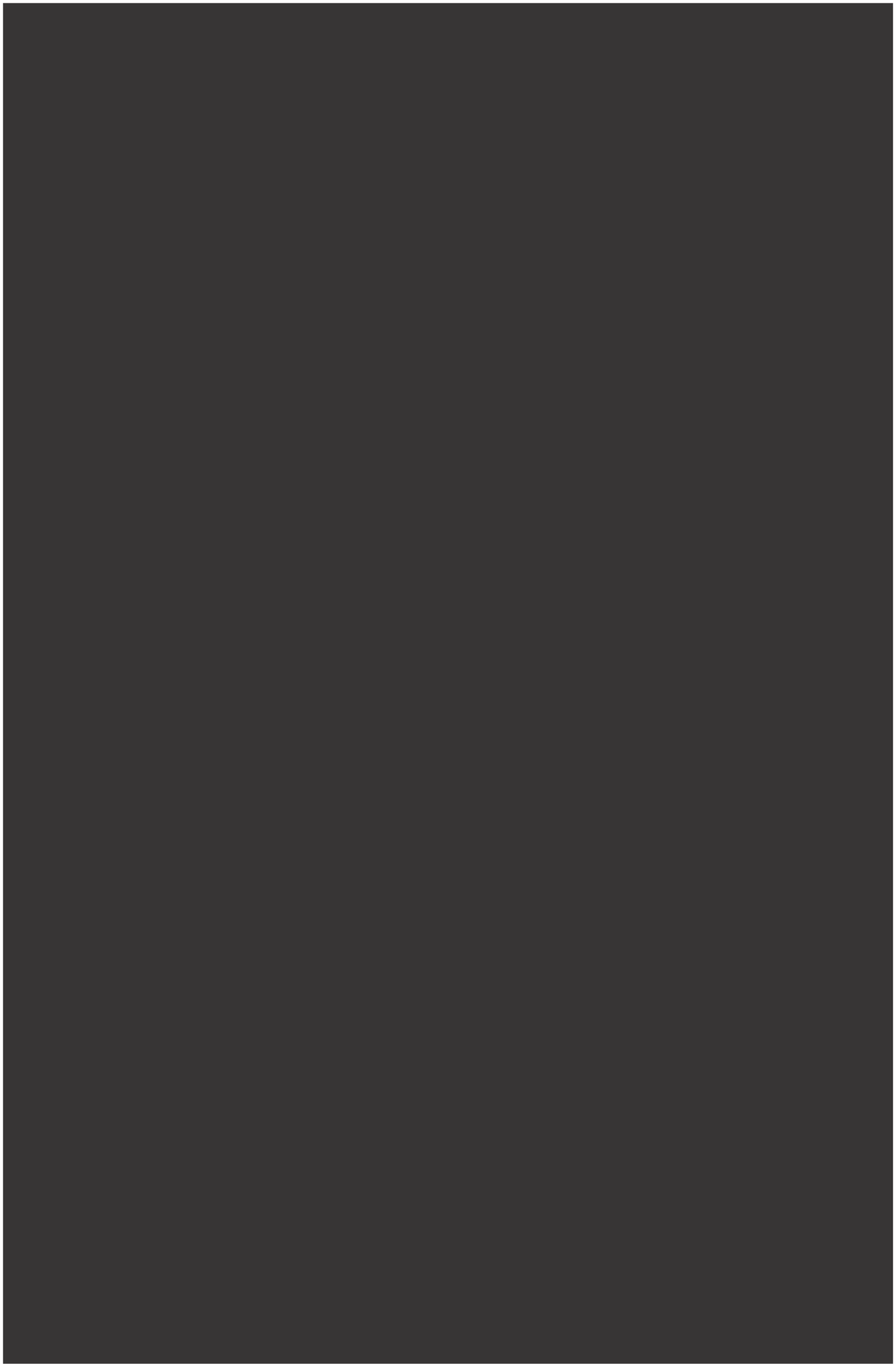


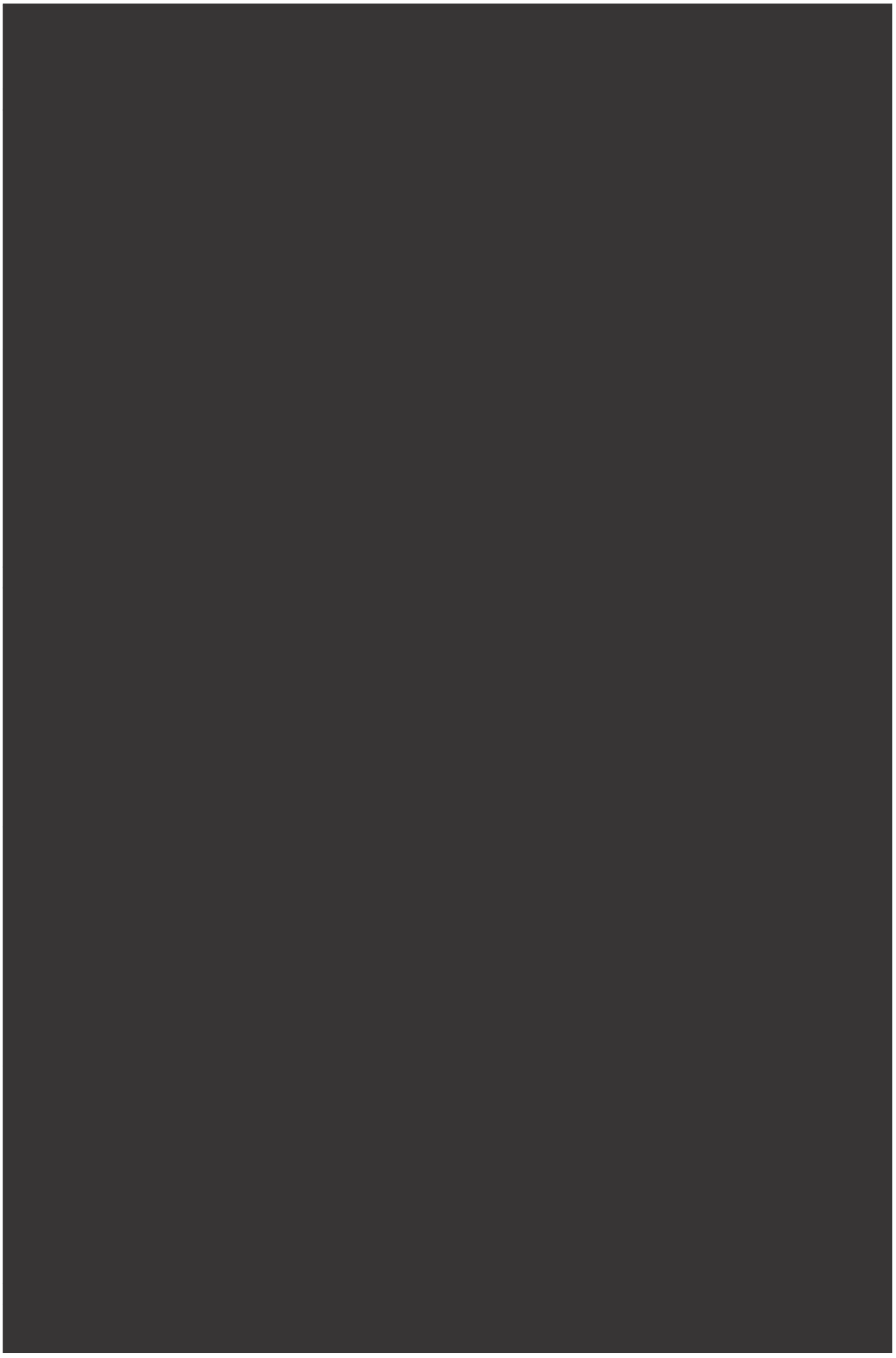


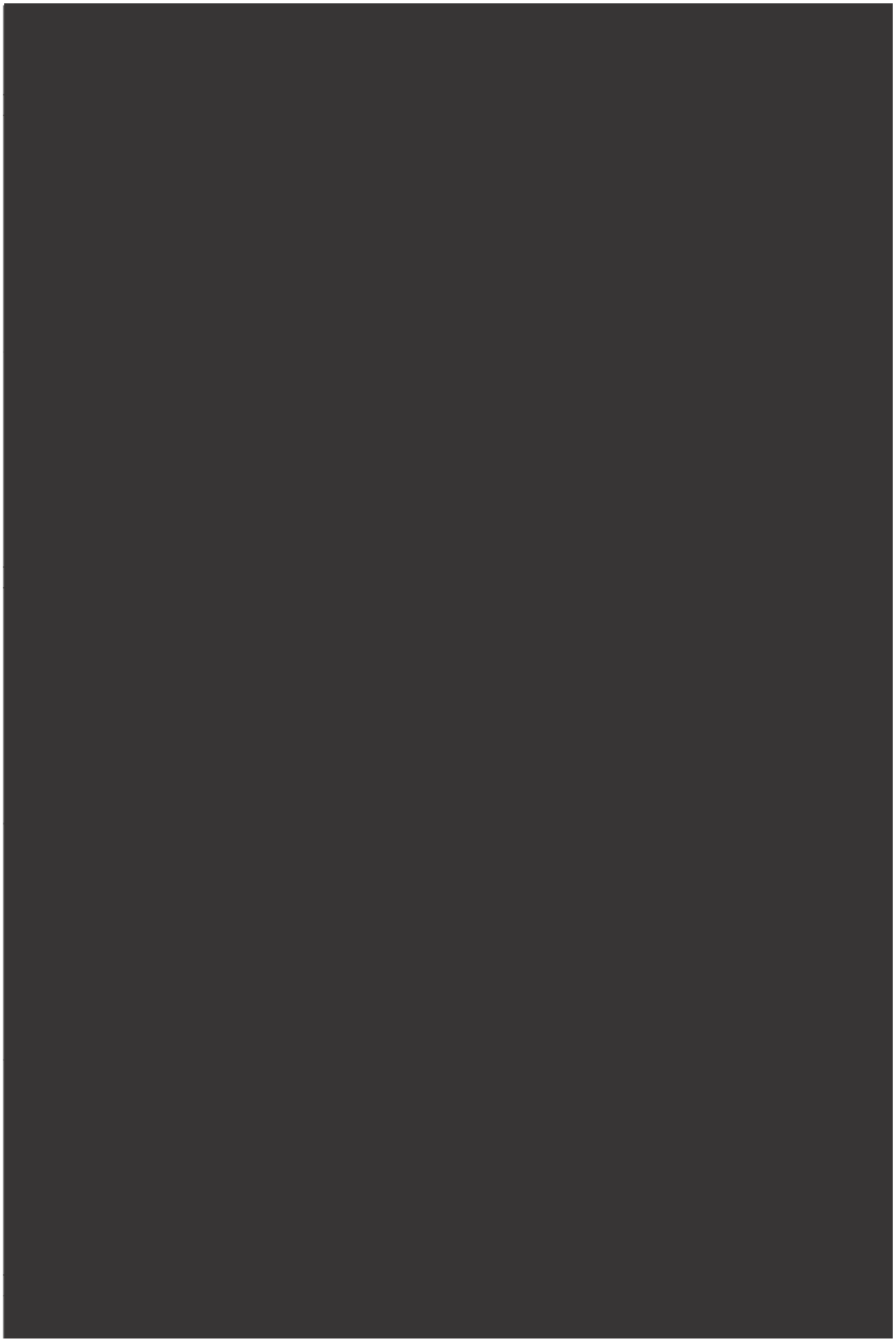


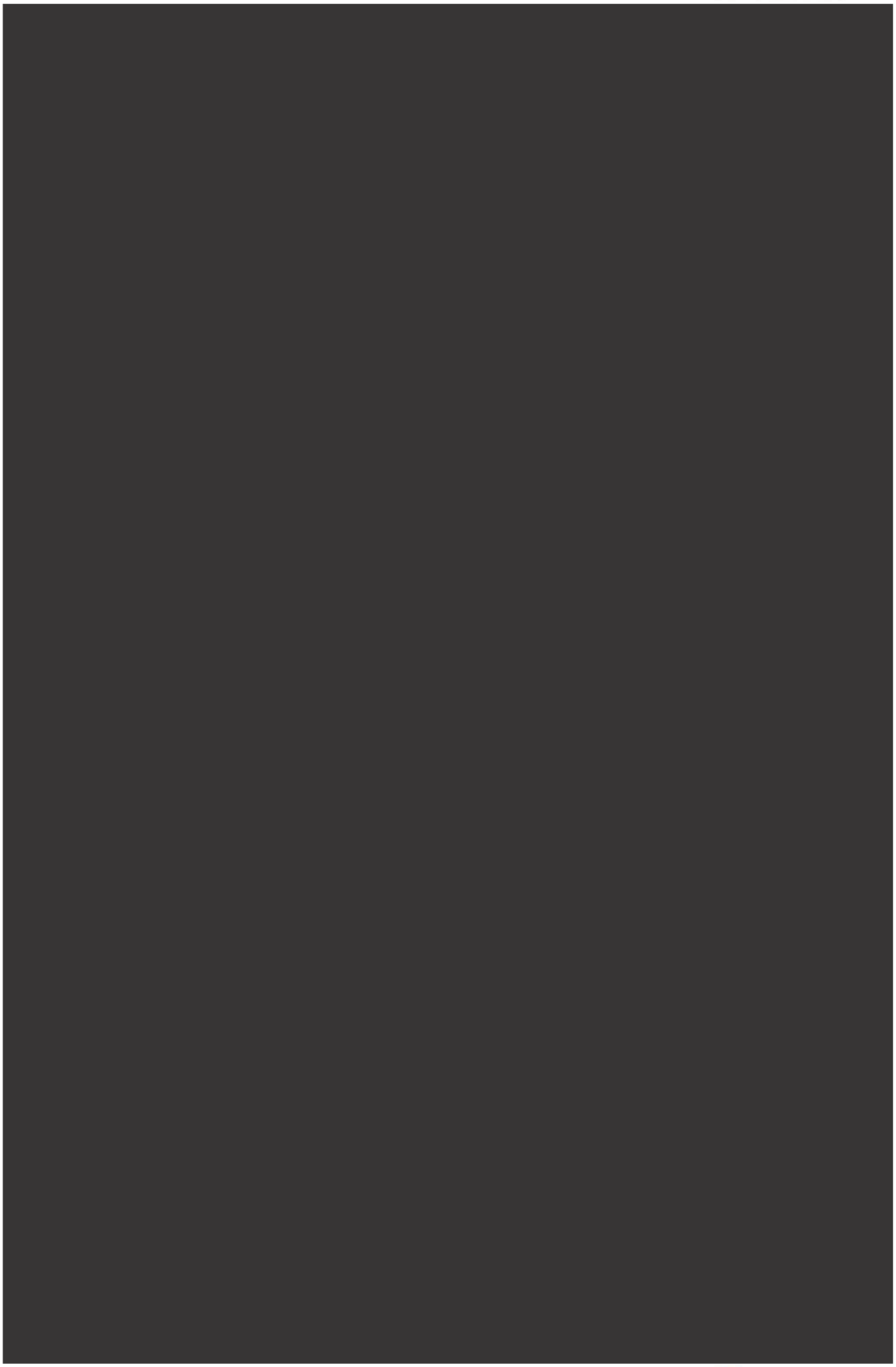


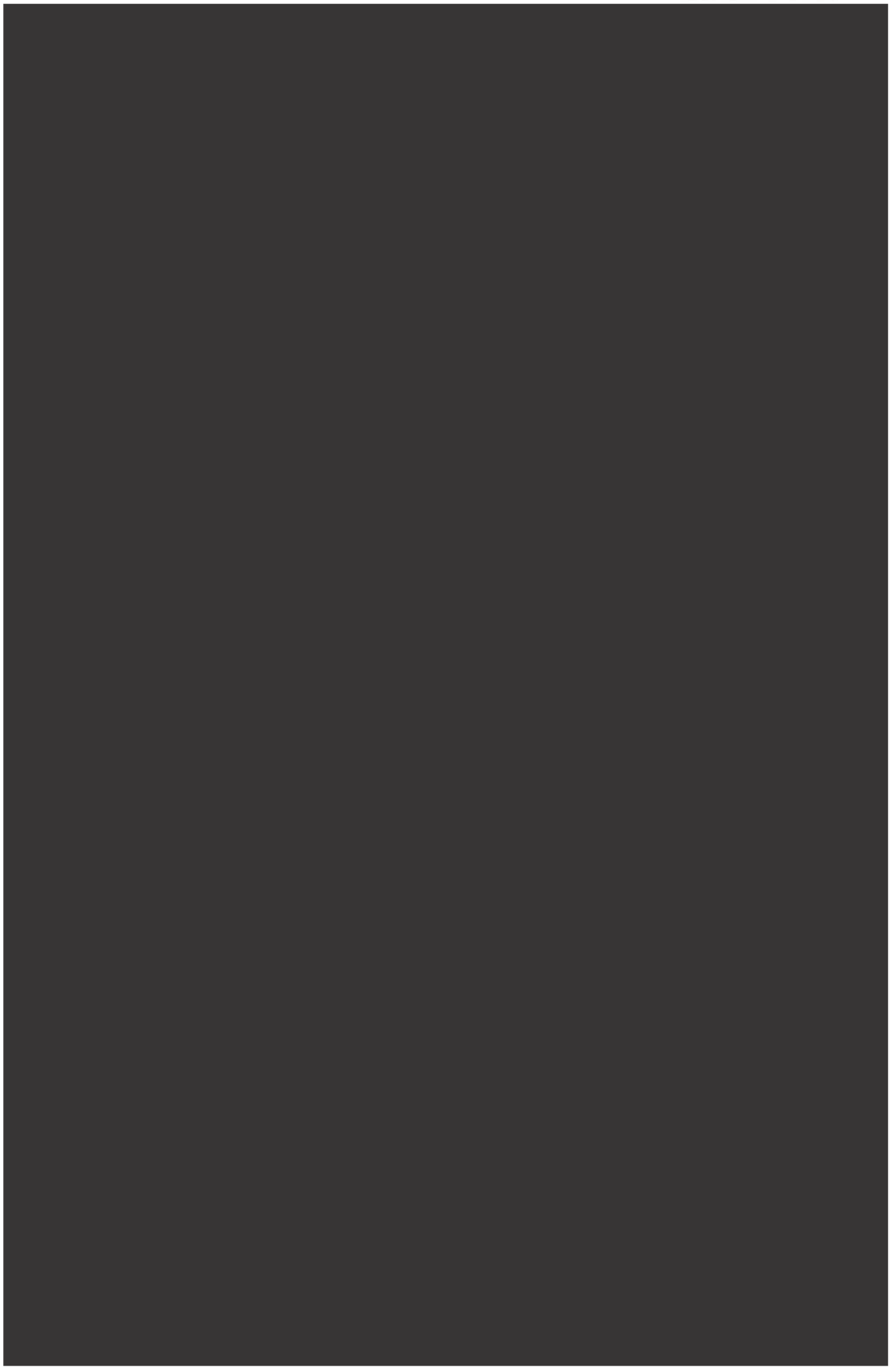


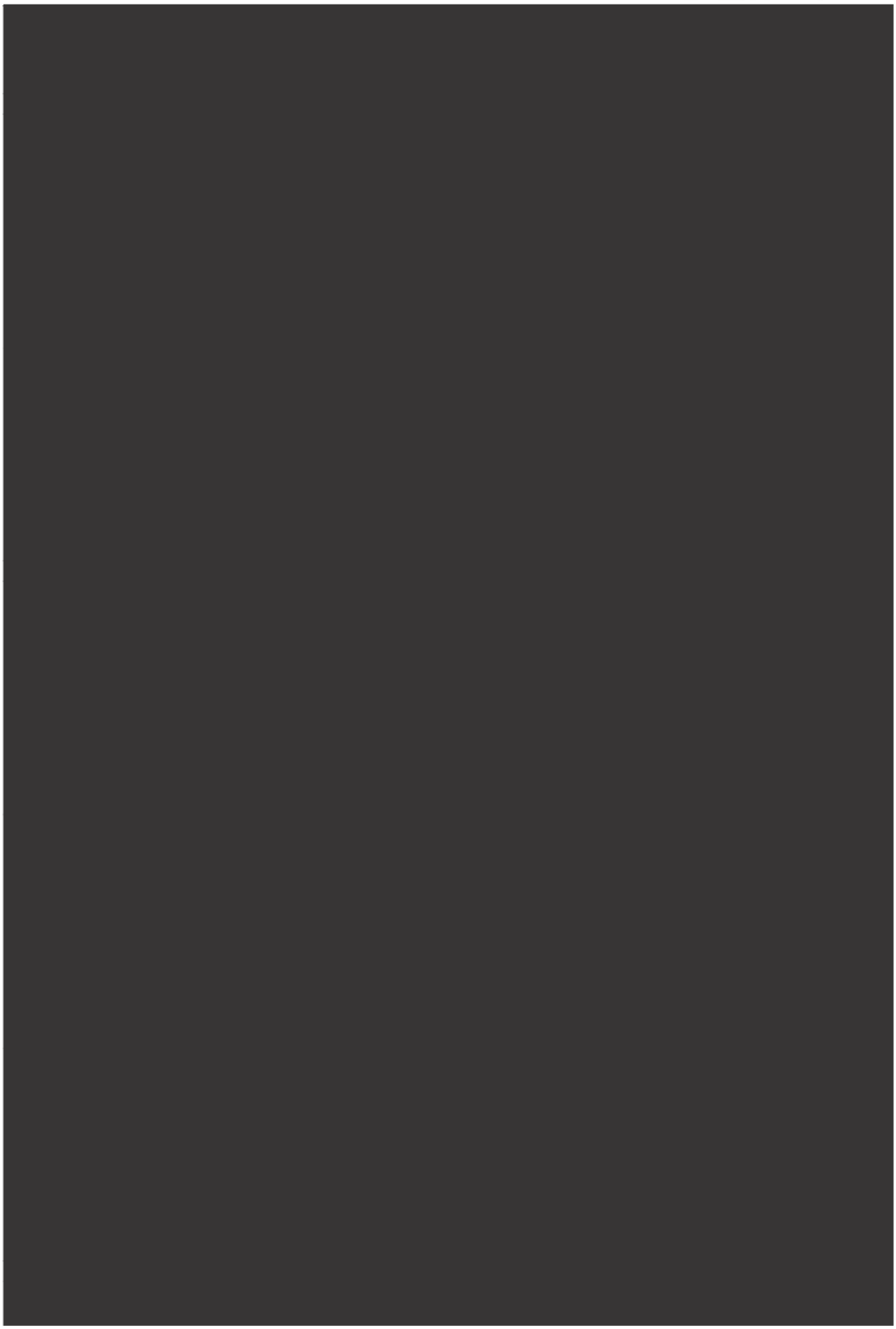


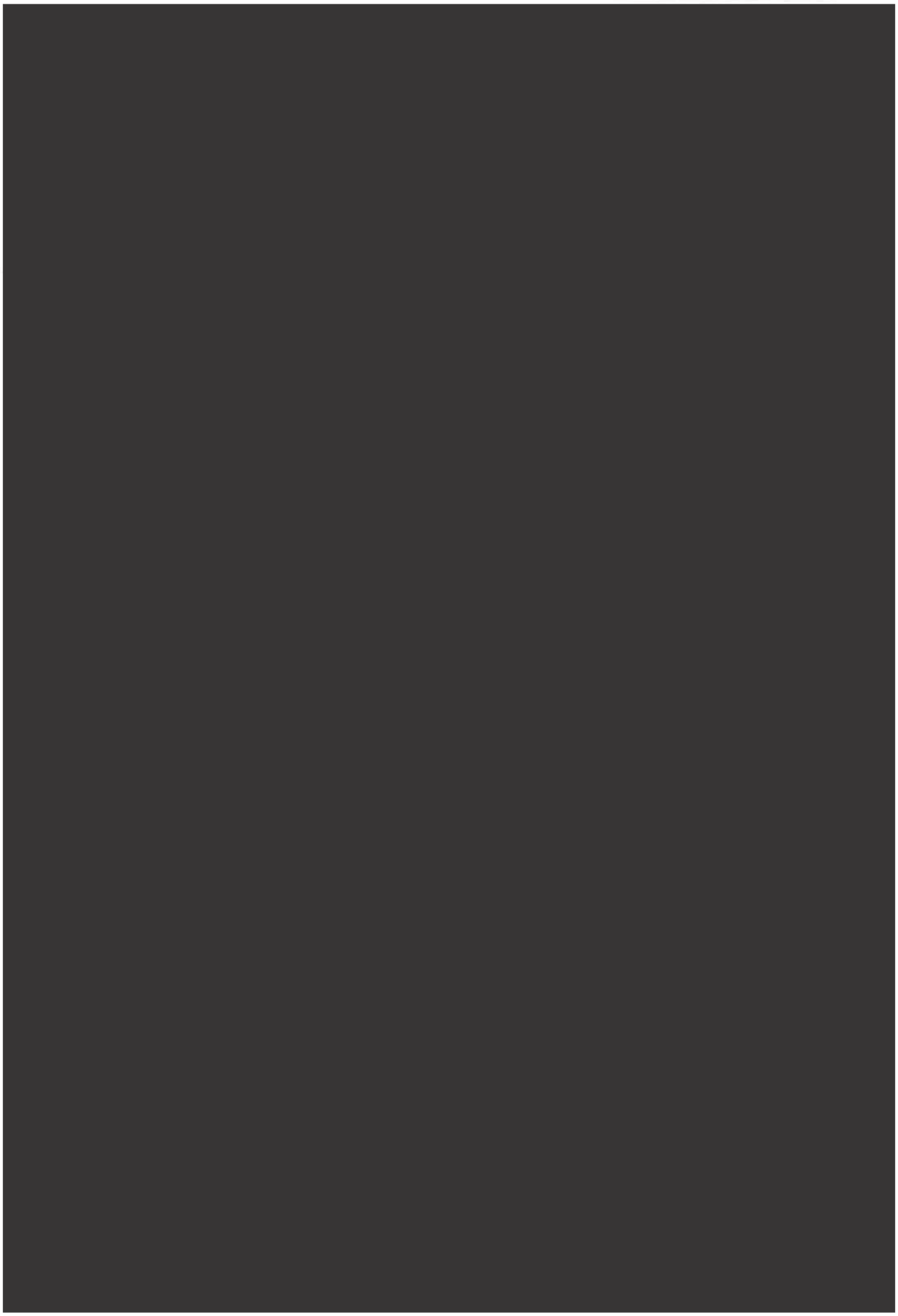
















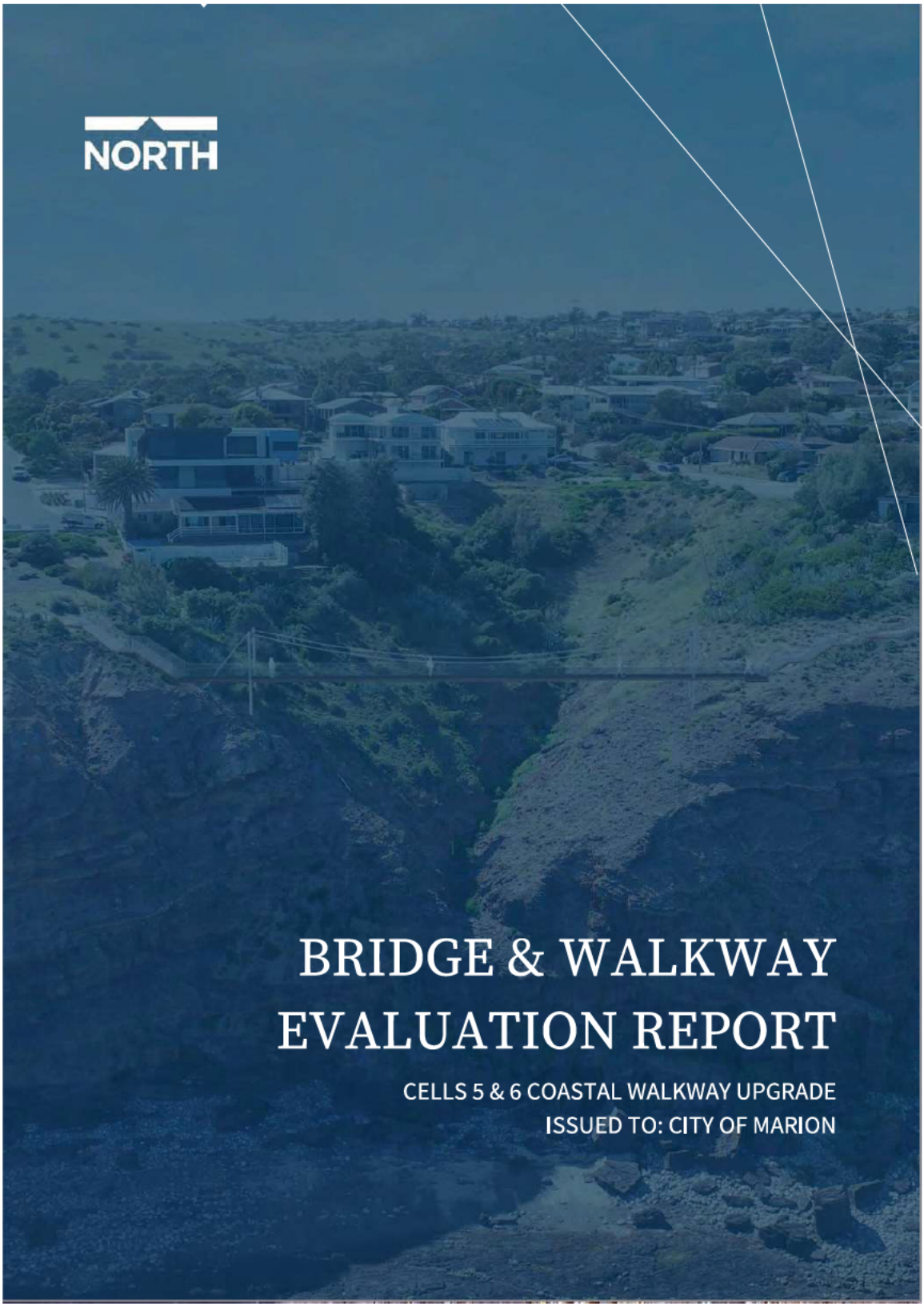

NORTH
BRIDGE & WALKWAY
EVALUATION REPORT
CELLS 5 & 6 COASTAL WALKWAY UPGRADE
ISSUED TO: CITY OF MARION

Table of Contents

1. Executive Summary 3
2. Introduction 4
3. Bridge & Boardwalk Evaluation 5
3.1 Financial Assessment 5
3.2 Time Assessment 7
3.3 Environmental Impact Assessment 7
3.4 Accessibility Assessment 8
3.5 Risk Assessment 9
3.6 Maintenance Assessment 9
4. Industry Engagement (ECI Process) 11
4.1 Overview 11
4.2 Benefits 11
4.3 ECI Process 11
4.4 Bridge Pros & Cons 12
5. Conclusion 14
6. Document Title 15

1. Executive Summary

City of Marion and the State Government allocated $4.8M to redevelop Cells 5, 6 and 10 of the existing Coastal Boardwalk. The budget did not suffice as founded in early cost consultations and as a result, Council decided to proceed with developing Cell 10 (Heron Way and Field River connection) and then Cells 5 & 6 would be procured through Early Contractor Involvement to have industry specialists and contractors to provide advice to inform design changes that would assist and influence a more feasible and sensible design for construction.

The full extent of the ECI process can be sighted in Appendix A. This procurement method was elected due to the complexity of the project site and the original pricing revised in the early phases of project development. The benefits of the ECI include a more cost-effective final design and less variations during construction. During the ECI process it was tabled that the inclusion of a bridge could be beneficial to the project and elevate a lot of the main concerns and key risks.

In Council exploring the inclusion of bridges to each gully it was suggested that this would minimise the construction risk, project timeframe, environmental impact, project cost and accessibility constraints for the project. The industry specialists informed the evaluation of both structures and Council then investigated both the boardwalk and the bridge based on these key elements.

The bridge was the recommended option from a financial standpoint as it the direct and ongoing whole of life costs are considerably less than the boardwalk option. The bridge structure also has reduced construction risks resulting in less contingency required for the total project cost.

Both structures are comparable in respects to time as expected completion date is similar between the two. Time advantages for the bridge had been nullified by the endorsement process and additional design work required to implement the structure. Provided construction works commence by April 2022 it is anticipated that works will be complete early 2023.

Through this process, the project team identified several accessibility constraints and the implications of these. It was also evident the boardwalk structure would result in a larger environmental impact, as well as a greater amount of safety concerns associated with the construction of the structures. Limited by the inability to get machinery access to the base of the gullies, the majority of the boardwalk would need to be delivered and installed by hand resulting a lengthier project program.

Council was advised on the risks associated with each structure which are summarised in Appendix B and Appendix C. The risk assessments outlined that there was a significantly higher degree of risks associated with the construction of the boardwalk than for the bridge which has the potential to substantially impact time and cost of the project.

Community consultation identified public concerns around the visual and noise impact of the bridge. It was found that all nominated locations of the bridge portals (pillars) are beneath the line of sight for neighbouring residents and that the structures noise and vibration impact would be negligible and considering this the adverse impacts of the bridge are reduced.

With an emphasis on the key project deliverables being noted as a positive in the adoption of the bridge, such as safety in construction, time for completion, accessibility, and budget as well as the additional environmental benefits it was evident through this exercise that the bridge was the favourable structure to achieve a best for Council outcome. This in conjunction with the compared key factor assessments as noted in Section 3 reiterates the superiority of the bridge in lieu of the boardwalk.

2. Introduction

Note all information provided within this report is confidential in nature and is for internal use only.

City of Marion and the State Government have allocated $4.8M to redevelop Cells 5, 6 and 10 of the existing Coastal Boardwalk. The existing walkway is approximately 20 years old and coming to the end of its design life. The intent for the funding and redevelopment was to remove and replicate that of the existing boardwalks, climbing the natural gullies terrain.

Through early cost consultation and concept designs, it was discovered that the allocated $4.8M would not suffice to deliver all the required works as per Council's scope and as detailed within the Concept Designs due to the site complexities with access.

As a result, it was decided that Council would proceed with developing Cell 10 (Heron Way and Field River connection) and issue as a separate tender for commencement in early 2021. Cells 5 & 6 then would then be procured through Early Contractor Involvement to engage industry specialists and contractors to provide expert advice to inform design changes that would assist and influence design detailing and drive a more feasible and sensible design for construction.

Throughout this process, Design Consultants, Cost Consultants and the Council have been informed and educated on the key complexities determining and identifying the constraining elements. The alterations from the original design to the current design, with the adoption of bridges to provide access across both the Gullies can be understood within the assessments as detailed in the below report.

3. Bridge & Boardwalk Evaluation

3.1 Financial Assessment

With costs being the rationale behind undertaking an alternative procurement method, an ECI, it was a key consideration at the basis of each decision and when progressing through each phase. With the project team knowing the current allocated budget did not suffice to construct the original concept design, the intent of design critique in Workshop 1 was to determine areas of opportunity that would decrease final project costs.

In completing cost comparative estimates based off the pricing provided by the contractors within Workshop 1 for the bridge construction, the opportunity was identified to implement a bridge as a more feasible alternative.

The below tables outline the cost per cell for each design concept:

TABLE 1: ORIGINAL CONCEPT BOARDWALK ESTIMATE (LM BREAKDOWN)

	QUANTITY (LM)	RATE (EX GST.)	TOTAL	SUM TOTAL
Cell 5 Grey Road Gully	341	[redacted]	[redacted]	[redacted]
Cell 6 Kurnabinna Gully	351	[redacted]	[redacted]	

TABLE 2: REVISED CONCEPT BRIDGE ESTIMATE (LM BREAKDOWN)

	QUANTITY (LM)	RATE (EX GST.)	TOTAL	SUM TOTAL
Cell 5 Grey Road Gully	330	[redacted]	[redacted]	[redacted]
Cell 6 Kurnabinna Gully	299	[redacted]	[redacted]	

The above figures are reflective of early figures provided by industry specialists for cost per bridge. It does not include future design development of the bridges. The tables above outline the cost per linear meters for each concept design - Table 1 reflecting the total linear meters covered with the installation of a boardwalk and Table 2, the bridge. It highlights the cost benefit in implementing the bridge within Cell 6 showing a reduction in excess of [redacted]per meter.

An addition to the project cost, there is a considerable difference in the costs for risks allowances associated with the construction methodology of each structure. Due to the complexity of the terrain and poor ground conditions, there would be larger sum for contingency required in the construction of the boardwalks due to the reliance of foundations down the steep embankment, potential increases in temporary works to provide access and project duration risks increasing preliminary costs. This is not factored into the above comparative costs and would further increase the price variance between both structures.

Further to the above, in evaluation of each structure, the maintenance, detailed in Section 3.6, and the consideration of the whole of life costs needs to be considers. It was identified that the boardwalk was a more costly option due to its larger footprint, maintenance schedule and accessibility constraints noting that the design life of each structure is equivalent.

Based on the information provided, the bridge is the recommended option from a financial standpoint as it the direct costs are considerably less than the boardwalk option. The bridge structure has reduced construction risks resulting in less contingency required and smaller costs associated with maintenance of the structure throughout it's design life. The below table outlines the overall costs per structure.

TABLE 3: OVERALL COST COMPARISON

	BOARDWALK	BRIDGE
PRELIMINARIES	[redacted]	[redacted]
CELL 5	[redacted]	[redacted]
CELL 6	[redacted]	[redacted]
PROVISIONAL SUM	[redacted]	[redacted]
WOL COST (50 YEARS)	[redacted]	[redacted]
TOTAL	[redacted]	[redacted]

The above table does not encapsulate contingency allowances required within the project budget to accommodate for potential variations that may arise as discussed in Section 3.5 below. It does outline the comparative total costs for construction and whole of life for each structure, solidifying that the bridge is a more feasible alternative.

3.2 Time Assessment

During the Expressions of interest, the contractors provided an indicative timeline for the completion of works to Cell 5 and Cell 6 based off the boardwalk design, this indicated a 12-month period was required to complete both Cells. Upon exploring the bridge option further, the contractors engaged provided a revised program for the construction of each Cell with a bridge which demonstrated a decreased time frame for the total construction period, however a lengthier timeframe was required to allow for bridge design.

Further to the construction timeframe, it is important to note due to the current volatile market constraints associated with procurement of materials with long lead times. Procurement of long lead time items have been allowed for and captured within each program. These would be relevant for both structures. The below table outlines items of concern for each.

TABLE 4: LONG LEAD PROCUREMENT ITEMS

ITEM	LEAD TIME (APPROXIMATE)	STRUCTURE
TIMBER	Up to 3 months	Both
STEEL	3-6 months	Both
FRP	3 months	Both
CABLES	6 months	Bridge

Additionally, within the current project timeframe constraints with a desired completion before the end of 2022 it is unconfirmed if such a large quantity of timber can be acquired in line with the project program. Expected completion date is comparable between the two as any time advantages for the bridge have now been nullified by the endorsement process and additional design work required. Provided construction works commence by April 2022 it is anticipated that works will be complete early 2023.

3.3 Environmental Impact Assessment

[redacted] completed an Environmental report which states recommendation for construction environmental management plans incorporating recommendations for weed and vegetation management and advice from Birdlife Australia to minimise the impact to local bird species. At the time of assessment, in August, it was noted there was only one native species identified and it was not detected as a location for migratory shorebirds, although it is important to note the report also states it was not optimal season to do so.

The notable impact in which the project area might have significant impact to the Lomandra Grassland, approximately 2500 square meters, two species of rare flora, Ptilotus Angustifolius and Myoporum Parvifolium and one fauna, Two Sooty Oystercatchers. The rare flora and fauna were only sighted at Cell 5, although further to this it was noted that there where few bird species inhabiting the mature trees in the general project area. Within Cells 5 and 6 five native vegetation associations where mapped, there are pictured within the gullies and climbing the cliffs edge adjacent to the at grade paths.

Due to the significant impact on the environment due to the complex terrain and susceptibility to inclement weather, it was a key discussion point when detailing the design and methodology for construction. To ensure safety in construction and endeavour to minimise the impact, it was noted that in designing the footings without large machinery for installation would minimise the need for temporary access tracks and significant temporary works.

Further to this, minimising the number of footings and associated disruptions to the ground would more greatly decrease the Council's risk to discovering latent conditions as well as the disturbance to local flora and fauna. The Bridge in comparison to the boardwalk has significantly less impact on the environment with only eight footings and a pile cap instead of the hundreds of footings required to install the boardwalk as well as substantial reductions in the temporary access tracks down the embankments.

Additionally, in the design development as a value management option, it was raised that removing the beach access at Kurnabinna Gully would result in significant cost savings and would minimise risk to the environment and public safety. By preventing the beach access, it removes the risk of entrapment from potential rock fall and associated hazards with tidal sea levels at the bottom of the gully, whilst additionally decreasing the project footprint. This assessment allowed council to land on the preferred position of removal of the beach access, noting that alternative accesses are available 1km to the south and to the west of Kurnabinna gully.

In decreasing the overall footprint within the gullies, it significantly minimises the potential impact to the environment and eases the environmental management obligations of Council and the contractor.

3.4 Accessibility Assessment

The current boardwalk is only accessible to the physically able and is classed as Grade 3 walking trail, alluding to the difficulty of its terrain, and whilst it promotes fitness aspects, it may deter the general public. The inclusion of a bridge in lieu of the boardwalk to the gullies reduces the difficulty of the entire boardwalk stretch by eliminating the need to traverse the gullies and creates a more appealing and inclusive asset for Council to attract the broader community. It would provide further access to portions of the coastal walkway for people of all abilities to enjoy the coastline views safely. Accessibility both during and post construction was a key project objective during the design development phase.

General public safety with the installation of the bridge was a noted risk when exploring the Bridge alternative, specifically the potential of falling / jumping risk due to height of the bridge. Additionally, there were concerns around people's apprehension to use the bridge because of it heights.

Further to the final product being more accessible post construction, the construction of a bridge provides the opportunity for the contractors to expedite the program and minimise the risk with the bridge alignment being positioned at accessible points of the gully. This would mitigate the safety risk in construction with the requirement to traverse the gullies. It was noted in early investigations that it was near impossible to have machinery access within the gullies and that an alternative construction method would be required to install the boardwalk, which would be costly in both time and money. The installation of the bridge eliminated the need to navigate the gullies and also allowed the use of the existing structures to complete demolition in lieu of additional temporary works such as harnesses and scaffolding, which would create further impact on the environment and be timely.

The decision to cut off access to the beach at Cell 6 inhibits local residents ease of access to their local beach and was not positively received by all members of the community in consultation. Although it prohibits this usage the removal of the access allows a safer construction methodology, with notable financial benefits and minimised public safety risks as detailed in section 3.3.

Accessibility factors attributed notably more benefits to implementing the bridge in lieu of the boardwalk. A Bridge is a more accessible both during construction and post construction and will appeal to a broader portion of the public.

3.5 Risk Assessment

In evaluating both the bridge and boardwalk concepts the risks associated where considered from both a cost, time and safety perspective. In completing early cost estimates, the Council where informed on the various risks that attribute to total project cost for each structure. Items such as higher contingencies due to increased risk for latent conditions associated with the boardwalk and additional design costs in order to inform the bridge design.

Due to the location, the construction period will be subjected to severe weather which leaves it susceptible to program delays. In order to mitigate this risk, the industry specialists provided recommendations around the formation of structures and constraints in constructability. In these discussions it was noted that due to the requirement for the boardwalk to climb the steep gully terrains it was more susceptible to longer construction timeframes and unknown issues resulting in latent conditions. It was this rationale that led to the suggestion of removing the beach access at Kurnabinna gully. In preventing the beach access, it mitigated potential rock fall risk to the public and minimised the construction risk by removing further need to traverse the gully with heavy materials and machinery.

Noting the susceptibility of inclement weather, all construction of the boardwalk would be completed off harnesses, leaving the project exposed to the chance of both safety concerns and program delays, resulting in higher contingency allowances and overall project cost. A detailed risk assessment is provided in Appendix C & B summarising the key risks associated with each structure. The risk assessments demonstrate the level of risk associated with each structure and clearly demonstrate that there are far greater risks in proceeding with the Boardwalk Concept Design.

3.6 Maintenance Assessment

Council Report issued in October 2021 noted that the bridge aligned to Coastal Walkway Asset Management Plan 2020 - 2030 which commits to the reduction of asset life cycle costs and improved functionality. The Council Report reflected on a whole of life assessment for both the Boardwalk and the Bridge structures, identifying the total assets cost to Council. This report founded that the bridge has a lifespan of 50-60 years with significantly less maintenance costs resulting in a whole of life cost [redacted]ess than that of the boardwalk.

The following table outlines the high-level maintenance requirements for each structure:

TABLE 5: STRUCTURE MAINTENANCE REQUIREMENTS

MAINTENANCE REQUIREMENT	CABLE BRIDGE	BOARDWALK
GENERAL	Easy access for visual inspection of all components	Hard access to visually assess the condition of the structure
LEVEL 1	Biannual inspections of condition of all components required by Council staff	Biannual inspections of condition of all components required by Council staff
LEVEL 2	5 yearly inspection on main support cables to test requirement for tightening and monitor structural elements by experience consultant	3 yearly inspections on structural elements by experienced consultant

Furthermore, the majority of the boardwalk structure would be constructed with timber decking that within the current market it is difficult to procure. Untreated timber requires more ongoing maintenance and upkeep to ensure its structural integrity remains in tack and splitting is avoided.

It was evident through the whole of life assessment that the longevity of the bridge was more suitable to the harsh conditions of the coastal environment than the boardwalk and aligned with Councils strategic goals more so than the boardwalk.

4. Industry Engagement (ECI Process)

4.1 Overview

North had been initially engaged to assist City of Marion to understand the project costs associated with the construction of Cells 5, 6 and 10. Through this engagement North discovered that the $4.8M budget allocated by Council and the State Government for the project works was an insufficient amount to complete the delivery as per concept drawings and its associated requirements.

North suggested that the City of Marion undertake an Early Contractor Involvement process to work through the project complexities and land at a design that was aesthetically pleasing, more budget friendly and buildable through the employment of selected contractors and expert personnel. The timeline of this process is summarised in Appendix A.

4.2 Benefits

The Early Contractor Involvement (ECI) process is typically utilised on projects that are complex in nature and require specialist input from experienced personnel in order to guide the design to assist in improving the constructability of the project. Due to the specialist nature of the process, an expression of interest was issued to five (5) contractors believed capable of both informing and delivering a complex project based on their previous experience and allocated personnel.

The benefits of an ECI can be summarised below:

- Δ More cost-effective final design
- Δ Less variations during construction
- Δ Great value than alternative procurement models
- Δ Increase in transparency
- Δ Shared project risk

4.3 ECI Process

The ECI Process founded the basis of information required to inform Council's design for Cell 5 and Cell 6 Structures. Due to the complexity of the sites, it was crucial to have consultation from industry specialist via the form of contractors to specify the constructability constraints, such as machinery access, design details to ease constructability and potential alternative methodologies to form the parameters of the design.

BluBuilt and [redacted] were the contractors engaged by City of Marion to partake in the ECI process alongside North Projects, [redacted] and [redacted] All parties during the ECI attended Workshops structured to inform the design development at each stage highlighting the crucial elements driving the project price, program and construction risks. It was within Workshops 1 & 2 the contactors highlighted the extreme difficulty in access within the gullies and inability to get any machinery to the base in order to complete construction of the boardwalks inclusive of foundations and material delivery. The inability to traverse the gullies to construct and install the boardwalk started the discussion around the design teams limitations in detailing the footing structures and that in calculating these they must consider the tools required for installation and the weight of materials proposed. In this workshop it was suggested by the contractors that Council consider the installation of a bridge across the top of the gullies in lieu of the climbing boardwalk to mitigate these risks, provide a more feasible design solution and decrease the construction duration.

After deliberation with the design and cost consultants it was identified that the bridge was a viable option and was proposed within the Council October 2021 report for endorsement. Concurrently [redacted] and Council coordinated drone photos of the gullies in order to complete a render to understand the visual impact of the bridges at each gully. This meant that after endorsement within the October Report Council had images to release for Community consultation.

Based on the feedback provided within the consultation period on concerns around the potential noise, vibration and visual impact of the bridge, further investigations were undertaken to understand implications of the bridge inclusive of a cost estimate. It was founded that the reduced level of the bridge was beneath the line of sight for neighbouring residents and that the structures noise and vibration impact would be negligible and therefore the bridge is a more practical and feasible option.

It was determined through specialist advice that irrespective of cost a bridge was a safer and more beneficial asset to council as demonstrated in the assessments detailed within Section 3 of this report. Therefore, demonstrating a comparable cost and being more favourable in terms of access, environmental and constructability considerations the bridge alternative was incorporated within the design documentation for costing for the contractor's submission of their Gross Maximum Price's.

Further detail for the ECI process and its timeline can be founded in Appendix A.

4.4 Bridge Pros & Cons

As a part of the ECI Process and various workshops when providing a design critique and solution for Council's consideration the contractors identified the key pro's and con's, the table below summarises all pro's and con's for the bridge:

TABLE 6: PRO'S AND CON'S FOR BRIDGE INCLUSION

PROS	CONS
Δ Significantly reduced the amount of foundation works required generally and to the steep embankments when compared to a conventional boardwalk (improved WHS outcomes and minimised risk for Council to incur variations for unknown ground conditions)	Δ General public safety – falling / jumping risk due to heigh of bridge
Δ Reduced construction cost	Δ Larger foundations required to support portals at each entrance
Δ Easier access for maintenance and visual inspection of all components over the life of the structure	Δ Removal of beach access at Cell 6
Δ Utilises more durable materials (i.e.: Stainless Steel throughout with FRP deck) provide improved better outcomes for Councils ongoing maintenance	Δ Community dissatisfaction with bridge alignment and obstruction with property views (note, this has been assessed and aligned below the line of sight)
Δ Fewer materials to procure which would result in cost effective replacement if required and minimise councils risk to delays in procurement and/or rise and fall in current volatile market	Δ Removal of multiple stairs that are currently utilised for fitness training
Δ Improved program timeframes over the conventional boardwalk system and minimised construction risk.	Δ People apprehension to use (afraid of heights, etc)
Δ Potential to be an accessible and iconic landmark tourist attraction	

Δ Removes the risk of flooding and damage to a boardwalk founded at lower levels	
Δ Removes risk of rock slips and falls onto lower-level landings or pedestrians	
Δ Improved pedestrian and emergency services access removing multiple flights of stairs	
Δ Structure for founding footings is reduced (i.e., Deep 10m rock anchors at two locations in lieu of 100 small anchors founded into varying/unknown rock/geotechnical conditions at multiple locations)	
Δ Prevents damage to flora & fauna – potential to revegetate gullies	
Δ The cost of overheads, labour, and temporary structure savings are reduced when compared to boardwalk construction	
Δ Minimises the extent of investigative works required inclusive of time and cost associated with this due reduced footprint	

With an emphasis on the key project deliverables being noted as a positive in the adoption of the bridge, such as safety in construction, time for completion, accessibility, and budget as well as the additional environmental benefits it was evident through this exercise that the bridge was the favourable structure to achieve a best for Council outcome. This in conjunction with the compared key factor assessments as noted in Section 3 reiterates the superiority of the bridge in lieu of the boardwalk.

5. Conclusion

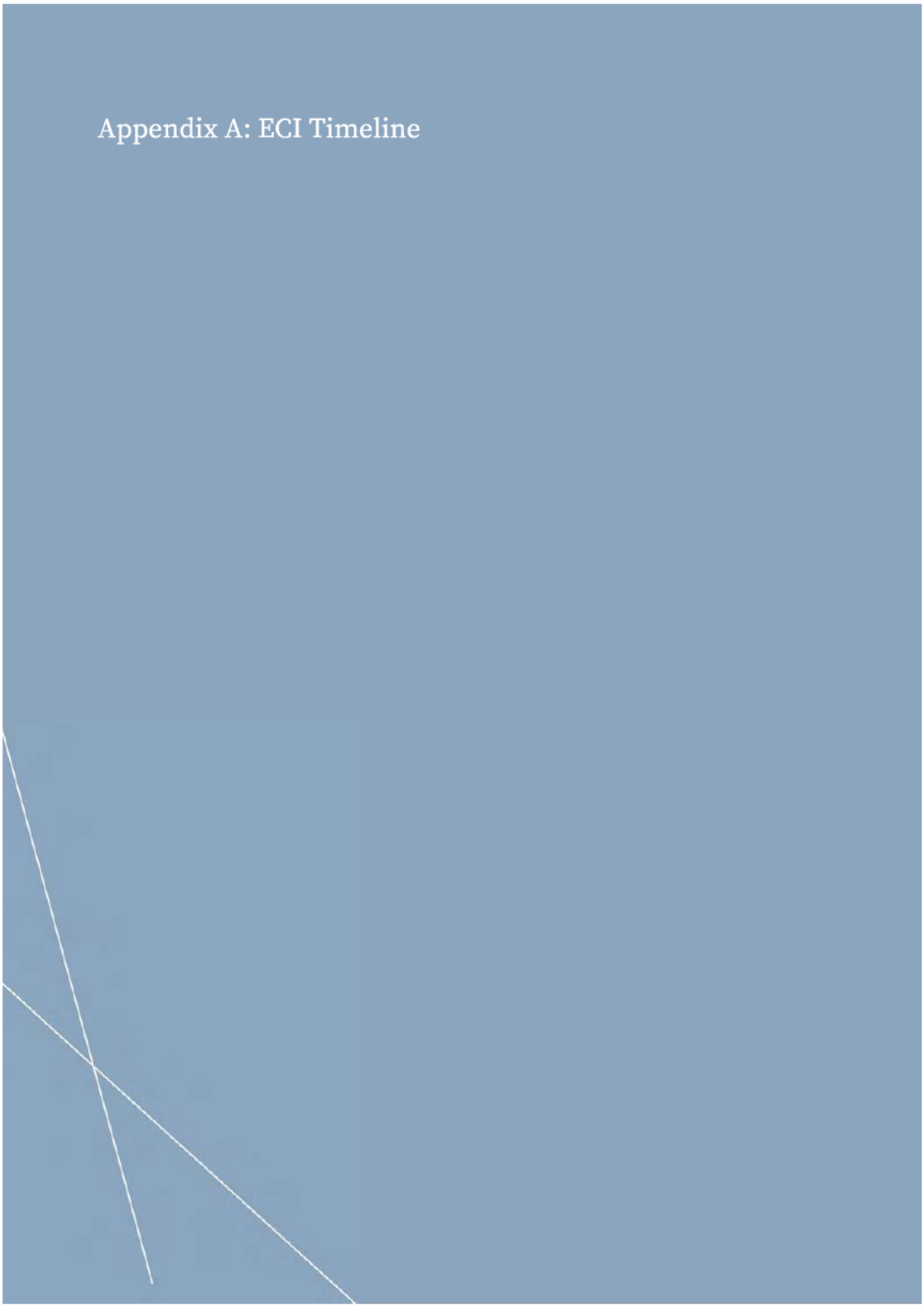
It was evident through the process that the implementation of bridges to each Gully would be a more favourable option for council due to the various factors such as accessibility, minimised environmental impact, reduced construction risks, shorter project program timeframes and minimised whole of life costs as outlined within this report. There is another body of work required within Phase 3 to further minimise the project costs and risk for Council through value management and design adjustments to accommodate access requirements. To assist in motivating the preferred contractor to do this in concluding Phase 2, a letter of intent will be issued to the preferred proponent in lieu of a contract in order to ensure that prior to contract award Council can confirm project funding commitment and enter in a contractual agreement that is more reflective of the final contract price.

6. Document Title

PROJECT REFERENCE

ISSUE	DESCRIPTION OF AMMENDMENT	AUTHOR	CHECKED	APPROVED	DATE
A	Creation	AF	CB	AC	09/02/2022

Previous issues of this document shall be destroyed or marked SUPERSEDED.


Appendix A: ECI Timeline


JULY 2021
1
1. EXPRESSION OF INTEREST - 13/07/2021
City of Marion to assess and select the two best contractors for the project based on their experience, recommendations, and personnel.
2
2. WORKSHOP 1 & 2 - 31/08/2021
Session for both proponents to attend a site walk. Workshop demonstrated the project parameters, design intent, site complexities, and aimed build a collaborative working relationship between the project team.
3
3. WORKSHOP 3 – 07/09/2021
Opportunity for proponents to explain their critiques, and for the design team to provide feedback and suggestions in their inclusions. Discussions from this workshop informed the 70% design.
4
4. NEXT STEPS MEETING – 17/09/2021
CoM directive to North to undertake new cost comparison boardwalk vs Bridge based on figures provided by proponents and concept design at this stage.
5
5. PROJECT TEAM CHECK IN TO DISCUSS PROGRESS – 24/09/2021
Δ Aspect a render for the bridge concept for Council Report and Community Consultation
Δ RFI's 5 & 6 issued for proponents' response
Δ North's comparison costing on revised Schematic Design
6
6. REVISED DRWG PRESENTATION & CONCEPT DISCUSSION – 07/10/2021
Meeting to run through new concept design inclusive of bridges with proponents.
7
7. COUNCIL RECEIVED FORMAL ENDORSEMENT OF BRIDGE DESIGN – 26/10/2021
Council received formal endorsement of new proposed bridge design.
8
8. WORKSHOP 4 – 04/11/2021
Expectations of RFT submissions and the revised 70% design from the architects. Proponents were granted additional time to complete the RFT to enable more accurate pricing. During post meeting discussions, it was evident that the design team had not placed the appropriate level of consideration into the 70% design
9
9. REQUEST FOR TENDER – 15/11/2021
Procurement Documentation completed and submission of Tender documentation from Aspect. Pricing exceeds previous estimates by more than [redacted] Program delays as a result of additional design work required.
10
10. SECOND COUNCIL REPORT – 14/12/2021
Report informing Council on pricing received for GMP's for additional funding consideration.
11
11. NOTIFY PREFERRED PROPONENT – 18/01/2022
BluBuilt were identified as the preferred contractor winning marginally by 0.4. Notification is pending and will be completed by CoM procurement team on the above date.
12
12. NEXT STEPS
Δ 90% Design Development - 19/01/2022
Δ Engagement of Bridge Designer - 01/02/2022
Δ 100% Design Development - 21/02/2022
Δ Final Price - 01/03/2022
Δ Issuing of Council Report - 22/03/2022
Δ Contract Award - 09/03/2022
Δ Construction Commencement -
FEB 2022

Appendix B: Risk Register - Boardwalk

RISK REGISTER

Project: Coastal Walkway Cell 5 & 6 - Boardwalk
Version: V1

ITEM	IDENTIFIED RISK	RISK DESCRIPTION	CURRENT RISK			MITIGATION METHOD & CONTROLS	RESIDUAL RISK		
			LIKELIHOOD	CONSEQUENCE	RATING		LIKELIHOOD	CONSEQUENCE	EXPOSURE
1	Risk of personnel falling during maintenance and inspection post construction	Unsafe access for maintenance personnel to undertake inspections and ongoing maintenance for boardwalk in gullies	4	5	20	Consideration of materials to be adopted - prioritise selection of highly durable, low maintenance materials. Installation of safe access system / static line down gully batters (adjacent structure).	3	5	15
2	Geotechnical Investigation	Geotechnical investigation requires pegs to be placed at multiple points within steep gullies. Significant Cost to project to project for investigations required to inform the 100% design.	5	3	15	Adoption of a bridge structure in lieu of boardwalk, would reduced the need for geotechnical investigations within these steep gullies.	3	2	6
3	Rock Anchor Foundations	Over 100 rock anchors are required to be founded in unstable surfaces within steep gullies for the boardwalk construction. This presents a safety hazard for personnel falling and a significantly high cost.	4	5	20	• Extensive and costly site investigations required to understand complexities of terrain. • Adopting bridge in lieu of boardwalk, would require signicantly less Rock Anchor foundations	2	3	6
4	Boardwalk vertical and horizontal alignment flexibility	Boardwalk requires flexibility in structural design to allow for slight variances in installation location due to the difficulty in founding structures in steep unstable terrain. This is a risk to staging and can result in program delays.	3	4	12	Prioritise horizontal / vertical alignment design at front end of project. Submit proposed alignment as a 'stand alone' design element for approval and sign off from Council to ensure design works / design program can be progressed without delay.	2	3	6
5	Construction access constraints—effect on design outcomes	Safe access within the steep gullies for conventional construction plant and equipment is not possible. This gives rise to the risk of Personnel falling and plant rollover.	3	5	15	• Constructability assessment will be a key factor in defining the final alignment, structural form and materials selection with construction access a key consideration when defining boardwalk type, configuration etc. • A bridge construction within these steep gullies would not require workers to utilise heavy machinery and plant while traversing. • Detailed geotechnical investigation to identify viability of rock anchors using hand-held installation equipment	3	3	9
6	Structure collapse due to gully batter erosion/collapse	The existing gullies have been subject to erosion/slips and will remain so post-construction. Significant erosion could undermine foundations / impact boardwalk structure.	3	5	15	Investigate viability of 50m span bridge spanning both gullies, limiting the extent of boardwalk rock footings to be constructed within the gulley batters.	3	3	9
7	Working at height within Gullies	Personnel falling from heights during construction of boardwalks	3	5	15	Establish fall prevention system, likley involving a static-line system, fixed via rock anchors, and extending down the gully faces. All personnel to wear harness and connect to static line. Option to leave static line in place for maintenance/ inspection personnel 'post-construction'.	2	4	8
8	Plant Rollover	Materials, Plant and Equipment falling/rollover during construction of at-grade paths, steps and boardwalks.	3	5	15	Utilisation of primarily 'tracked' plant, with experienced operators. Construction access to established at commencement of site works - with access widths to reflect planned plant / equipment requirements. Batter/ bench slopes to minimise extent of crossfall and subsequent risk of rollover.	2	5	10
9	Manual Handling with limited opportunity for mechnical assistance	Personnel injuries associated with carrying heavy equipment and materials down steep batters (falling, tripping, back injuries, muscle injuries).	3	5	15	• Identify opportunities to prefabricate boardwalk elements and lift into position using helicopter • Stage boardwalk construction to allow materials to be transported on completed sections (ie:commencing, and completing in sections, boardwalk superstructure construction from the top, working to the bottom) • Adopting bridge in lieu of boardwalk in steep gullies to reduce the need for carrying heavy machinery down the batter	2	4	8
10	Impact on flora and fauna	Damage to existing flora and fauna in steep gullies during construction of boardwalk	4	3	12	• Establish flora protection zones as required to mitigate risk. • Bridge Construction in steep gulies would prevent damage to flora & fauna - potential to revegetate gullies	2	3	6
11	Durability of boardwalk structure	The harsh coastal environment, together with difficult post-construction access makes maintenance and inspection challenging within steep gullies for Council in the future.	4	3	12	Design Basis Report to developed at the 'front-end' of design defining design life, preferred materials and maintenancy strategy	4	2	8
12	Accessibility for emergency services and general public	The multiple steps within the steep gullies make access to the lower levels of the boardwalk difficult, presenting an accessibility and safety issue for emergency services attempting to reach an injured member of public.	3	5	15	Ensure 'barriers for entry' are checked daily along with all pedestrian management controls. Educate the public on what to do in the event of emergency.	2	5	10
13	Safety in Construction (Inclement Weather & Personnel Safety)	Due to the location of the boardwalk and susceptibility of incurring inclement weather, there is a risk to personnel working without harnesses. Strong winds are very likely to impact the works and staff not properly secured have the potential to fall from heights. This will also impact program and cost.	3	5	15	Personnel working at heights to be harnessed at all times regardless of wind level	2	5	10

Appendix C: Risk Register - Bridge

RISK REGISTER

Project: Coastal Walkway Cell 5 & 6 - Bridge
Version: V1

ITEM	IDENTIFIED RISK	RISK DESCRIPTION	CURRENT RISK			MITIGATION METHOD & CONTROLS	RESIDUAL RISK		
			LIKELIHOOD	CONSEQUENCE	RATING		LIKELIHOOD	CONSEQUENCE	EXPOSURE
1	Risk of personnel falling during maintenance and inspection post construction	Maintenance personnel falling from heights during inspections and ongoing maintenance for boardwalk and bridge	2	5	10	The bridges across both gullies create more opportunities for easy to access harness points and minimise the frequency for maintenance staff to traverse steep terrain.	1	5	5
2	Geotechnical Investigation	Geotechnical investigations will need to occur at several points within the gullies resulting in a cost impact to the project.	3	4	12	The adoption of the bridge structure in lieu of boardwalk reduces the number of survey points required within the steep gullies.	2	2	4
3	Rock Anchor Foundations	Rock anchors are required to be founded in unstable surfaces within the gullies for the boardwalk and bridge construction. This presents a safety hazard for personnel falling could result in a higher cost.	2	5	10	• Extensive site investigations required to understand complexities of terrain. • Signicantly less Rock Anchor foundations to the steep embankments are required through adopting bridge in lieu of boardwalk.	2	3	6
4	Working at height	Personnel falling from heights during construction of boardwalks and bridges.	2	5	10	Establish fall prevention system, likley involving a static-line system, fixed via rock anchors, and extending down the gully faces. All personnel to wear harness and connect to static line. Option to leave static line in place for maintenance/ inspection personnel 'post-construction'.	1	4	4
5	Potential for Bridge to bounce under loads	Potential for bridge to 'bounce' under pedestrian traffic loads (including runners)	2	3	6	Engagement of specialist bridge consultant to assist in assessing and minimising bridge load impacts.	2	2	4
6	Potential for Bridge to sway	Potential for bridge to sway / vibrate under wind loads. Risk of people falling off or apprehension to use.	2	3	6	Engagement of bridge engineer to assess vibration and wind load capacity of bridge design to minimise impacts	2	2	4
7	Structure collapse due to gully batter erosion/collapse	The existing gullies have been subject to erosion/slips and will remain so post-construction. Significant erosion could undermine foundations and impact boardwalk and bridge structure.	2	4	8	• Due to the addition of the 50m bridge spanning both gullies, there are limited rock footings in the steep gullies, minimising the impact of gully batter erosion/collapse. • Preliminary load testing completed to inform alignment and ensure that the structure is founded on safe durable ground	2	3	6
8	Manual Handling with limited opportunity for mechnical assistance	Personnel injuries associated with carrying heavy equipment and materials down steep batters (falling, tripping, back injuries, muscle injuries).	2	5	10	• Identify opportunities to prefabricate boardwalk elements and lift into position using helicopter • Stage boardwalk construction to allow materials to be transported on completed sections (recommencing, and completing in sections, boardwalk superstructure construction from the top, working to the bottom) • Adopting bridge in lieu of boardwalk minimises the need for handheld heavy machinery within steep gullies.	2	3	6
9	Impact on flora and fauna	Damage to existing flora and fauna in steep gullies during construction of boardwalk and bridge	2	4	8	• Establish flora protection zones as required to mitigate risk. • Bridge Construction in steep gulies prevents damage to flora & fauna • The footprint compared to the exisitng boardwalk has been reduced providing the opportunity to revegetate gullies	2	3	6
10	Materials, Plant and Equipment falling/rollover	Materials, Plant and Equipment falling/rollover during construction of at-grade paths, steps and boardwalks.	2	4	8	Utilisation of primarily 'tracked' plant, with experienced operators. Construction access to established at commencement of site works - with access widths to reflect planned plant / equipment requirements. Batter/ bench slopes to minimise extent of crossfall and subsequent risk of rollover.	2	3	6
11	Accessibility for emergency services and general public	The multiple steps within the gullies makes access to sections of boardwalk difficult, presenting an accessibility and safety issue for emergency services attempting to reach an injured member of public.	2	5	10	Ensure 'barriers for entry' are checked daily along with all pedestrian management controls. Educate the public on what to do in the event of emergency.	2	4	8
12	Construction access constraints—Personnel Falling and Plant Rollover	Safe access within the steep gullies for conventional construction plant and equipment is not possible. This gives rise to the risk of Personnel falling and plant rollover.	3	5	15	• Constructability assessment will be a key factor in defining the final alignment, structural form and materials selection with construction access a key consideration when defining boardwalk type, configuration etc. • Detailed geotechnical investigation to identify viability of rock anchors using hand-held installation equipment • The bridge works do not require workers to utilise heavy machinery and plant while traversing • The alignment will be adjusted to facilitate where possible.	3	3	9

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Marion Coastal Walkway Environmental Review Report

November 2022

Version 2

Prepared by [redacted] for City of Marion

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[redacted]

[redacted]

GLOSSARY AND ABBREVIATION OF TERMS

AH Act	*Aboriginal Heritage Act 1988*
dBA	decibel/s (A weighted)
DPC-AAR	Department of the Premier and Cabinet – Aboriginal Affairs and Reconciliation
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
km	kilometre/s
m	metre/s
mm	millimetre/s
m/s	metres per second
NPW Act	*National Parks and Wildlife Act 1972*
NV Act	*Native Vegetation Act 1991*
SA	South Australia/n
sp.	Species
spp.	Species plural
ssp.	Subspecies



Table of Contents

1 INTRODUCTION 1

1.1 Background information 1

1.2 Objectives 1

2 WIND NOISE 5

2.1 Background 5

2.2 Wind Noise – Aeolian Tones 5

2.3 Design Review 5

2.4 Site Wind Conditions and Terrain Effects 5

2.5 Wind Noise Prediction 6

2.6 Summary and Conclusions 6

3 ABORIGINAL CULTURAL HERITAGE 8

3.1 Background 8

3.2 Methods 8

3.2.1 Desktop methods 8

3.2.2 Field survey methods 8

3.3 Results 8

3.3.1 Desktop results 8

3.3.2 Field survey results 9

3.4 Summary and Conclusions 9

4 FLORA AND FAUNA 10

4.1 Background 10

4.2 Methods 10

4.2.1 Desktop methods 10

4.2.2 Field survey methods 11

4.3 Results 11

4.3.1 Native vegetation 11

4.3.2 Threatened Ecological Communities 11

4.3.3 Threatened species 12

4.4 Summary and Conclusions 12

5 GEOTECHNICAL DESIGN ADVICE 14

5.1 Background 14

5.2 Methods 14

5.2.1 Site visit 14

5.2.2 Field investigation 14

5.3 Results 15

5.3.1 Regional geology 15

[redacted]

5.3.2 Geotechnical mapping and subsurface conditions 15
5.3.3 Groundwater 17
5.4 Summary and Conclusions 17

6 CONCLUSION 18

7 REFERENCES 19

8 APPENDICES 20

Appendix 1: Construction drawings – Grey Road Gully 21
Appendix 2: Construction drawings – Kurnabinna Terrace Gully 22

List of Tables

Table 1. Design elements of suspension bridges and wind noise. 5
Table 2. Offshore wind speed statistics. 5
Table 3. Predicted noise from bridge cables. 6
Table 4. Information sources used for the desktop flora and fauna assessment. 10
Table 5. Assessment of the presence of Threatened Ecological Communities. 12
Table 6. Ecological constraints at Grey Road and Kurnabinna Terrace Gullies. 13
Table 7. Subsurface soil and rock sequence at Grey Road and Kurnabinna Terrace Gullies. 16
Table 8. Typical geotechnical parameters. 17

List of Figures

Figure 1. Location of Grey Road Gully suspension bridge, south (drawing provided by City of Marion). 2
Figure 2. Location of Grey Road Gully suspension bridge, north (drawing provided by City of Marion). 3
Figure 3. Location of Kurnabinna Terrace Gully suspension bridge, south (drawing provided by City of Marion). 4



1 INTRODUCTION

1.1 Background information

The City of Marion Coastal Walkway (Coastal Walkway) forms part of the South Australian (SA) Government's Coast Park initiative. This initiative will provide a 71 kilometre (km) recreational trail linking Sellicks Beach in the South to North Haven in the north.

The Coastal Walkway extends for 7.2 km within the City of Marion, from Hallet Cove to Marino. In June 2019, 2.5 km of the Coastal Walkway was temporarily closed by the City of Marion due to safety concerns. This closure included the Grey Road and Kurnabinna Terrace Gullies, with a proposed rebuild of these sections of walkway funded jointly by the City of Marion and the SA Government.

The rebuild includes the construction of two suspension bridges, with the gullies to remain closed until the rebuild is complete. The location of each bridge are shown in Figure 1, Figure 2 and Figure 3, with construction drawings provided as Appendix 1 (Grey Road Gully) and Appendix 2 (Kurnabinna Terrace Gully).

Further details on the Coastal Walkway, its closure and expected dates of completion can be found on the City of Marion's website: https://www.marion.sa.gov.au/things-to-do/walking-and-cycling-trails/coastal-walkway/coastal-walkway-section-reopening-and-extension.

The City of Marion commissioned several environmental studies to assess the potential impacts of the rebuild of the Coastal Walkway, including the Grey Road and Kurnabinna Terrace Gully locations. This included the following reports:

- *Hallet Cove – Cable Suspended Bridge – Wind Noise* ([redacted], 2021).
- *Marion Coastal Walkway Upgrade: Aboriginal Cultural Heritage Report* ([redacted], 2020).
- *Marino Coastal Walkway: Flora and Fauna Assessment* ([redacted], 2020).
- *Coastal Walkway Upgrade Bridge Design Advice, Grey Road Gully and Kurnabinna Gully, Hallet Cove, SA 5158: Factual Geotechnical Report* ([redacted], 2022).

These reports can be accessed from Coastal Walkway Document Library, available at https://www.makingmarion.com.au/coastal-walkway.

1.2 Objectives

The objective of this report is as follows:

- To consolidate the major findings into a single environmental review report.

[redacted]

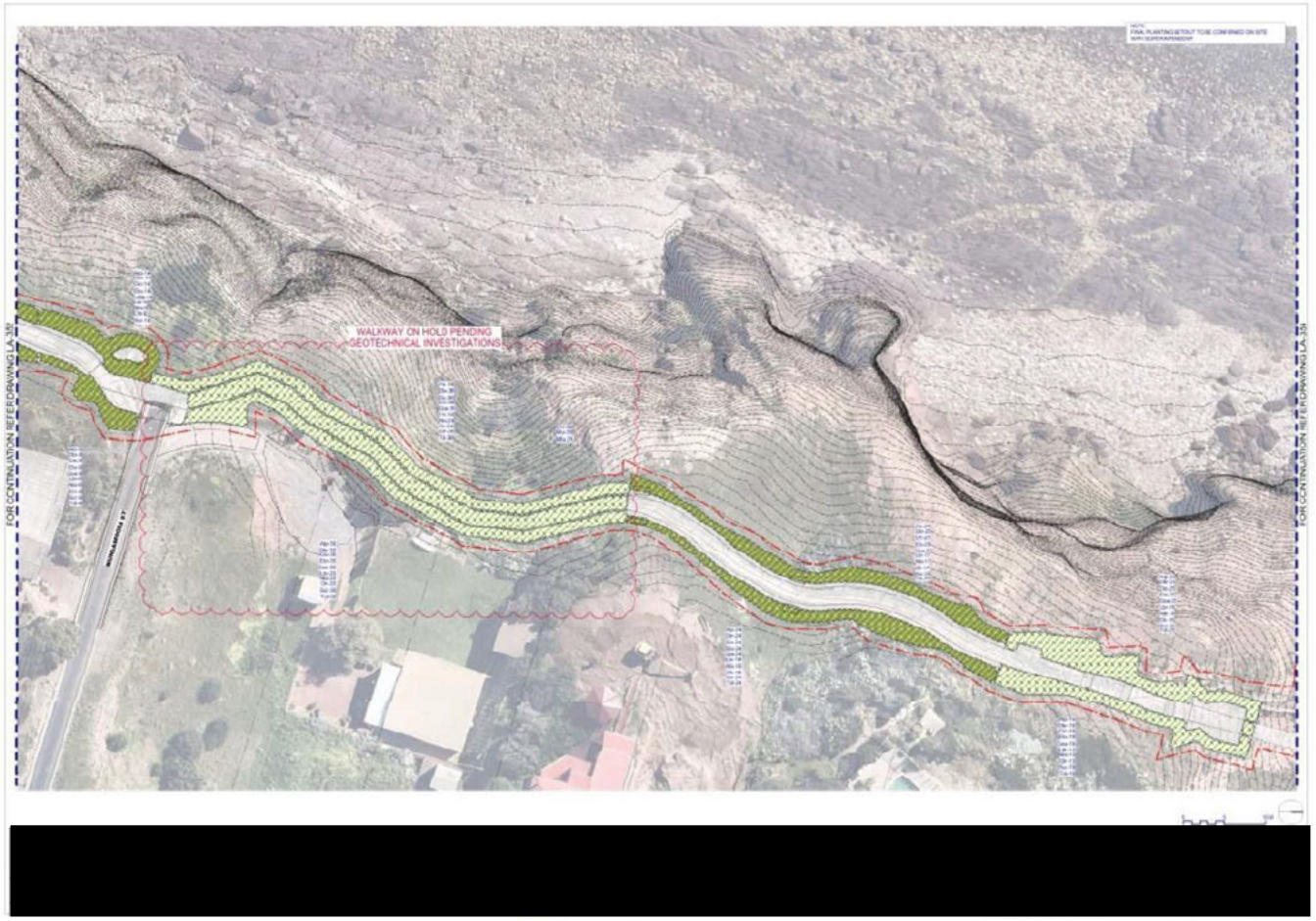


Figure 1. Location of Grey Road Gully suspension bridge, south (drawing provided by City of Marion).

[redacted]



[redacted]

Figure 2. Location of Grey Road Gully suspension bridge, north (drawing provided by City of Marion).

[redacted]



[redacted]

Figure 3. Location of Kurnabinna Terrace Gully suspension bridge, south (drawing provided by City of Marion).

[redacted]

2 WIND NOISE

2.1 Background

During the consultation phase of the project, the community raised concerns regarding noise from wind interaction with the proposed bridges. To address these concerns, the City of Marion engaged [redacted] to review the proposed structures and comment on it's potential to generate noise from wind interaction.

The following Sections summarise the findings of the wind noise study. The findings are available in full in *Hallet Cove – Cable Suspended Bridge – Wind Noise* ([redacted], 2021).

2.2 Wind Noise – Aeolian Tones

Wind induced noise is generated due to vortices being shed as wind blows across a slender object, such as a cylinder. The frequency of the tone depends on the form of cylinder (for example circular, square or triangular), it's characteristic cross dimension and the wind speed.

2.3 Design Review

A review of the bridge designs indicated that cables and balustrade mesh will likely cause minor wind generated noise. To predict the noise levels from wind interaction with the bridges, the design elements listed in Table 1 were assumed.

Table 1. Design elements of suspension bridges and wind noise.

Design Element	Approximate diameter (mm)
Main cables	48
Secondary cables	12
Balustrade mesh	3

2.4 Site Wind Conditions and Terrain Effects

Offshore wind data for the project location is unobstructed and demonstrates the characteristic south-west/north-east prevailing wind directions. Table 2 shows the frequency of wind from any direction, with strong winds occurring about 1 hour per week, or approximately 2% of the year.

As offshore wind approaches the shoreline, it accelerates up the gullies due to site-specific obstructions. The mean wind speed is shown by modelling to increase by approximately 20% due to this effect.

Table 2. Offshore wind speed statistics.

	Calm	Light	Gentle	Moderate	Fresh	Strong	Near Gale	Gale
Wind speed (m/s)	0	0.5 – 3.5	3.5 – 5	5 – 8	8 – 11	11 – 14	14 – 17	17 – 21
Occurrence frequency (%)	5	27	31	25	10	2	0.2	0.02

[redacted]

2.5 Wind Noise Prediction

To estimate the predicted noise generated by wind interaction with the bridges, the following assumptions have been made:

- The worst-case (with highest predicted noise level) receiver point is approximately 30 m from the bridge.
- The receiver point is located downwind.
- The wind incident is normal to the cable span/mesh plane.
- All extent of cables/mesh are located at the closest point at the bridge from the receiver (i.e., approximately 30 m).
- An allowance of 25% for additional cable length during procurement.
- The 99th percentile wind speed considered used in lieu of average (50th percentile resulting in higher noise levels).
- The prediction is based on geometric spreading and does not consider access attenuation from air and ground absorptions.

The predicted noise levels at the closest receiver point (30 m) from the source, under 14 m/s wind speed, are summarised in Table 3. The predicted worst-case noise level is 31 dBA. At this level, the ambient noise level at a wind speed of 14 m/s is likely to be greater and will mask any tonal or modulation noise characteristics. The application of a noise penalty is therefore not warranted.

Table 3. Predicted noise from bridge cables.

	Main Cables	Secondary Cables	Balustrade Mesh
Diameter (mm)	48	12	3
Length (m)	160	200	7100
Predicted noise level (dBA)	<5	<15	31
Tonal frequency (Hz)	60	239	956

2.6 Summary and Conclusions

There is no specific legislation or guidelines for the assessment of wind generated noise impact at residences. Therefore, reference has been made to the *Environment Protection (Noise) Policy 2007* (the Policy) for guidance on appropriate noise criteria to protect noise amenity at residences. The criteria are derived based on the zoning of the noise source (the bridges) and noise receivers (the closest residences).

Based on the footbridges being within a Conservation Zone and the closest residences within a Hills Neighbourhood Zone, the Policy provides the following average noise level ($L_{Aeq,15min}$) criteria (with *Clause 20* of the Policy applied for development):

- 45 dB(A) during the daytime (7am to 10pm); and,
- 38 dB(A) at night-time (10pm to 7am).

[redacted]

The assessment indicates that the predicted maximum noise level due to aeolian tones is 31 dBA. This is below the night-time criteria of the Policy of 38 dBA. Wind noise from the bridges is therefore unlikely to exceed the noise criterion and is unlikely to cause annoyance to the surrounding community.



3 ABORIGINAL CULTURAL HERITAGE

3.1 Background

[redacted] were engaged by [redacted] to undertake an Aboriginal cultural heritage desktop assessment and field survey of the Grey Road Gully and Kurnabinna Terrace Gully Project Areas.

The following Sections summarise the findings of the Aboriginal Cultural study. The findings are available in full in *Marion Coastal Walkway Upgrade: Aboriginal Cultural Heritage Report* ([redacted], 2020).

3.2 Methods

3.2.1 Desktop methods

A search of the Register of Aboriginal Sites and Objects, maintained by Department of the Premier and Cabinet – Aboriginal Affairs and reconciliation (DPC-AAR), was undertaken for the Project Area. The search identified the presence, or lack of, any reported or recorded Aboriginal cultural heritage sites as defined under Part 1, Section 3 of the *Aboriginal Heritage Act 1988* (AH Act).

Searches were conducted of the Australian Heritage Database, the South Australian Heritage Places Register, Australian Museum Anthropologic database, South Australian Museum database, and archives for images, newspaper clippings, journal entries and other primary sources that may contain information about the early uses of the area and early interactions between Aboriginal people and others.

A review of available heritage reports for the general region was undertaken, where applicable. These studies can provide a broad background of the region and provide information on the types and location of sites previously identified near the project area. Some reports remain restricted through confidentiality agreements so are unable to be accessed.

3.2.2 Field survey methods

An archaeological survey was undertaken to identify and record the location of any sites of significance to Aboriginal heritage and/or tradition. A pedestrian survey was used as the method to assess the Project Area. Suitably qualified personnel systematically inspected the Project Areas on foot, looking for archaeological sites and objects.

3.3 Results

3.3.1 Desktop results

Hallett Cove is within the Kaurna Peoples native title determination and the principal Aboriginal heritage legislation for the Marion Coastal Walk Upgrade is the *Native Title Act 1993*, *Native Title Act* (South Australia) *1994* (the NT Act) and the *Aboriginal Heritage Act 1988* (the AH Act).

Hallett Cove and the surrounding region has been shown to have a long history of Aboriginal land use with large numbers of sites and objects being recorded throughout the greater area. In the project areas though, no Aboriginal sites, objects, cultural and/or spiritual histories have been listed on the Register of Aboriginal Sites and Objects. The closest registered site is approximately 2 km away at the Field River.

[redacted]

The South Australian Museum Database contained 316 records for Hallett Cove, but only sparse details on their locations were provided. It was not possible to determine if any of the items were recovered from the two project areas.

3.3.2 Field survey results

Grey Road Gully

No Aboriginal archaeological sites, objects and remains, or sites of significance according to Aboriginal tradition, archaeology, anthropology or history were identified during the cultural heritage survey.

Kurnabinna Gully

No Aboriginal archaeological sites, objects and remains, or sites of significance according to Aboriginal tradition, archaeology, anthropology or history were identified during the cultural heritage survey.

3.4 Summary and Conclusions

The Aboriginal cultural heritage survey established the following:

- There are no newly recorded archaeological sites as defined by the AH Act in the Project Area.
- There are no previously recorded sites that will be impacted by the proposed upgrade works.
- The project areas have been cleared archaeologically/anthropologically by KNCHA representatives.
- It is unlikely that unknown sites will be encountered during ground works.



4 FLORA AND FAUNA

4.1 Background

[redacted] was engaged by [redacted] to undertake a flora and fauna survey of the Coastal Walkway Project Area to inform the design process and identify any ecological constraints based on Project design available at the time of writing. The objectives of this survey were to:

- Identify biodiversity constraints (i.e., threatened species and native vegetation) that may influence the design and location of the walkway; and
- Provide broad recommendations that avoid, minimise or mitigate possible impacts on these constraints.

The City of Marion is situated within metropolitan Adelaide and is therefore exempt from clearance controls under the *Native Vegetation Act 1991* (NV Act).

The following Sections summarise the findings of the flora and fauna study. The findings are available in full in *Marino Coastal Walkway: Flora and Fauna Assessment* ([redacted], 2020).

4.2 Methods

4.2.1 Desktop methods

A desktop assessment was undertaken to determine the potential for any threatened species and ecological communities to occur in the Project Area. Relevant databases were searched using a 5 km buffer of the Project Area for known records of species and communities listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the National Parks and Wildlife Act 1972 (NPW Act). Information sources used for the desktop assessment are listed in Table 4.

Table 4. Information sources used for the desktop flora and fauna assessment.

Information Source	Description
Protected Matters Search Tool (PMST) report	A Protected Matters Search Tool (PMST) report was generated on 28 July 2020 to identify Matters of National Environmental Significance (MNES) under the EPBC Act relevant to the Project Area.
Biological Database of South Australia (BDBSA)	The Biological Database of South Australia (BDBSA) was searched through NatureMaps, the web portal maintained by the Department for Environment and Water (DEW) and available at http://spatialwebapps.environment.sa.gov.au/naturemaps/?locale=en-us&viewer=naturemaps. The BDBSA is comprised of a collection of species records compiled from the South Australian Museum, conservation organisations, Birdlife Australia and other information sources. The search was undertaken on the 28 July 2020.
Flora and fauna assessment: Coast Park – Hallet Cove	Unpublished report by T&M Ecologists Pty Ltd for the City of Marion. This study mapped the Vegetation Association at the mouth of the Field River and identified ecological constraints at this location.

Threatened species and communities identified by methods described above were assessed as to the likelihood of its occurrence in the Project Area. Each was assigned a rating to describe the nature of its presence; Known / Highly Likely, Likely, Possible and Unlikely. Criteria such as habitat constraints and date and proximity of most recent records were considered in the context of the features of the Project Area when assigning a likelihood rating.

[redacted]

4.2.2 Field survey methods

Vegetation was surveyed according to the Biodiversity Assessment Manual (BAM). The BAM (Native Vegetation Council, 2019a) was developed by the Native Vegetation Management Unit to assess areas of native vegetation requiring clearance.

All native and exotic fauna species opportunistically encountered (directly observed, or tracks, scats, burrows, nests and other signs of presence) during the native vegetation assessment were recorded. Potential fauna refuge sites, such as hollows, were noted as an indication of availability of suitable habitat. Particular attention was paid to identifying habitat for threatened species.

The beach at the mouth of the Field River was actively searched for Hooded Plover and other migratory shorebirds. The search was conducted according to the *Survey guidelines for Australia's threatened birds – guidelines for detecting birds listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999* (Department of the Environment, 2010). This area is not in the vicinity of the Grey Road and Kurnabinna Terrace Gullies.

4.3 Results

4.3.1 Native vegetation

Five native and two exotic Vegetation Associations were mapped along the Coastal Walkway, with those present at the Grey Road and Kurnabinna Terrace gullies listed below:

- *Acacia cupularis* and *Zygophyllum aurantiacum* Low Open Shrubland over *Austrostipa* spp. and exotic grasses and forbs.
- *Lawrencia squamata* Sparse Low Shrubland over *Disphyma crassifolia* and *Austrostipa* spp.
- *Lomandra effusa* and *Chloris truncata* Sparse Grassland.
- *Olearia axillaris / Atriplex cinerea +/- Acacia cupularis* Low Open Shrubland over *Austrostipa* spp. and exotic grasses and forbs.
- *Olea europaea +/- Pinus halepensis* Low Woodland over *Chrysanthemoides monilifera* and *Avena* sp.
- Revegetation areas and garden plantings.

Native vegetation ranged in condition from poor to fair, with high impact from weeds, particularly introduced species of grasses, such as *Avena* sp. (wild oats), and forbs such as *Oxalis pes-caprae* (Soursob). Along the length of the walkway, numerous informal trails and access points also cause significant impact to vegetation.

4.3.2 Threatened Ecological Communities

The desktop assessment identified that two threatened ecological communities (TEC) may occur in the Project Areas:

- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia (EPBC Act Endangered).

[redacted]

- Iron-grass (*Lomandra*) Natural Temperate Grassland of South Australia (EPBC Act Critically Endangered)

However, the field survey confirmed that neither TEC is present, based on the EPBC Act guidelines as summarised in Table 5

Table 5. Assessment of the presence of Threatened Ecological Communities.

Threatened Ecological Community	Assessment
Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia.	**Does not occur in the Project Area.** The Project Area is not situated on low slopes and plains, rather situated on coastal cliff tops. The vegetation structure is shrubland and grassland and *Eucalyptus microcarpa* is not present. Given the landscape position, natural vegetation of the area pre-disturbance would have consisted of similar low shrubland.
Iron-grass (*Lomandra*) Natural Temperate Grassland of South Australia.	**Does not occur in the Project Area.** *Lomandra* grassland in the Project Area consists of two disconnected patches, both <0.25 ha in area. Neither patch has >15 species of native plants.

4.3.3 Threatened species

Although the desktop assessment identified 42 threatened species as potentially occurring in the Project Area, the field survey recorded only four species:

- *Ptilotus angustifolius* (Narrow-leaf Yellow-tails). NPW Act Rare.
- *Myoporum parvifolium* (Creeping Boobialla). NPW Act Rare.
- Sooty Oyster Catcher (*Haematopus fuliginosus*). NPW Act Rare.
- Yellow-tailed Black Cockatoo (*Zanda funerea whiteae*). NPW Act Vulnerable.

Based on habitat available in the Project Area, a further four threatened species were assessed as likely or highly likely to occur, despite not being recorded during the field survey:

- *Austrostipa densiflora* (Fox-tail Spear-grass). NPW Act Rare.
- *Podolepis muelleri* (Button Podolepis). NPW Act Vulnerable.
- Eastern Reef Egret (*Egretta sacra sacra*). NPW Act Rare.
- Grey-headed Flying-fox (*Pteropus poliocephalus*). EPBC Act Vulnerable.

4.4 Summary and Conclusions

The threatened fauna species listed above, either recorded during the survey or assessed as likely to occur, require either wetland/beach or mature tree habitat. These habitats are not impacted by the bridge construction across Grey Road Gully and Kurnabinna Terrace Gully.



Given the findings of the flora and fauna study, the ecological constraints listed in Table 6 are relevant to the Project. The report made the conclusions and recommendations as listed in the table. The construction of suspension bridges at Grey Road Gully and Kurnabinna Gully is not likely to have any significant impact on native vegetation or threatened species.

Referral of the Project under the EPBC Act is not required and the Project Area is outside that part of SA where the NV Act applies.

Table 6. Ecological constraints at Grey Road and Kurnabinna Terrace Gullies.

Project Area	Ecological Constraint	Comments	Recommendations
Grey Road Gully	Native vegetation	Four native Vegetation Associations occur at Grey Road Gully. All works are proposed to occur on current alignment, except potential new link with Pindee St.	Where possible, design walkway to follow existing alignment and place any laydown/construction sites outside areas mapped as native vegetation. Vegetation Management Plan to be included in the Construction Environmental Management Plan. Weed Management Plan to be included in the Construction Environmental Management Plan.
	Threatened flora	Two threatened flora species occur at the northern end of Cell 5. No work is proposed for this location.	
Kurnabinna Terrace Gully	Native vegetation	Three native Vegetation Associations occur at Kurnabinna Terrace Gully Potential new path alignment on The Esplanade is in non-native vegetation (revegetation and garden plantings). Wa kway realignment north of Kurnabinna Gully is in non-native vegetation (revegetation and garden plantings). Re-development of Kurnabinna Gully crossing will impact native vegetation.	Where possible, design wa kway to follow existing alignment and place any laydown/construction sites outside areas mapped as native vegetation. Vegetation Management Plan to be included in the Construction Environmental Management Plan. Weed Management Plan to be included in the Construction Environmental Management Plan.
	Threatened flora	No threatened flora were recorded in this Cell during the field survey. However, it is possible that four species may occur that were not detected due to survey limitations.	

[redacted]

5 GEOTECHNICAL DESIGN ADVICE

5.1 Background

[redacted]) was engaged by [redacted] to assess the geotechnical conditions for the proposed upgrade of the Coastal Walkway near to the location of bridge abutment structures at Grey Road Gully and Kurnabinna Terrace Gully.

[redacted] has previously undertaken geotechnical assessments for these two locations to assess the stability of the areas of the existing boardwalks for the construction of new elevated boardwalks. During detailed design it has been identified that suspension bridges are the preferred construction method to traverse these two locations and geotechnical information is required to inform foundation designs.

This report provides a description of subsurface conditions assessed by a percussion drill rig investigation near to the location of proposed bridge abutment structures Grey Road Gully and Kurnabinna Terrace Gully.

The following Sections summarise the findings of the geotechnical study. The findings are available in full in *Coastal Walkway Upgrade Bridge Design Advice, Grey Road Gully and Kurnabinna Gully, Hallet Cove, SA 5158: Factual Geotechnical Report* ([redacted], 2022).

5.2 Methods

5.2.1 Site visit

An initial site visit of the bridge locations was undertaken. This included a walk over with the bridge designer to assess abutment locations based on site features. The location of access tracks and laydown areas for the drilling rig and construction plant was also determined.

5.2.2 Field investigation

The field investigation was undertaken in February and March 2022 and involved the following:

- Drilling of one borehole at each abutment location to a depth of 15 m, using 105 mm percussion techniques; and
- Drilling and installation of up to three additional boreholes at each location and install anchors for anchor pull out testing.

Given the difficulty of access at the bridge abutment sites, a specialist in drilling on rock slopes was engaged to undertake the drilling. The use of percussion techniques produced a crushed product during drilling from which the subsurface conditions of each site were estimated. To support these drill investigation samples, additional mapping included an assessment of strength and defect spacing characteristic of the rock mass at nearby rock outcropping locations.

[redacted]

5.3 Results

5.3.1 Regional geology

Both gullies are steep with little vegetation present. The steepest slopes are characterised by outcropping rock with little soil cover. Erosion caused by the creeks at the base of each gully has eroded away the soil and exposed siltstone outcrops.

Grey Road Gully

Existing geological mapping indicates the area is underlain by Pleistocene aged Hindmarsh Clay, Carisbrooke Sand and sediments of the Ochre Cove Formation. South of the gully, it is expected to be underlain by Reynella Siltstone Member formation comprising dark red siltstone, sandy to gritty in part, with dolomitic lenses and rare small pebbles. To the east and northeast of the site, it is expected to be underlain by Wilmington Formation comprising fine to medium grained grey-green sandstones interlayered with coarse-grained lithic sandstone, grey-green to red-brown siltstone and dolomite, basal conglomeratic beds.

Kurnabinna Terrace Gully

Existing geological mapping indicates that the area is underlain by the Reynella Siltstone Member formation comprising dark red siltstone, sandy to gritty in part, with dolomitic lenses and rare small pebbles.

5.3.2 Geotechnical mapping and subsurface conditions

The soil and rock units are considered to generally be consistent with the published geology for the area and can be generalised according to the subsurface sequence described in Table 7. Typical geotechnical parameters for the rock units observed are provided in



Table 8.

Table 7. Subsurface soil and rock sequence at Grey Road and Kurnabinna Terrace Gullies.

Soil/Rock Unit	Description
Calcrete	An inconsistent thickness and lateral extent but hard and dense.
Unit 1: Clay	Gravelly clay of hard consistency and medium plasticity.
Unit 2: Gravel	Medium to coarse grained, sub-angular to angular with fine to coarse grained sand, red brown, with grey; Residual Soil to extremely weathered siltstone.
Unit 3: Siltstone	Fine grained, laminated, red brown, highly weathered siltstone.
Unit 4: Siltstone	Fine grained, laminated, red brown, moderately weathered siltstone.
Unit 5L Siltstone	Fine grained, laminated, red brown, slightly weathered siltstone.
Note: thin layers of sandstone were encountered but were difficult to locate. The sandstone layers were of lower strength and higher weathering than the adjacent siltstone rock.	

[redacted]

Table 8. Typical geotechnical parameters.

Rock Unit	Strength	Weathering	Joint Sets	Aperture (mm)	Persistence (m)	Planarity	Roughness	Rock Quality Designation (%)	Geological Strength Index (GSI)
Siltstone	L	XW-HW	3	0-2	<100	ST	SM	10	35
	M	MW	3	0-2	<200	ST	RO/UN	40	45
	M/H	MW-SW	3	1	>300	ST	RO	80	55

Classification Codes
Strength: L: Low Strength. M: Medium Strength. H: High Streng h.
Weathering: XW: Extremely Weathered. HW: Highly Weathered. MW: Moderately Weathered. SW: Slightly Wea hered.
Planarity:
Roughness: RO: Rough. SM: Smooth

5.3.3 Groundwater

Groundwater was not encountered during the investigation and is not anticipated to impact the footing of the bridge structures. Further, based on published regional geological information, groundwater is not expected to influence the design site.

5.4 Summary and Conclusions

Based on the assessment results the subsurface materials are a thin veneer of residual soils composed of loose to medium dense gravels underlain by gently sloping laminated low strength sedimentary rock units.

[redacted]

6 CONCLUSION

Results of specialist reports summarised above indicate that the construction of suspension bridges at Grey Road and Kurnabinna Terrace Gullies are not likely to have any adverse environmental impacts.

Using the currently proposed bridge design and trail alignment, the following has been found:

- Wind noise from the bridges at the closest receptors will be below the guideline level of 38 dBA.
- There are no known cultural heritage sites in the vicinity of the construction areas.
- Threatened flora and fauna species are not impacted and clearing of native vegetation has been minimised to the smallest possible extent in the project design.
- Geotechnical studies have been undertaken to categorise the integrity of the underlying geology, with bridge abutments designed and to be constructed accordingly.

[redacted]

7 REFERENCES

[redacted]. (2022). *Coastal Walkway Upgrade Bridge Design Advice, Grey Road Gully and Kurnabinna Gully, Hallet Cove, SA 5158: Factual Geotechnical Report.* [redacted] Report by [redacted] to [redacted].

Department of the Environment. (2010). *Survey guidelines for Australia's threatened birds - Guidelines for detecting birds listed as threatened under the Environment Protections and Biodiversity Conservtion Act 1999.* [redacted] Department of the Environment.

[redacted]. (2020). *Marino Coastal Walkway: Flora and Fauna Assessment.* [redacted] Report by [redacted] to [redacted].

[redacted] (2020). *Marion Coastal Walkway Upgrade: Aboriginal Cultural Heritage Report.* [redacted] Report by [redacted] to [redacted].

[redacted]. (2021). *Hallet Cove - Cable Suspended Bridge - Wind Noise.* [redacted] Report by [redacted] for the City of Marion.

Native Vegetation Council. (2019a). *Bushland Assessment Manual.* [redacted] Government of South Australia.

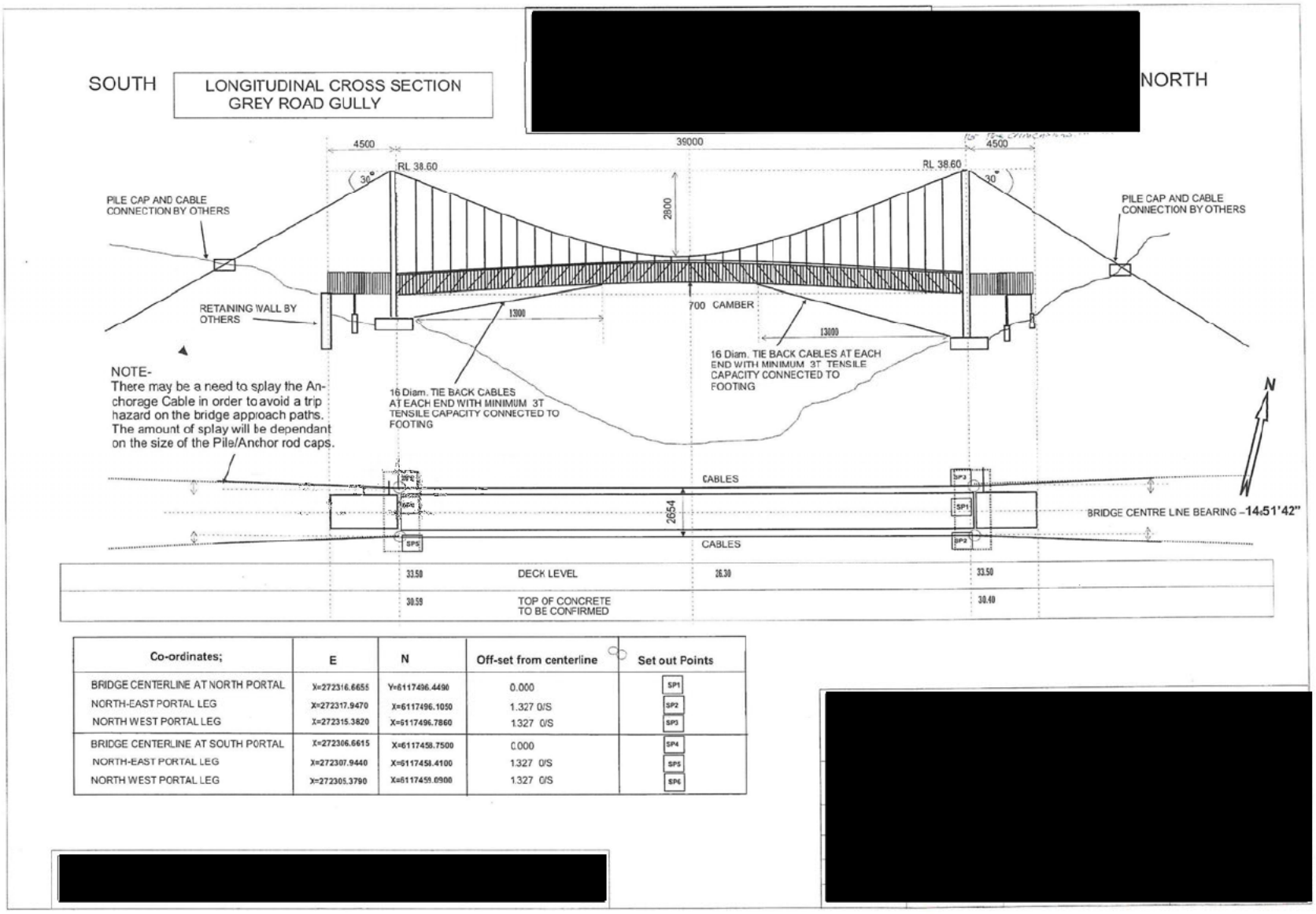
Threatened Species Scientific Committee. (n.d.). *Iron-grass Natural Temperate Grassland of South Australia ecological community Advice*. Department of Agriculture, Water and the Environment.

[redacted]

8 APPENDICES



Appendix 1: Construction drawings – Grey Road Gully

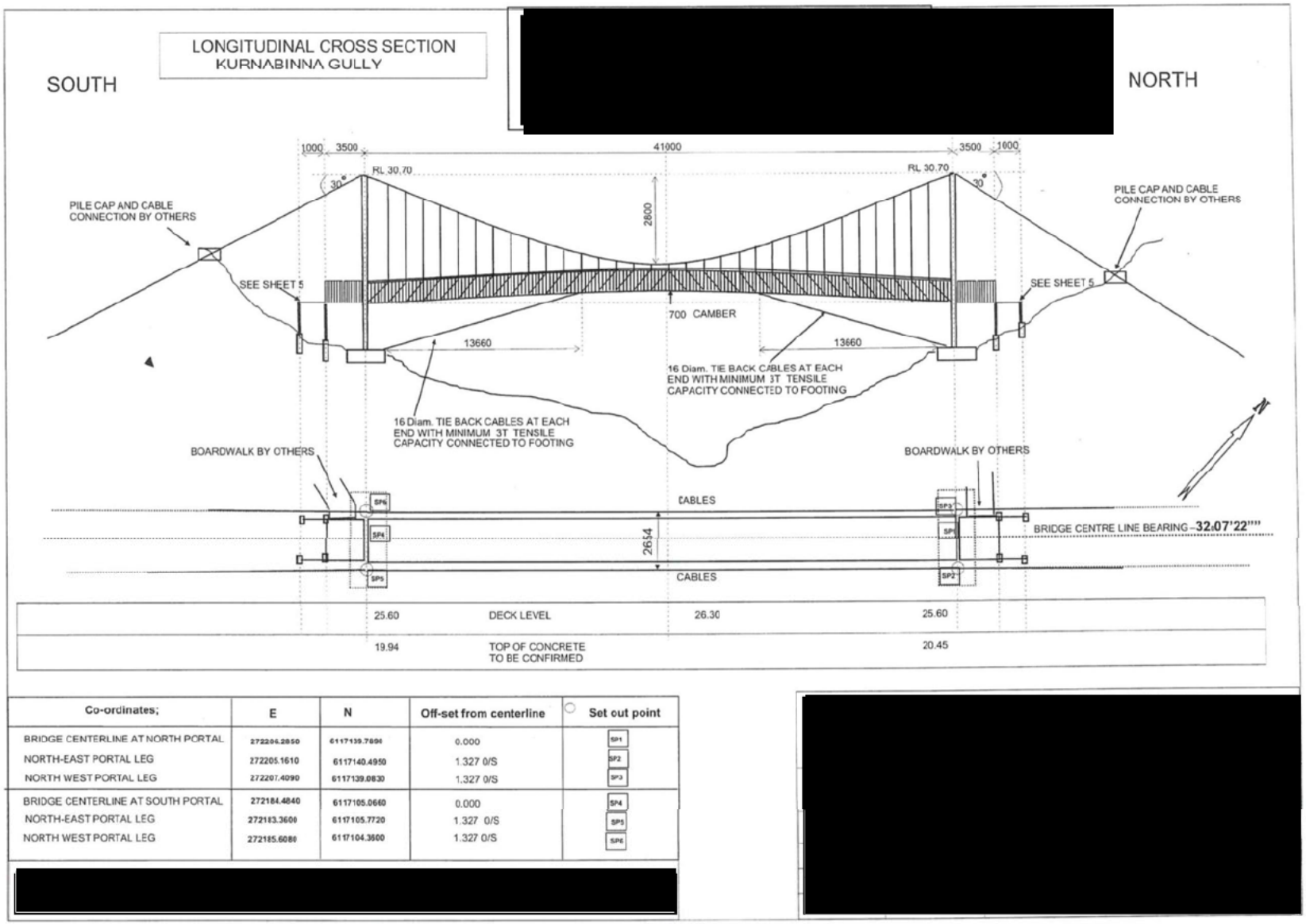


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BRIDGE CENTERLINE AT NORTH PORTAL	X=272316.6655	Y=6117496.4490	0.000	SP1
NORTH-EAST PORTAL LEG	X=272317.9470	X=6117496.1050	1.327 O/S	SP2
NORTH WEST PORTAL LEG	X=272315.3820	X=6117496.7860	1.327 O/S	SP3
BRIDGE CENTERLINE AT SOUTH PORTAL	X=272306.6615	X=6117458.7500	0.000	SP4
NORTH-EAST PORTAL LEG	X=272307.9440	X=6117458.4100	1.327 O/S	SP5
NORTH WEST PORTAL LEG	X=272305.3790	X=6117459.0900	1.327 O/S	SP6

[redacted]

[redacted]

Appendix 2: Construction drawings – Kurnabinna Terrace Gully



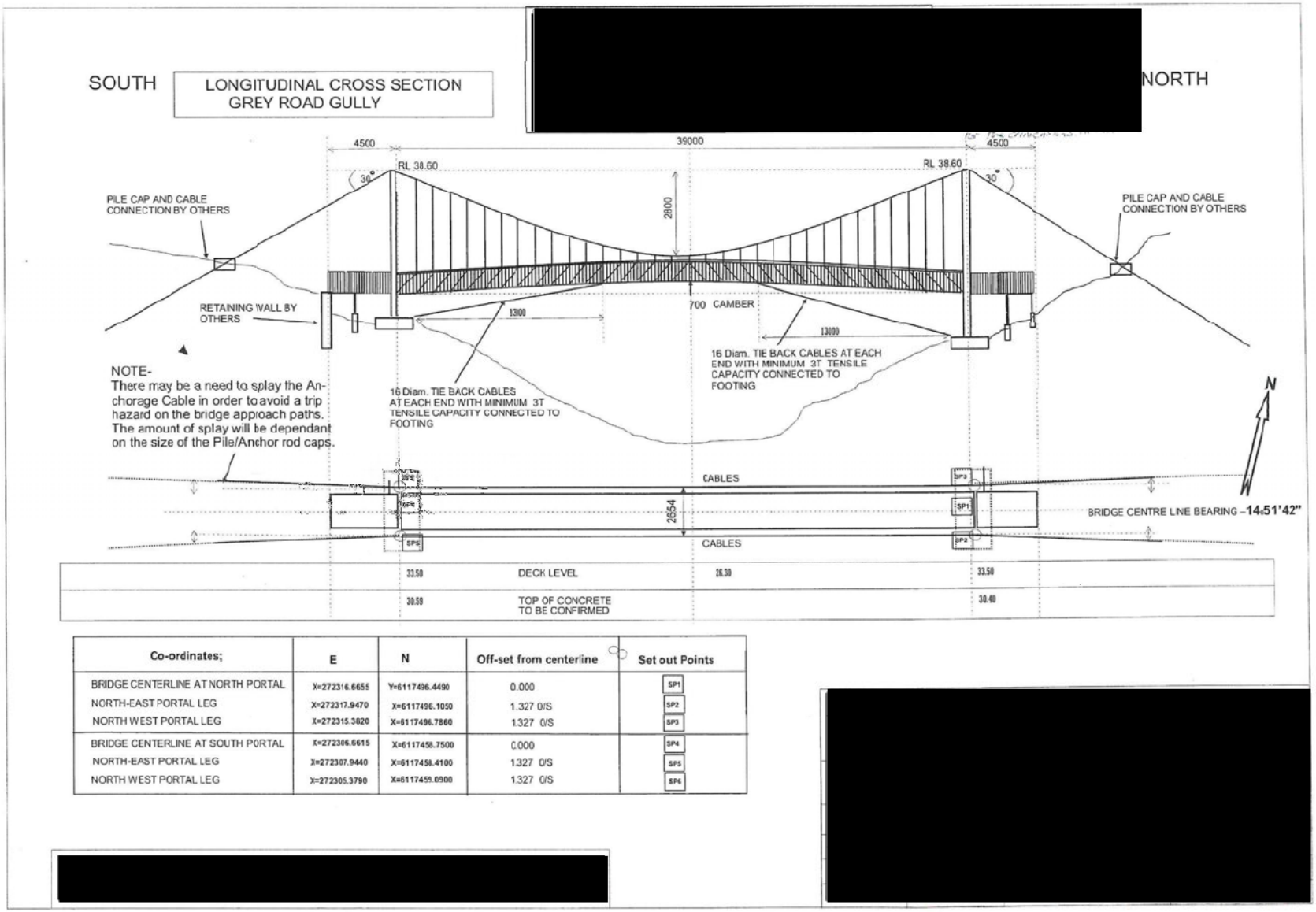
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NORTH WEST PORTAL LEG	272207.4090	6117139.0830	1.327 0/S	SP3
BRIDGE CENTERLINE AT SOUTH PORTAL	272184.4840	6117105.0660	0.000	SP4
NORTH-EAST PORTAL LEG	272183.3600	6117105.7720	1.327 0/S	SP5
NORTH WEST PORTAL LEG	272185.6080	6117104.3600	1.327 0/S	SP6

[redacted]

[redacted]



Appendix 1: Construction drawings – Grey Road Gully

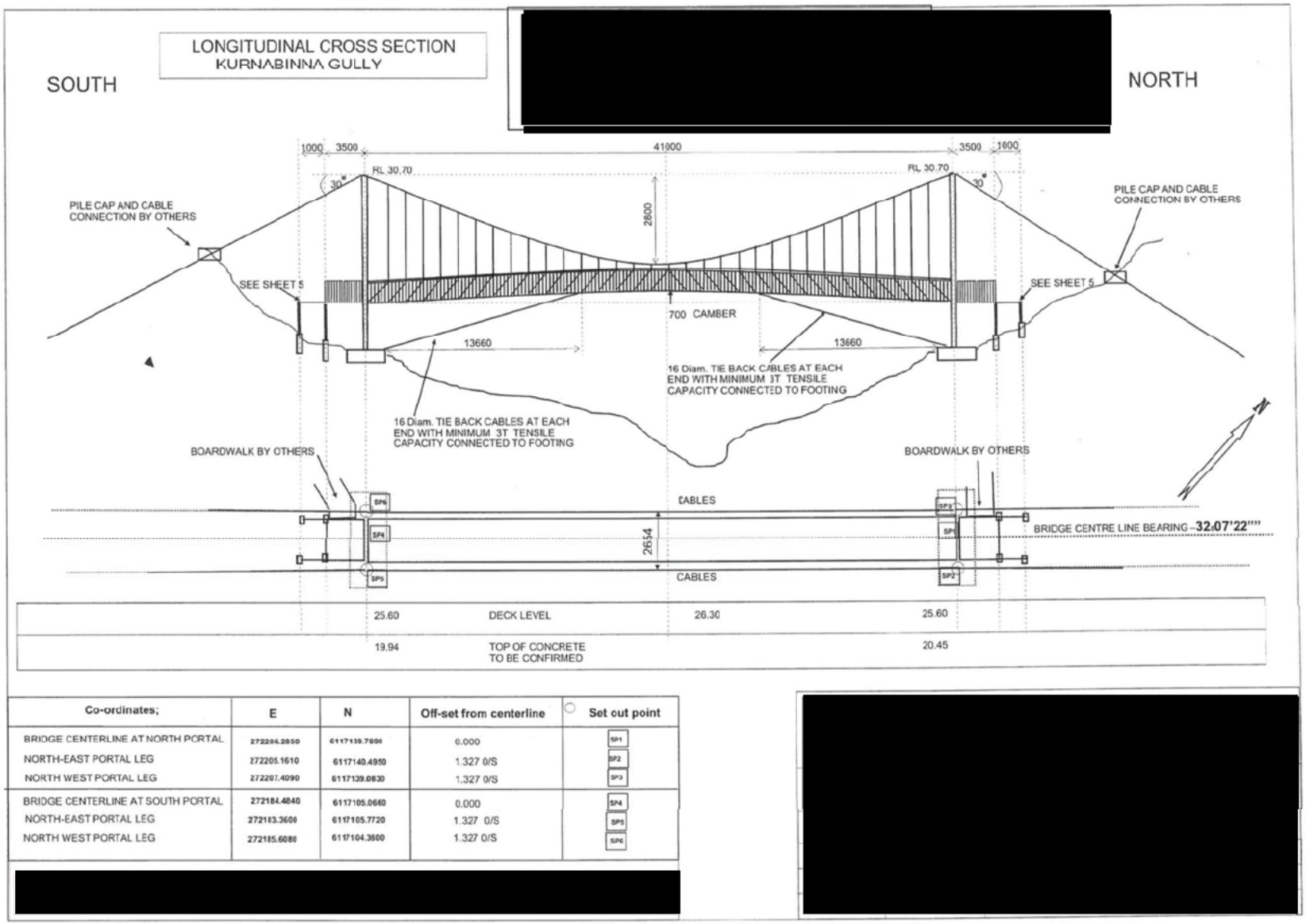


Co-ordinates;	E	N	Off-set from centerline	Set out Points
BRIDGE CENTERLINE AT NORTH PORTAL	X=272316.6655	Y=6117496.4490	0.000	SP1
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NORTH WEST PORTAL LEG	X=272315.3820	X=6117496.7860	1.327 O/S	SP3
BRIDGE CENTERLINE AT SOUTH PORTAL	X=272306.6615	X=6117458.7500	0.000	SP4
NORTH-EAST PORTAL LEG	X=272307.9440	X=6117458.4100	1.327 O/S	SP5
NORTH WEST PORTAL LEG	X=272305.3790	X=6117459.0900	1.327 O/S	SP6

[redacted]

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Appendix 2: Construction drawings – Kurnabinna Terrace Gully



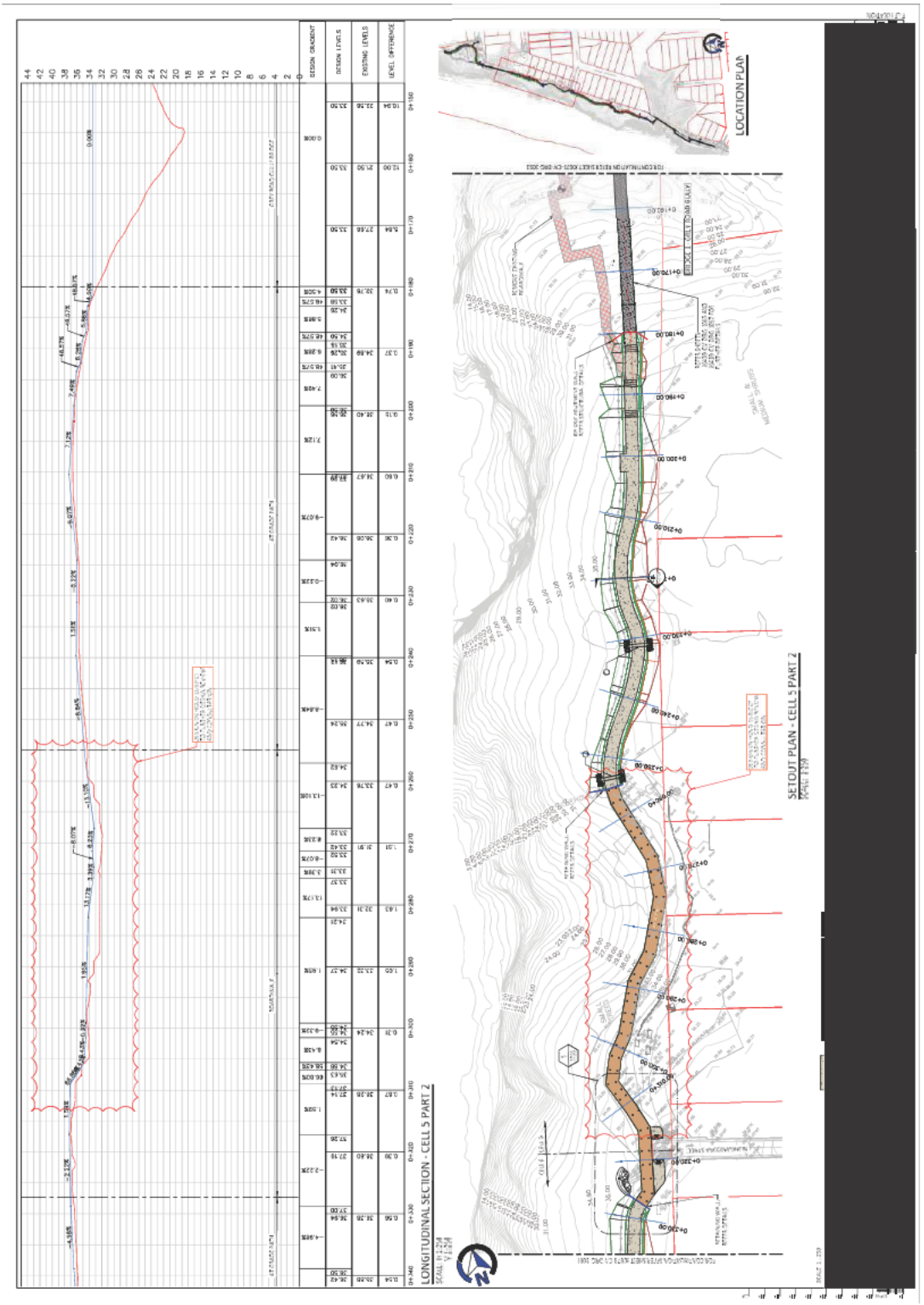
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NORTH WEST PORTAL LEG	272185.6080	6117104.3600	1.327 0/S	SP6

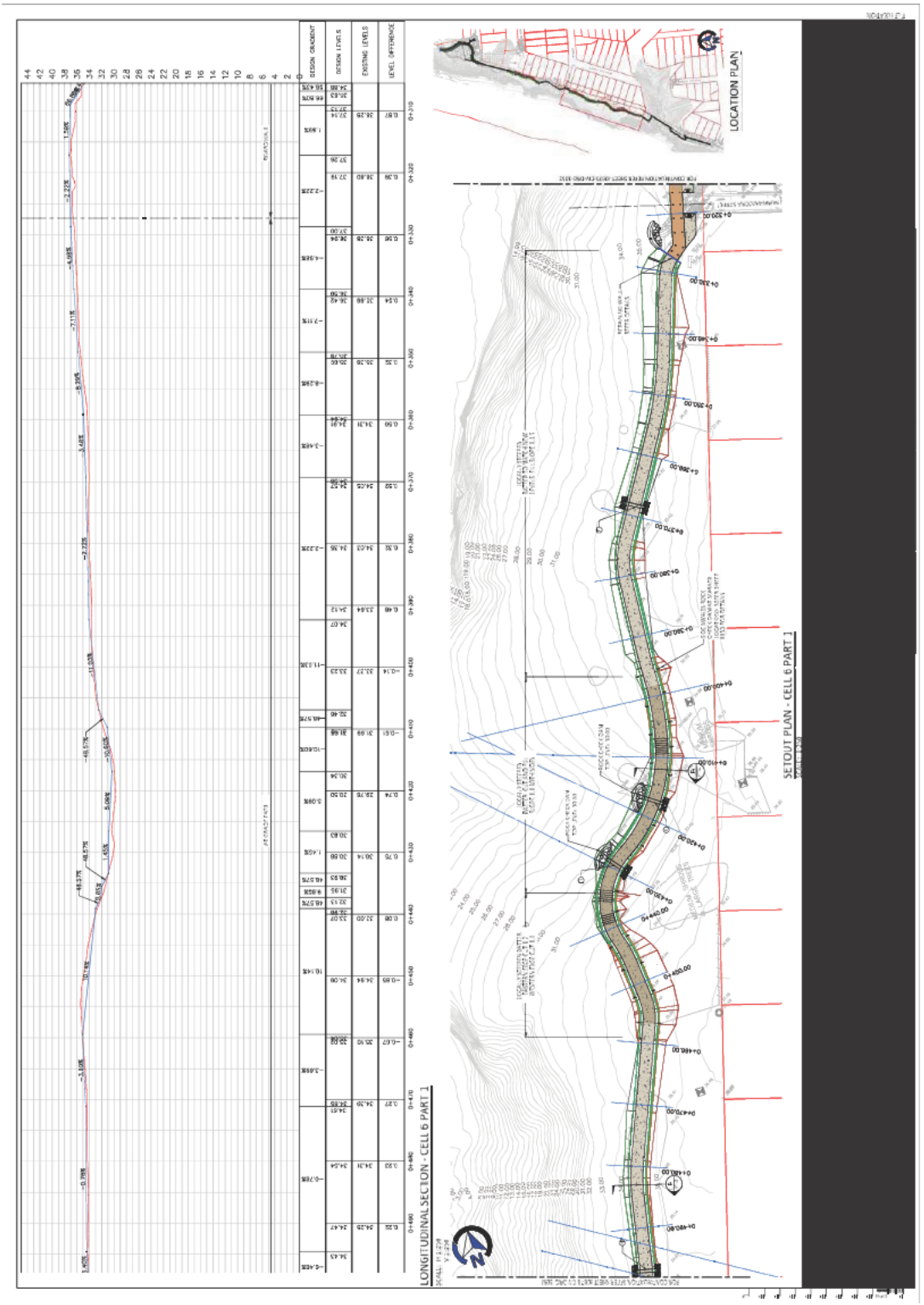
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LOCATION PLAN
LONGITUDINAL SECTION - CELL 5 PART 1

Attachment 11.3.4 98




LOCATION PLAN
SETOUT PLAN - CELL 6 PART 1
LONGITUDINAL SECTION - CELL 6 PART 1



Attachment 11.3.4 100

BLUBUILT

[redacted]

COASTAL WALKWAY CONSTRUCTION - GULLIES
BRIDGE VS BOARDWALK CLARIFICATION

To further clarify City of Marion's (CoM's) queries regarding the final design solutions adopted for the Hallett Cove Coastal Walkway project, BluBuilt provides responses to the following CoM questions:

1. What environmental benefit does the bridge solution have over the replacement of the boardwalk and step?
2. Provide an overview of construction processes, complete with environmental considerations for both the boardwalk and bridge options?
3. Impact of the bridge foundations / anchors on overall stability of the existing cliffs?

OVERVIEW

In providing context as to why a bridge option was originally tabled during the ECI phase, several significant risks and environmental aspects were identified as key factors influencing investigation of bridge option, summarised below.

Risk/ Aspect	Description	Benefit of a Bridge Solution
Existing topography, site access and logistical constraints	Inability to get larger plant to the top of embankment of each gully and on/ down the existing embankments due to the steepness	Localised anchor works limited to upper embankment areas only. Some accessible by larger equipment.
Structure collapse due to batter erosion / collapse –	Extensive erosion is evident and has impacted the structural integrity of existing boardwalk. Likely to be recuring with no means to control overland/ embankment water flow	Limiting the extent, founding deeper and relocating further away from the ocean facing cliffs reduces erosion risk in comparison to the multiple, shallower boardwalk anchors
Personnel safety during construction	Extensive manual handling and construction works at height, requiring implementation of appropriate fall prevention systems.	Extensive works on the embankment face, at multiple locations is eliminated. Fall prevention system installation simplified.
Extensive environmental footprint associated with Concept Design (boardwalk/ stairs)	Construction of new boardwalk requires boardwalk anchor, fall prevention anchors and general personnel access across the entire footprint of the proposed boardwalk.	Works limited to one area on each gully embankment. Boardwalk option potentially increases the risk of embankment erosion.

We provide the following commentary on your queries below.

1. **WHAT ENVIRONMENTAL BENEFIT DOES THE BRIDGE SOLUTION HAVE OVER THE REPLACEMENT OF THE BOARDWALK AND STAIRS?**

Whilst BluBuilt does not profess to be expert in environmental engineering or environmental science, it is experienced in the construction of elements within sensitive environmental areas and has carried these learnings through into the ECI process with CoM and its wider delivery team.

As summarised in the aforementioned overview, the bridge solution was investigated on the basis of the following key environmental principals:

- Reduction of the overall construction footprint across the gully footprints – positive environmental outcome.
- Relocation of works away from the ocean facing cliffs – reducing erosion impacts clearly evident within this zone of the embankment
- Reduction in the number of foundations within the gully embankments, reducing the extent of erosion as a result of overland/ embankment water flow becoming turbulent at the many boardwalk column / embankment interface locations.

Initially, and for the purpose of understanding the commercial viability of an alternate bridge option, a simple negative camber 'swing' bridge option was tabled at a nominal 50m length, with preliminary foundation allowances provided by [redacted]. Ignoring the constructability benefits, this initial bridge solution supported the environmental assumptions noting:

- Cable stay anchors comprised 4 x 10m deep anchor with a small pile cap, all accessible from the upper embankment
- Portal foundations were shallow with a small pile cap only and located within proximity of the cable stay pile caps
- Erection of the bridge structure provides for 'stringing' of the cables and delivery of portal frames using a helicopter, eliminating any construction footprint within the gully

As the design was progressed, it became evident that the following issues impacted the final design solution:

Design Change	Environmental Impact
A positive camber suspension bridge was specified, with spans reduced to 39m and 41m between portals for Grey Rd Gully and Kurnabinna Gully respectively. We understand this was reduced by the Design Team to mitigate visual impact to residents and improved visual amenity.	The portal frame and cable stay foundations are now located further down the gully embankment, marginally increasing the construction footprint within the gully embankment
Suspension bridge introduced an additional set of foundations to support the approach platforms	Additional anchor and pile cap works increase the construction footprint within the gully embankment.
Final bridge loading and geotechnical investigation and design resulted in significant increases to foundation requirements, both in terms of extent of rock anchors and size of pile caps.	Significant increase in earthworks within the existing gully embankments during construction. Visually, this may appear to be a negative environmental outcome, however final solution will be negligible.

2. PROVIDE AN OVERVIEW OF CONSTRUCTION PROCESSES, COMPLETE WITH ENVIRONMENTAL CONSIDERATIONS FOR BOTH THE BOARDWALK AND BRIDGE OPTIONS?

The bridge solution was primarily tabled on the basis of improved constructability and safety-in-design outcomes over the boardwalk and stair solution, noting secondary benefits related to improved environmental outcomes as detailed in commentary no. 1 above.

When assessing the construction processes in a comparative sense, it is important to understand the evolution of the design and the associated impacts on both constructability and environmental outcomes.

Task	Original - 50m bridge	Final Design - 39m & 41m Bridge	Concept Design - Boardwalk and Stairs
Personnel access / Fall Prevention	Installation and testing of temporary rock anchors at the top of the embankment, directly inline with the bridge centreline, allowing personnel to abseil to portal and cable stay location. Minimal abseiling works due to higher portal locations	Identical method to the original bridge proposal, noting majority of works at the portals and cable anchors are required under abseiling conditions.	Installation and testing of multiple temporary rock anchors, both horizontally and vertically with double lanyard fall prevention approach allowing safe connection between anchor points.
Rock anchor drilling	Rock drilling with Marini hydraulic tripod drill supported via cable and winch anchored at the top of the embankment	Identical process, however nearly double the length of anchors required to be installed across an increased vertical and horizontal footprint.	Same rock drilling rig to be utilised. Extensive number of anchor points to be installed at each boardwalk column location, resulting in an extensive number of temporary anchor points required (directly above proposed rock drilling location) to support the rig.
Anchor installation and grouting	Stock length rods manually inserted into the holes and coupled together to achieve design embedment. Grout placed using a grout pump sited on the upper embankment.	Due to the increased number of anchors and difficulty of access, an alternative proposal to utilise strand anchors for the deep embedment anchors and onsite 'Double Corrosion Protection' was proposed and adopted. Nil negative environmental impact but an increase in material and labour efficiencies in the difficult access locations.	Installation of prefabricated rod/ boardwalk connection brackets are installed and grouted in a similar manner to the original bridge solution, noting the anchor depths are minimal.
Cable stay pile caps and portal frame pile caps	Excavation of small pile caps using both mechanical (excavator) and manual (jackhammer) methods. Minimal waste fill that is simply incorporated into the final works. Conventional form, reinforce and concrete placement adopted, with concrete placed via excavator or winched trolley, subject to location.	Excavation of significantly larger pile caps (>10 times larger by volume), requiring mechanical excavation on the embankment. Temporary construction platform to be installed with small excavator lifted into position with a helicopter. More robust winched trolley system to be designed for transportation of waste fill to the top of the embankment.	Not required.

Task	Original - 50m bridge	Final Design - 39m & 41m Bridge	Concept Design - Boardwalk and Stairs
	Minimal environmental footprint.	Environmental footprint increased by Approximately 200% over the original bridge design.	
Bridge construction	Portal frames mobilised and lifted into final position using a helicopter Temporary work platform established at each portal approach, founded on shallow rock anchors Cables 'strung' over the portals and connected to the cable stay anchor blocks Bridge deck support frames landed on the temporary work platforms (helicopter), allowing the frames to be systematically fixed to the cables, working from the portal out Deck and balustrade units landed on temporary work platforms (helicopter), allowing them to be systematically fixed to the cables, working from the portal out	Identical process adopted, noting: • larger portal frames • larger deck support frames • larger cable	Not required
Boardwalk construction			Mobilisation of heavy, long boardwalk components presents a logistical challenge, particularly noting the alignment traverses a varied vertical and horizontal alignment. Manual handling methods would be primarily required (significant WHS risk), with various access 'corridors' required vertically on each gully embankment allowing materials to be winched down to the site. From an environmental perspective, it is likely a large footprint would be occupied to facilitate construction.

3. **IMPACT OF THE BRIDGE FOUNDATIONS / ANCHORS ON OVERALL STABILITY OF THE EXISTING CLIFFS?**

An extensive amount of geotechnical design work has been undertaken by [redacted], with slope/ cliff stability assessment an integral part of the final foundation design solution. [redacted] would be best positioned to provide these assurances accordingly.

Notwithstanding, it is BluBuilt's opinion that the final rock anchor configuration and depths (comprising raked anchors across a larger footprint) would improve the structural integrity of the existing embankments and cliffs particularly noting that rock / soil nailing is the leading engineering solution for cliff and embankment stabilisation works. It is BluBuilt's understanding that the composite design of the rock anchors and concrete footings has a secondary benefit of not only supporting the bridge loads directly from the higher capacity rock substrate but are also designed to reinforce the poor overlying soil layers and reduce the potential for landslip. This is a design element that was not incorporated in the original boardwalk design.

With the question of cliff stability, it is pertinent to understand that the option to construct a new boardwalk requires its alignment to traverse a similar vertical and horizontal alignment to existing. It is clearly evident that significant portions of the new boardwalk will be required to be founded in sections of the embankment / cliff that are located in close proximity to the ocean facing cliffs, and, in sections of the embankment that are clearly disposed to erosion.

The location of the multiple boardwalk columns is thought to produce obstructions across embankment potentially impacting overland/ sheet water flow and increasing erosion impact on the embankment together with increased risk of undermining the foundations, potentially requiring substantial ongoing future maintenance/ repair.

King regards,

[redacted]

Grey Rd Gully



LOCATION PLAN

Artist impression

G ey Gu ly, D one Concept Image



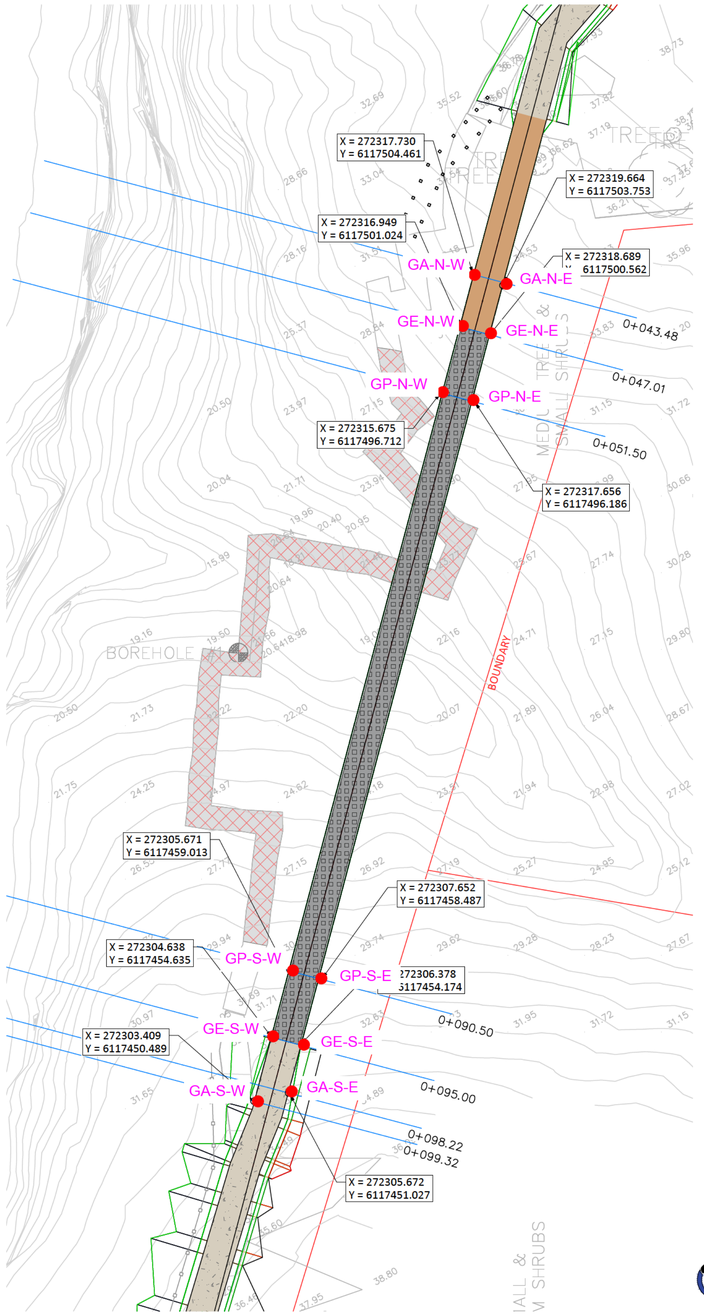

Kurnabinna Gully
Artist impression

Ku nab nna Gully, D one Concept Image



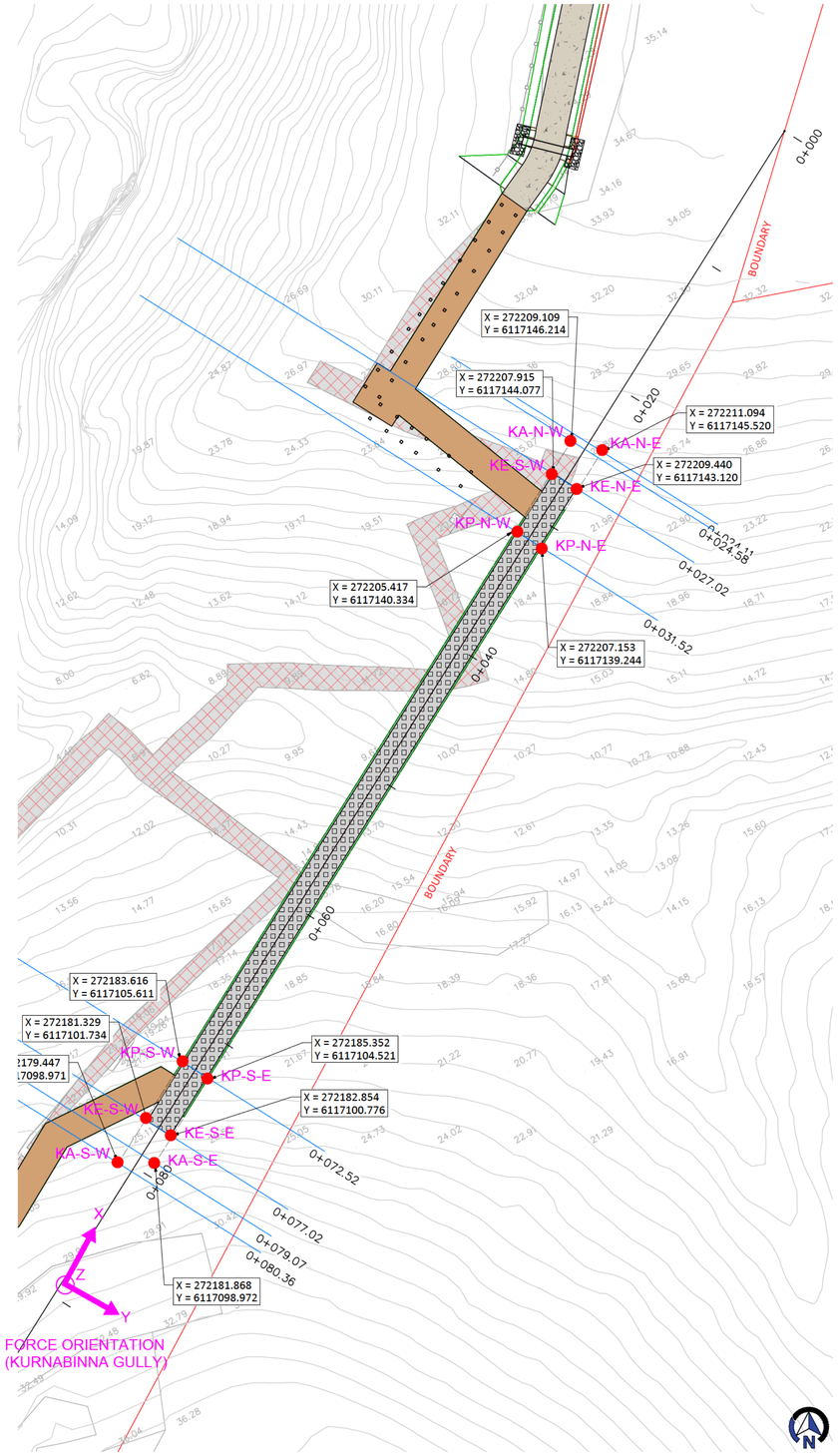
Kurnabinna Gully, Current





BRIDGE 1 GREY ROAD PART PLAN

SCALE: 1:200



BRIDGE 2 KURNABINNA GULLY PLAN

SCALE: 1:200

VERTICAL AND HORIZONTAL SCALE 1 : 100

0 1 2 3 4 5 10

[redacted]

FILE LOCATION:

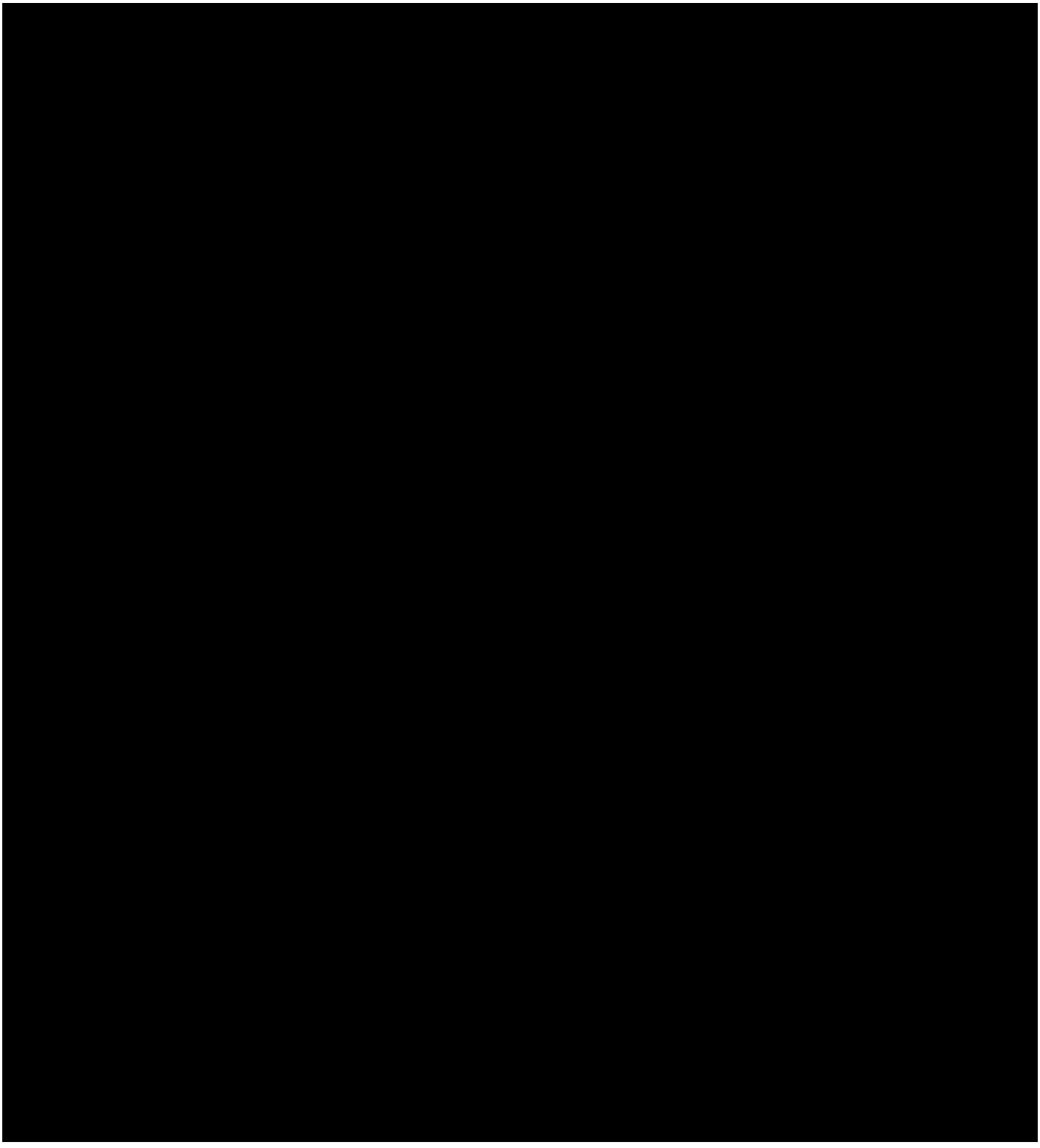
PRINT DATE:

MARK	DESCRIPTION	X (kN) Longitudinal	Y (kN) Lateral	Z(kN) Vertical
KP-S-E	KURNABINNA GULLY SOUTH PORTAL (EAST)	64.5	35	514.2
KP-S-W	KURNABINNA GULLY SOUTH PORTAL (WEST)	64.5	35	514.2
KA-S-E	KURNABINNA GULLY SOUTH ANCHOR (EAST)	571	28	330
KA-S-W	KURNABINNA GULLY SOUTH ANCHOR (WEST)	571	28	330
KE-S-E	KURNABINNA GULLY SOUTH EXTENSION (EAST)	0.19	5.08	18.81
KE-S-W	KURNABINNA GULLY SOUTH EXTENSION (WEST)	0.19	5.08	18.81
KP-N-E	KURNABINNA GULLY NORTH PORTAL (EAST)	64.5	35	514.2
KP-N-W	KURNABINNA GULLY NORTH PORTAL (WEST)	64.5	35	514.2
KA-N-E	KURNABINNA GULLY NORTH ANCHOR (EAST)	571	28	330
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KE-N-W	KURNABINNA GULLY NORTH EXTENSION (WEST)	0.19	5.08	18.81
GP-S-E	GREY ROAD GULLY SOUTH PORTAL (EAST)	64.5	35	514.2
GP-S-W	GREY ROAD GULLY SOUTH PORTAL (WEST)	64.5	35	514.2
GA-S-E	GREY ROAD GULLY SOUTH ANCHOR (EAST)	571	28	330
GA-S-W	GREY ROAD GULLY SOUTH ANCHOR (WEST)	571	28	330
GE-S-E	GREY ROAD GULLY SOUTH EXTENSION (EAST)	0.19	5.08	18.81
GE-S-W	GREY ROAD GULLY SOUTH EXTENSION (WEST)	0.19	5.08	18.81
GP-N-E	GREY ROAD GULLY NORTH PORTAL (EAST)	64.5	35	514.2
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GE-N-W	GREY ROAD GULLY NORTH EXTENSION (WEST)	0.19	5.08	18.81

Notes:
1. All loads in this table are ULS reactions (i.e. factored) for DL + LL+ WL.
2. Grey Road Gully Loads use same as for Kurnabinna Gully.

Ref: 2402B-REACTION MARKS 17-02-2022





Marion Coastal Walkway Upgrade Aboriginal Cultural Heritage Report

22 September 2020

Version 1.1

Prepared by [redacted] for [redacted]

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CITATION: [redacted] (2020) Marion Coastal Walkway Upgrade Aboriginal Cultural Heritage Report. Report to [redacted], Adelaide.

Cover photograph: View south from Grey Road Gully.

[redacted]

[redacted]

GLOSSARY AND ABBREVIATION OF TERMS

AH Act	*Aboriginal Heritage Act 1988*
DEW	Department for Environment and Water
DPC-AAR	Department of the Premier and Cabinet – Aboriginal Affairs and Reconciliation
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
HP Act	*Heritage Places Act 1993*
ILUA	Indigenous Land Use Agreement
km	kilometre(s)
KNCHA	Kaurna Nations Cultural Heritage Association
m	metre(s)
NT Act	*Native Title* (South Australia) *Act 1994*
SA	South Australia(n)
SAM	South Australian Museum
the Council	South Australian Heritage Council

[redacted]

EXECUTIVE SUMMARY

[redacted] has been engaged by the City of Marion to undertake a planning investigation, and a concept and detailed design for the Marion Coastal Walk Upgrade. The upgrade has been divided into sections and priortised. The current priority requires investigation for Grey Road Gully (Cell 5) and Kurnabinna Gully (Cell 6).

[redacted] were engaged by [redacted] to undertake an Aboriginal cultural heritage desktop assessment and field survey as the project has now moved to the Design Phase. The aim of the desktop assessment and cultural heritage survey is to identify any Aboriginal sites or objects that may be within the two project areas and protected by the South Australian *Aboriginal Heritage Act* 1988 (AH Act). The cultural heritage report will inform the planning process and assist the City of Marion and their contractors to identify and appropriately manage sites protected by the AH Act.

The Kaurna Nations Cultural Heritage Association (KNCHA), as the Traditional Owners of the land on which the project will be undertaken, participated in the cultural heritage survey of Cell 5 and Cell 6.

Desktop Results

Hallett Cove is within the Kaurna Peoples native title determination and the principal Aboriginal heritage legislation for the Marion Coastal Walk Upgrade is the *Native Title Act 1993*, *Native Title Act* (South Australia) *1994* (the NT Act) and the *Aboriginal Heritage Act 1988* (the AH Act).

Hallett Cove and the surrounding region has been shown to have a long history of Aboriginal land use with a large number of sites and objects being recorded throughout the greater area. In the project areas though, no Aboriginal sites, objects, cultural and/or spiritual histories have been listed on the Register of Aboriginal Sites and Objects. The closest registered site is approximately two kilometres (km) away at Field River.

The South Australian Museum Database contained 316 records for Hallett Cove, but only sparse details on their locations were provided. It was not possible to determine if any of the items were recovered from the two project areas.

Cultural Heritage Survey Results

Grey Road Gully (Cell 5)

No Aboriginal archaeological sites, objects and remains, or sites of significance according to Aboriginal tradition, archaeology, anthropology or history were identified during the cultural heritage survey.

Kurnabinna Gully (Cell 6)

No Aboriginal archaeological sites, objects and remains, or sites of significance according to Aboriginal tradition, archaeology, anthropology or history were identified during the cultural heritage survey.

[redacted]

Recommendations

In consultation with KNCHA representatives, the following recommendations are made for the Project:

Recommendation 1: Stop work/site discovery procedure

It is recommended that all staff and contractors are provided with a stop work/site discovery procedure in the event of an unexpected find. A copy of the procedure should also be on display in the site office. An example procedure has been provided in Appendix 1.

Recommendation 2: Aboriginal monitoring during ground works

It is recommended that Aboriginal Monitors should be engaged during ground works if the Grey Road Gully is cut into to provide a potential new link or potential alternative at grade link as shown in Figure 3. Although the AH Act does not mandate the requirement for monitoring during ground works, the survey area lies across a landscape that is considered culturally significant for the Kaurna people.



Table of Contents

1 INTRODUCTION 1

1.1 Scope of works 1
1.2 Project location 1
1.3 Limitation of the report 4

2 COMPLIANCE AND LEGISLATIVE SUMMARY 5

2.1 Commonwealth legislation 5
2.1.1 Environment Protection and Biodiversity Conservation Act 1999 5
2.1.2 Native Title Act 1993 5
2.2 SA State legislation – Aboriginal heritage 5
2.2.1 Native Title Act (South Australia) 1994 5
2.2.2 Aboriginal Heritage Act 1988 6
2.3 SA State legislation – Historical heritage 6
2.3.1 Heritage Places Act 1993 6
2.3.2 Planning, Development and Infrastructure Act 2016 7

3 METHODOLOGY 8

3.1 Desktop assessment 8
3.1.1 DPC-AAR Register search 8
3.1.2 Archival research 8
3.1.3 Previous work/consultancy reports 8
3.2 Archaeological survey 8

4 RESULTS 12

4.1 Native Title Claim 12
4.2 Indigenous Land Use Agreement 12
4.3 SA Museum database 13
4.4 DPC-AAR Register search 13
4.4.1 Grey Road Gully (Cell 5) 13
4.4.2 Kurnabinna Gully (Cell 6) 13
4.4.3 Interested Aboriginal Parties 14
4.5 Archaeological Site Assessment 14
4.5.1 Grey Road Gully (Cell 5) 15
4.5.2 Kurnabinna Gully (Cell 6) 16

5 FUTURE HERITAGE OBLIGATIONS 17

5.1 Monitoring by Aboriginal representatives 17
5.2 On-call archaeologist 17
5.3 *Aboriginal Heritage Act 1988* - Section 21, 23 or 29(1)(b) application 17

[redacted]

6 DISCUSSION AND RECOMMENDATIONS 18

7 REFERENCES 19

8 APPENDICES 20

Appendix 1 – Stop Work Procedure. 20
Appendix 2 – DPC-AAR Letter for Grey Road Gully (Cell 5). 22
Appendix 3 – DPC–AAR Letter for Kurnabinna Gully (Cell 6). 25

List of Tables

Table 1. Native title land types. 5
Table 2. Native Title determination. 12
Table 3. Registered ILUA. 12
Table 4. Aboriginal Groups that may have an interest in the Project Area. 14

List of Figures

Figure 1. Existing coastal trail – Grey Road to Nungamoora Street (Cell 5). 2
Figure 2. Existing coastal trail – Nungamoora to Peera Streets (Cell 6). 3
Figure 3. Proposed route for coastal walk - Grey Road to Nungamoora Street (Cell 5). Image provided by [redacted] 10
Figure 4. Proposed route for coastal walk - Nungamoora Street to Peera Street (Cell 6). Image provided by [redacted] 11
Figure 5. Beginning of walkway from Peera Street looking north. 14
Figure 6. Walkway at Kurnabirra gully crossing looking north. 14
Figure 7. Grey Road Gully looking south. 15
Figure 8. Grey Road looking north along informal path. 15
Figure 9. Protected Aboriginal Site sign on pirate ship artwork. 15
Figure 10. Pirate ship artwork with Protected Aboriginal Site sign. 16
Figure 11. Pirate ship artwork without sign. Photo courtesy of Walking SA website. 16

[redacted]

1 INTRODUCTION

The Marion Coastal Walk is an approximately 8 km section between Marino and Hallett Cove and is part of the broader Adelaide Metropolitan Coast Park which extends along the coastline from Sellicks Beach to North Haven.

The Coastal Walk is to be upgraded with The City of Marion's Coastal Walkway Plan (2020) dividing the upgrade work into sections and priortised. The current priority requires investigation for two sections; Grey Road Gully (Cell 5) and Kurnabinna Gully (Cell 6). An Aboriginal cultural heritage survey is required for each cell to assist with informing the project design. It is noted that the route for the walkway has not been determined at this stage, but the walkway route shall be entirely within public land such as designated Coastal or Road Reserve or in adjacent Council reserve land subject to consistency with relevant Community Land Management Plans.

1.1 Scope of works

The aims of the desktop research and cultural heritage survey are to:

- Engage and consult with all interested and available parties;
- Conduct a cultural heritage survey within the proposed Project Areas, in collaboration with identified and available stakeholders;
- Identify and record any Aboriginal sites or objects of heritage or potential heritage/cultural significance;
- Provide recommendations in relation to any potential impacts the proposed activities could have on locations of heritage significance in light of the City of Marion's responsibilities under the AH Act;
- Provide clearance for works to progress within the proposed project areas;
- Provide detailed management measures for acknowledging and protecting the cultural significance of any specific areas within the project area;
- Prepare a report and maps detailing the project findings.

1.2 Project location

Grey Road Gully (Cell 5)

The project area is between Grey Road and Nungamoora Street including the Grey Road Gully and currently consists of 250 metres (m) of shared use trail. The trail consists of the natural ground surface with timber steps and a large timber structure bridge network across Grey Road gully (Refer to Figure 1).

Kurnabinna Gully (Cell 6)

The project area is between Nungamoora and Peera Streets including Kurnabinna Gully and consists of 450 m of shared use trail. The trail consists of the natural ground surface with a large timber structure bridge network across Kurnabinna Road gully (Refer to Figure 2).



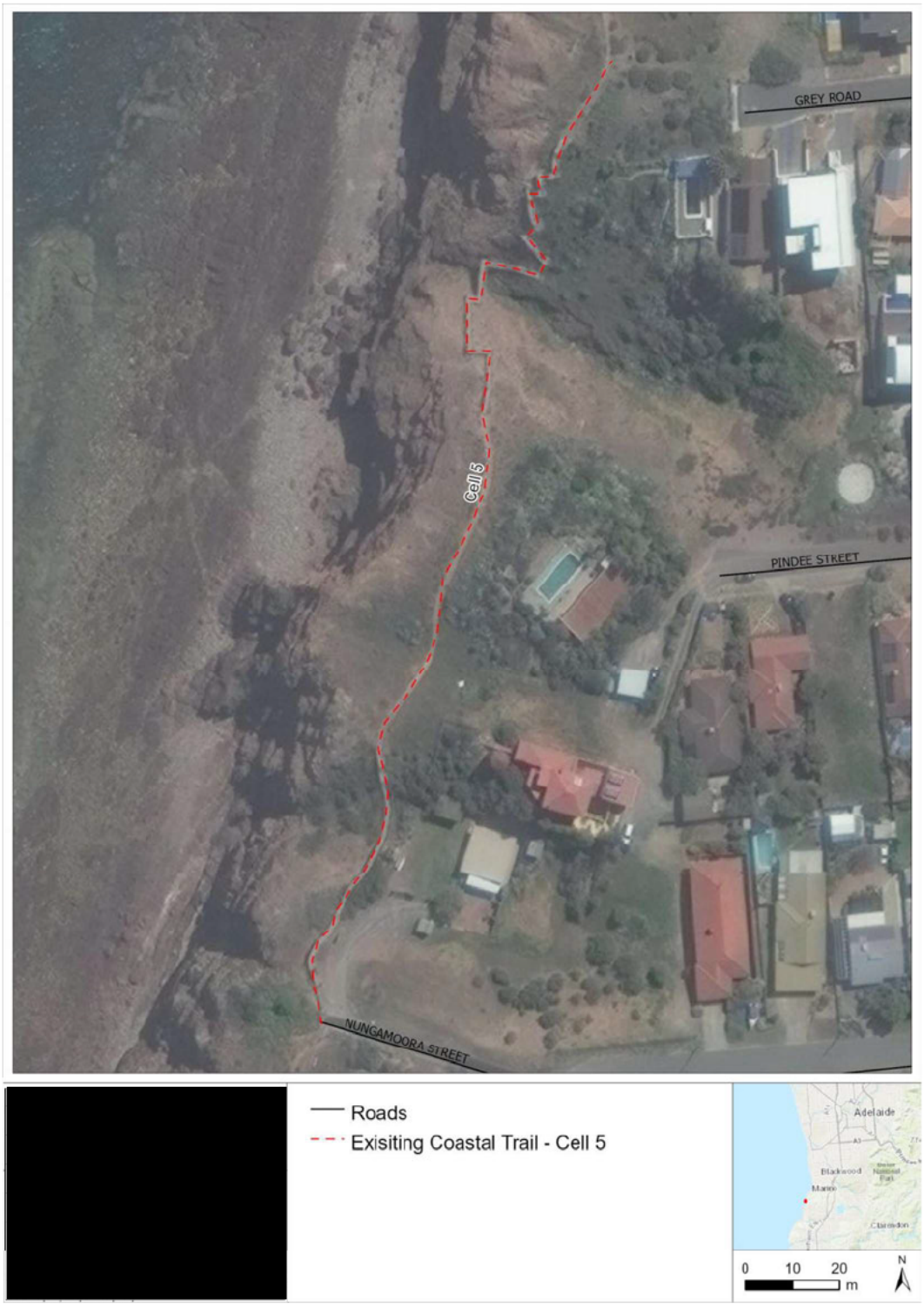


Figure 1. Existing coastal trail – Grey Road to Nungamoora Street (Cell 5).

[redacted]

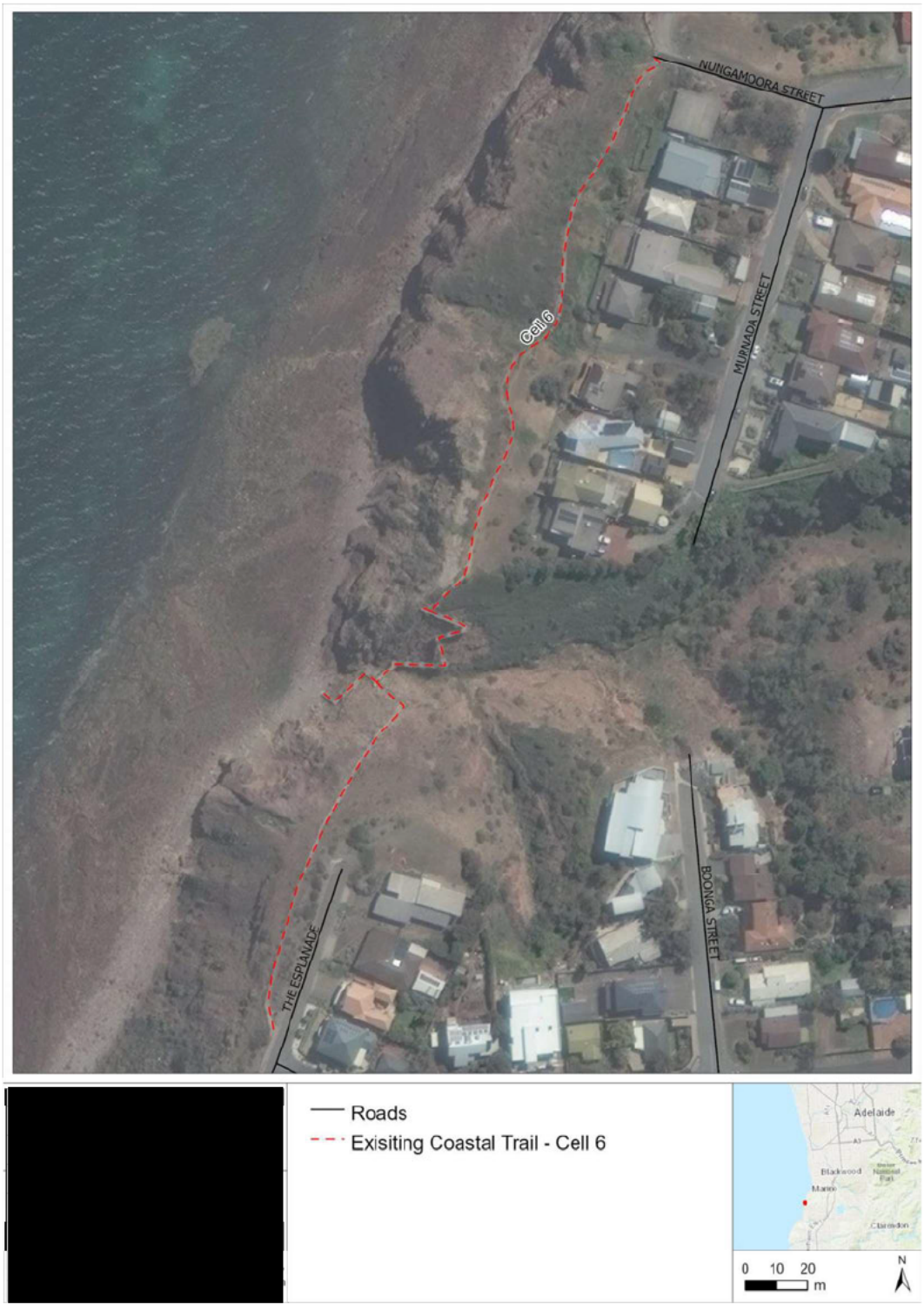


Figure 2. Existing coastal trail – Nungamoora to Peera Streets (Cell 6).

[redacted]

1.3 Limitation of the report

This report was undertaken to the best archaeological practice and its conclusions are based on professional opinion. However limitations in historical documentation and archaeological methods make it difficult to accurately predict subsurface deposits. The findings expressed by [redacted] are based solely upon information in existence at the time of the assessment. It does not therefore warrant that there is no possibility that archaeological material will be located on site.

[redacted]

2 COMPLIANCE AND LEGISLATIVE SUMMARY

2.1 Commonwealth legislation

2.1.1 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *Environment Protection and Biodiversity Conservation Regulations 2000* provide a national scheme of environment and heritage protection and biodiversity conservation. Under the Act, a National Heritage List (for places outside of Commonwealth land) and a Commonwealth Heritage List (for places within Commonwealth land) have been established.

The EPBC Act specifies that any action that has, will have, or is likely to have a significant impact on a place of national culture and/or environmental significance must be referred to the Australian Government Minister for the Environment for approval.

2.1.2 Native Title Act 1993

The Commonwealth *Native Title Act 1993* provides a national system for the recognition and protection of native title. The Act recognises the existence of Indigenous land ownership tradition where connections to country have been maintained and where acts of government have not extinguished this connection.

Not all land is subject to native title and native title may be partly or wholly extinguished (Table 1).

Table 1. Native title land types.

Indicative land types which may be subject to native title:	
Vacant Crown land	Beaches and foreshores
State forests and national parks	Land held by the government agencies
Some pastoral leases	Land held in trust for Aboriginal communities
Unalienated Crown land public reserves	Seas, reefs, rivers and other waters that are not privately owned
Native title may be extinguished by:	
Privately owned freehold land including family homes and freehold farms	Valid grants of private freehold land or water
Residential or commercial leases	Exclusive possession of leases
Public works built before 23 December 1996	Mining dissection lease
Community purpose leases	Pastoral or agricultural leases that grant exclusive possession

2.2 SA State legislation – Aboriginal heritage

2.2.1 Native Title Act (South Australia) 1994

The *Native Title Act (South Australia) 1994* (NT Act) establishes a legal framework to manage and resolve the diversity in the rights and interests in lands and waters within South Australia and requires that a Register be kept of records of native title and claims to native title on land in the State. When certain activities or development is undertaken in areas where native title exists or may exist, the developer will need to consider the possible impacts of their actions on native title rights and interests.



2.2.2 Aboriginal Heritage Act 1988

The South Australian *Aboriginal Heritage Act 1988* (AH Act) is administered by the SA Department of Premier and Cabinet - Aboriginal Affairs and Reconciliation (DPC-AAR). The legislation ensures that any Aboriginal site, object of significance, or remains are protected, whether previously recorded or not.

The most applicable sections of the AH Act are detailed below:

Section 21 - A person must not, without the authority of the Premier, excavate land for the purposes of uncovering any Aboriginal site, object or remains;

Section 23 - It is an offence to 'damage, disturb or interfere' with an Aboriginal site, object or remains unless written authorisation is obtained from the Premier;

Section 29(1)(b) – A person must not, without the authority of the Premier, remove an Aboriginal object from the State;

Section 35 - Except as authorised or required by the Act, a person must not divulge information relating to an Aboriginal site, object, remains or Aboriginal tradition.

2.3 SA State legislation – Historical heritage

2.3.1 Heritage Places Act 1993

The *Heritage Places Act 1993* (HP Act) makes provision for the identification, recording and conservation of places and objects of historical heritage significance in SA and the SA Heritage Register documents places that are protected.

The HP Act is governed by the Department for Environment and Water (DEW) and the South Australian Heritage Council (the Council).

It is an offence to carry out the following without a permit from the Council:

Section 26 - Excavate or disturb a State Heritage Place designated as a place of archaeological significance; or remove archaeological artefacts from such a place;

Section 27 - Excavate or disturb any land (not designated as a place of archaeological significance) for the purpose of searching for or recovering archaeological artefacts of heritage significance; or excavate or disturb any land (not designated as a place of archaeological significance) knowing or having reasonable cause to suspect that the excavation or disturbance will or is likely to result in an archaeological artefact of heritage significance being discovered, exposed, moved, damaged or destroyed; and/or

Section 28 - Damage, destroy or dispose of an archaeological artefact removed from a State Heritage Place designated as a place of archaeological significance (whether removed before or after the entry of that place in the Register) and to damage, destroy or dispose of an object entered in the Register (either as a provisional or confirmed entry).

The Act further stipulates that:

[redacted]

Section 36 - A person who intentionally or recklessly damages a heritage place or engages in conduct knowing that it will or might destroy or reduce the significance to a State Heritage Place can be fined. There is no penalty if damage results from an action authorised by an approval or authorisation under the *Development Act 1993*.

2.3.2 Planning, Development and Infrastructure Act 2016

The South Australian *Planning, Development and Infrastructure Act 2016*, often used in conjunction with the *Planning, Development and Infrastructure (General) Regulations 2017*, provides for matters that are relevant to the use, development and management of land and buildings, including by providing a planning system to regulate development within the State, rules with respect to the design, construction and use of buildings, and other initiatives to facilitate the development of infrastructure, facilities and environments that will benefit the community.

The Act requires a planning authority to refer a development application affecting a State Heritage Place or State Heritage Area to the Minister responsible for the HP Act. This can include applications relating to non-listed properties in the vicinity of a State Heritage Place where the work is considered to 'materially affect the context within which the State Heritage Place is situated'.

As per Part 8, Division 1, Section 129(3) of the Act, the following provisions may apply in relation to proposed development to be undertaken for the purposes of essential infrastructure -:

(a) if the proposed development is to be undertaken within an infrastructure reserve—an assessment against the Planning Rules, and planning consent, are not required; and

(b) if the proposed development is consistent with a standard infrastructure design and to be undertaken within an infrastructure reserve where that design is recognised as being permitted within that reserve—an accredited professional may (if qualified under this Act) act as a relevant authority for the purposes of granting any relevant development authorisation.

Essential infrastructure means —

(a) Transport networks or facilities (including roads, railways, busways, tramways, ports, wharfs, jetties, airports and freight-handling facilities).

Infrastructure reserve means —

(a) land identified in the Planning and Design Code as having a land use that is specified as being suitable for infrastructure; or

(b) land that is subject to a statutory easement; statutory easement means an easement under an Act that is brought within the ambit of this definition by the regulations.

[redacted]

3 METHODOLOGY

3.1 Desktop assessment

3.1.1 DPC-AAR Register of Aboriginal Sites and Objects search

A search of the Register of Aboriginal Sites and Objects, maintained by DPC-AAR, was undertaken for both the project areas. The search identified the presence, or lack of, any reported or recorded sites as defined under Part 1, Section 3 of the AH Act;

Aboriginal site is an area of land;

a) That is of significance according to Aboriginal tradition; and/or

b) That is of significance according to Aboriginal archaeology, anthropology or history.

Aboriginal object means an object—

a) of significance according to Aboriginal tradition; or

b) of significance to Aboriginal archaeology, anthropology or history, and includes an object or an object of a class declared by regulation to be an Aboriginal object but does not include an object or an object of a class excluded by regulation from the ambit of this definition.

3.1.2 Archival research

Searches were conducted of the Australian Heritage Database, the South Australian Heritage Places Register, Australian Museum Anthropologic database, South Australian Museum database, and archives for images, newspaper clippings, journal entries and other primary sources that may contain information about the early uses of the area and early interactions between Aboriginal people and others.

3.1.3 Previous work/consultancy reports

A review of available heritage reports for the general region was undertaken, where applicable. These studies can provide a broad background of the region and provide information on the types and location of sites previously identified near the project area. Some reports remain restricted through confidentiality agreements so are unable to be accessed.

3.2 Archaeological survey

The survey objective is to locate and record any sites of significance to Aboriginal heritage and/ or tradition and if found sites will be recorded to a detail required for site cards to be lodged with DPC-AAR.

Prior to the survey, geographic information system data was uploaded to a handheld Global Positioning System unit for orientation in the field and for identification of the Project Area boundaries. Field maps illustrating the proposed development were created and distributed to the Traditional Owner groups prior to the survey commencing and hard copies were brought to site. A discussion on the background of the Project and proposed works was undertaken prior to the survey beginning.



The archaeological component was carried out using a pedestrian survey, involving survey participants systematically inspecting the Project Areas on foot (Figure 3 and Figure 4), looking for archaeological sites and objects.

The survey commenced in Cell 6 at The Esplanade and Peera Street intersection and followed the trail north to the Kurnabirra Gully. Due to safety concerns the participants proceeded by vehicle to Nungamoora Street then walked south back along the trial to Kurnabirra Gully. Starting at Nungamoora Street the participants then walked north to Grey Gully. Again due to safety concerns the participants walked to Grey Road Gully then proceeded by vehicle to Grey Road walking south back along the walkway to Grey Road Gully.

On completion of the survey discussions were held with the KNCHA representatives to consider the results of the survey and to provide an opportunity for any concerns or issues to be raised and recommendations for the Project moving forward were noted.



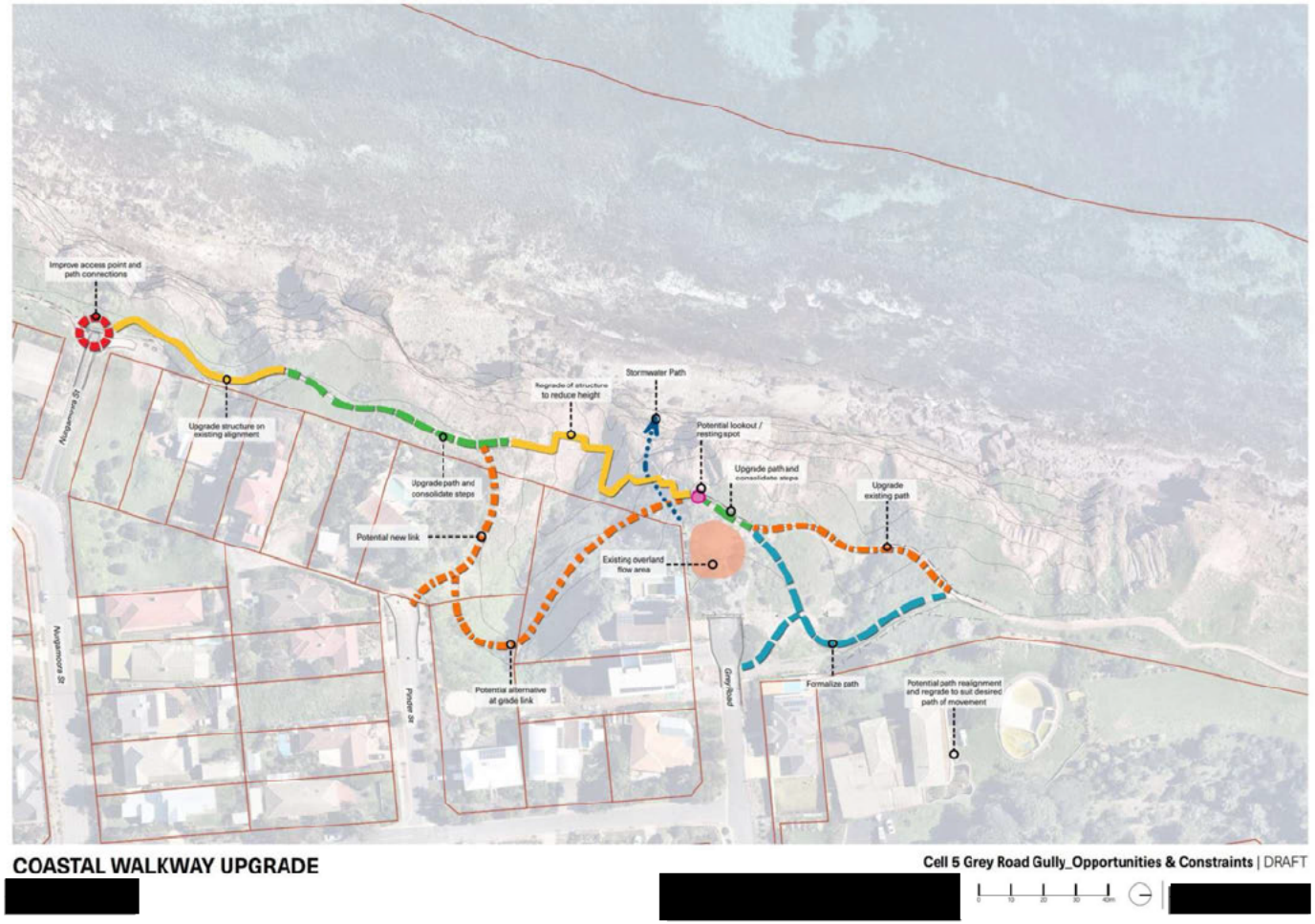


Figure 3. Proposed route for coastal walk - Grey Road to Nungamoora Street (Cell 5). Image provided by [redacted]

[redacted]

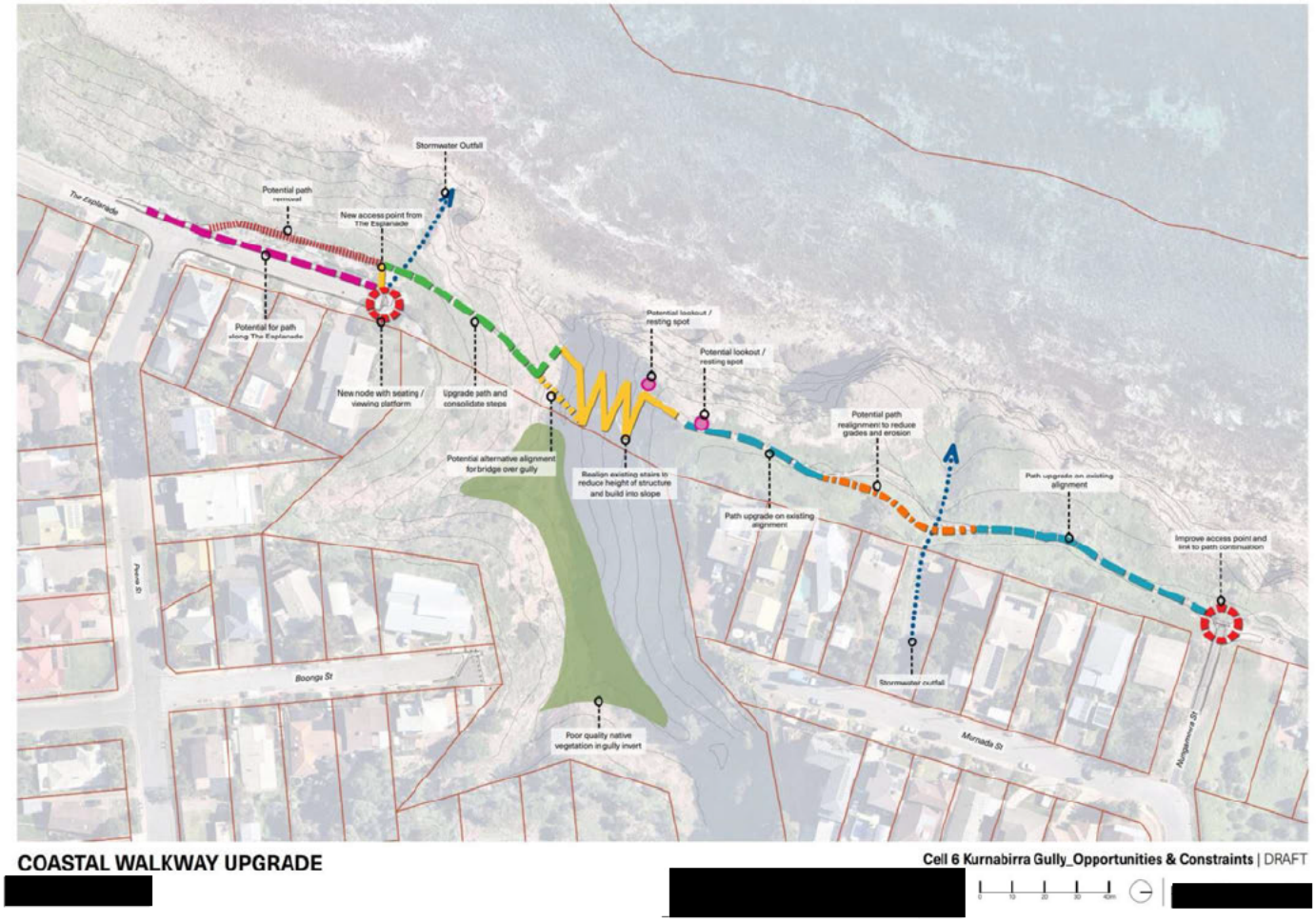


Figure 4. Proposed route for coastal walk - Nungamoora Street to Peera Street (Cell 6). Image provided by [redacted]

[redacted]

4 RESULTS

4.1 Native Title Claim

The National Native Title Register is established under Section 192 of the *Native Title Act 1993* and contains determination of native title made by the High Court of Australia, the Federal Court of Australia, or a recognised body such as South Australia's Supreme Court and the Environment Resources and Development Court. Native title recognises the rights and interests over land or waters where Aboriginal and Torres Strait Islander groups have practiced and continue to practice, traditional laws and customs prior to sovereignty.

The Native Title Register identifies the native title claimants as the Kaurna Peoples (Table 2) with native title rights existing for 17 parcels of land as noted in Schedule 3 of the Determination. None of these parcels are within the two project areas. As per Schedule 4 (5) of the Determination:

> *Native title rights and interests do not exist over any land and waters within the Determination Area other than those parcels listed at Schedule 3.*

Native title is complex, and the City of Marion should seek legal advice if there is any uncertainty whether native title interests may exist over the project areas.

Table 2. Native Title determination.

Name	Tribunal File No.	Status	Determination Outcome	Registered Native Title Body Corporate
Kaurna Peoples Native Title Claim	SCD2018/001	Determined	Native title exists in parts of the determination area	Kaurna Yerta Aboriginal Corporation

Source: Register of Native Title Claims.

4.2 Indigenous Land Use Agreement

The Kaurna Peoples have an Indigenous Land Use Agreement (ILUA) which is a voluntary agreement between the native title group and The Attorney-General for the State of South Australia regarding the use and management of the determination land and waters (Table 5). When registered, ILUAs bind all parties and all native title holders to the terms of the agreement.

The Kaurna ILUA area is all of the land and waters the subject of the Determination and includes both the Native Title Land and the land and waters over which native title does not exist, as set out in the Determination. The ILUA covers about 3,470 square km in the vicinity of Adelaide, extending easterly from Gulf St Vincent to the foothills of the Mount Lofty Ranges.

Table 3. Registered ILUA.

Name	Tribunal file no	Status
Kaurna People Native Title Settlement ILUA	SI2018/004	ILUA registered 19 November 2018

Source: Register of Indigenous Land Use Agreements.

[redacted]

4.3 SA Museum database

The South Australian Museum (SAM) database details Aboriginal cultural material and skeletal remains held by the museum. The database is a valuable tool used to identify former cultural activity and lists the types and numbers of materials previously found in the area. The information helps to assess the potential for sub-surface cultural material to be unearthed in undisturbed soil profiles during works.

Most of the collection represents cultural material that was donated to or purchased/collected by the museum. Where available, the database contains information on how the item(s) came into the collection, the location in which it was found and the date it was acquired. Many of the records are without archaeological context and are often incomplete, therefore the database is used only to inform the risk assessment.

The database contained 316 records for Hallett Cove; 16 entries for stone tools, one entry for fresh water mussel shells from a kitchen midden and one entry for food scraps. The remaining 298 records had no identifying information. Most of the records were also without any location information. One hundred and three entries were described as '*below the railway station'* which is only approximately 400 m from the Cell 6 project area, two entries for '*Field River'* approximately 2.5 km from the Cell 6 project area and eleven entries for '*Curlew Point'*, more than 6 km from Cell 6 project area. A skull (no jaw) with a hole drilled through the top was listed for Marino, the suburb located only 130 m north of Grey Road (Cell 5).

Although specific locations for any of the items are not given, the database does show that a large number of artefacts have been found along the length of the Hallett Cove coast indicating constant and prolonged use of the sea and land by Aboriginal people.

4.4 Department of the Premier and Cabinet – Aboriginal Affairs and Reconciliation (DPC-AAR) Register of Aboriginal Sites and Objects search

[redacted] requested a search of the Register of Aboriginal Sites and Objects on 13 August 2020. The search request was for a 1.2 km radius from the project area. The wider search parameter can identify whether other sites have been recorded in the district and gives a more robust review of known sites to better inform the risk assessment.

4.4.1 Grey Road Gully (Cell 5)

[redacted] was advised that the central archive has no entries within 1.2 km of the requested search area. The results are provided as a guide only and may not be a complete list of all Aboriginal heritage items within an area. Therefore DPC-AAR advises that sites or objects may exist in the development area even though the Register doesn't identify them. Refer to Appendix 1 for the full letter.

4.4.2 Kurnabinna Gully (Cell 6)

[redacted] was advised that the central archive has no entries within 1.2 km of the requested search area. The results are provided as a guide only and may not be a complete list of all Aboriginal heritage items within an area. Therefore DPC-AAR advises that sites or objects may exist in the development area even though the Register doesn't identify them. Refer to Appendix 2 for the full letter.

[redacted]

4.4.3 Interested Aboriginal Parties

The DPC-AAR additionally provided the details of Aboriginal groups that may have an interest in the region (Table 4). The Kaurna people have native title determination over the project area, therefore they should be consulted prior to any contact with other possible interested groups.

Table 4. Aboriginal Groups that may have an interest in the Project Area.

Name	Chairperson	Phone	Email
Kaurna Nation Cultural Heritage Association Inc	[redacted]	[redacted]	[redacted]
Original Southern South Australian Tribes Indigenous Corporation	[redacted]	[redacted]	[redacted]
Ramindjeri Heritage Association Incorporated	[redacted]	-	[redacted]

4.5 Archaeological Site Assessment

The cultural heritage survey was undertaken on 16 September 2020 by [redacted] archaeologist [redacted]. [redacted] and [redacted], representatives of KNCHA the Traditional Owners of the land on which the project will be undertaken, also participated in the survey.

The existing trail in Cell 5 and Cell 6 consists of portions of dirt, bark, blue metal and gravel with sections of boardwalk, steps and bridges, as shown in Figure 5 to Figure 8.

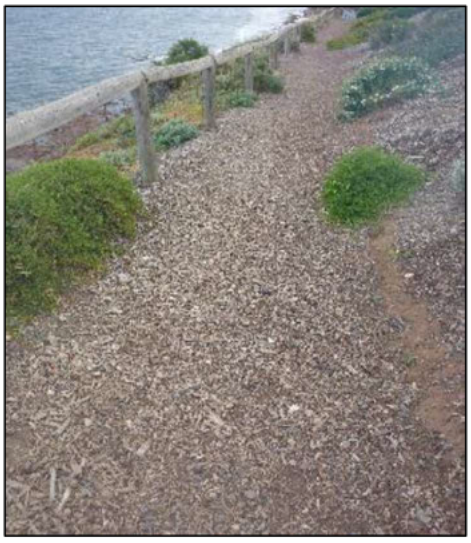


Figure 5. Beginning of walkway from Peera Street looking north.

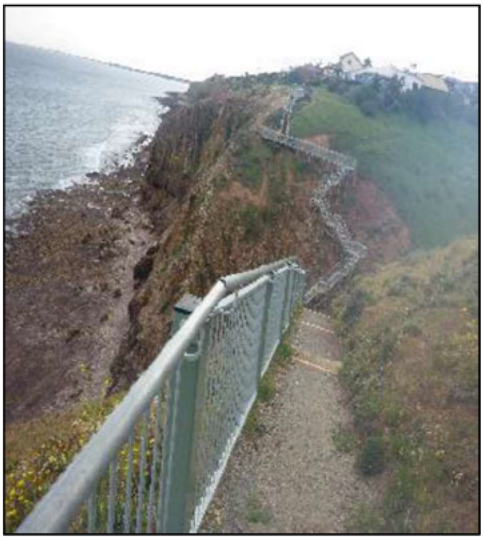


Figure 6. Walkway at Kurnabirra gully crossing looking north.

[redacted]



Figure 7. Grey Road Gully looking south.



Figure 8. Grey Road looking north along informal path.

4.5.1 Grey Road Gully (Cell 5)

There were no heritage sites found as a result of this survey in Cell 5. The KNCHA confirmed that the project area was deemed clear of any cultural material and there were no restrictions to the proposed project from a cultural heritage perspective. It was recommended that Aboriginal Monitors be present for ground disturbance works if the potential new link and the potential alternative at grade link from Pindee Street (Figure 3) requires cutting into the Grey Road Gully.

A few metres north of Nungamoora Street where the steps meet the board walk, is a pirate ship art piece. A Protected Aboriginal Site sign has been attached to the western side of the piece facing the boardwalk (Figure 9 to Figure 11). After reviewing the Register of Aboriginal Sites and Objects and other photos of the art piece, and discussions with the KHAHC representatives it has been concluded that someone not associated with the Department of Premier and Cabinet has added the sign. Therefore the artwork is deemed not an authentically listed Protected Aboriginal Site under the Aboriginal Heritage Act.



Figure 9. Protected Aboriginal Site sign on pirate ship artwork.



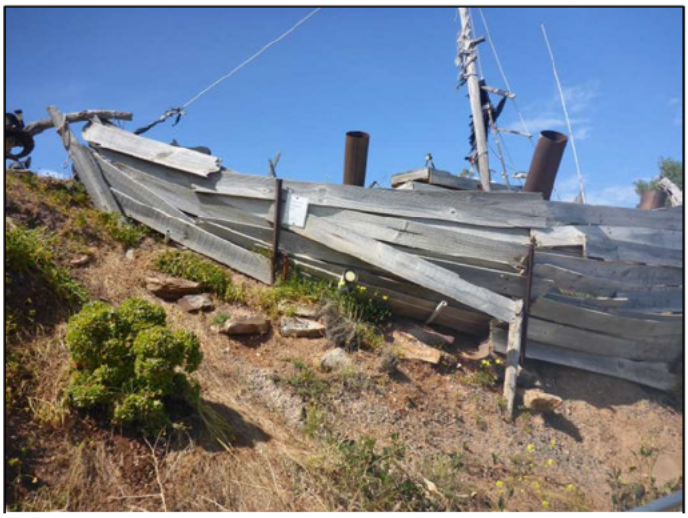


Figure 10. Pirate ship artwork with Protected Aboriginal Site sign.



Figure 11. Earlier photo of pirate ship artwork without sign. Photo accessed from Walking SA website (2020).

4.5.2 Kurnabinna Gully (Cell 6)

There were no heritage sites found as a result of this survey in the project area. The KNCHA confirmed that the project area was deemed clear of any cultural material and there were no restrictions to the proposed project from a cultural heritage perspective.

[redacted]

5 FUTURE HERITAGE OBLIGATIONS

5.1 Monitoring by Aboriginal representatives

Although it is not a requirement under the AH Act, having Aboriginal Monitors present during ground works is advisable for the proposed project should it be decided that Grey Road Gully will need to be cut into for a potential new link. Monitoring during ground disturbing works is effective for the early detection of artefacts, objects and burial sites during works. Early detection is crucial for reducing time lost due to unexpected finds. The monitoring program should be developed once the final design for the Project has been completed. Monitoring involves the continuous observation of earthmoving works to:

- Watch the sediments being excavated to see any change;
- Inspect and sieve the removed soil to ensure that no discoveries go unnoticed;
- Ensure that harm to any cultural heritage that may be present is mitigated when and where it cannot be reasonably avoided.

Monitoring of earthworks is recommended until the specified depth required for development is reached. Monitoring should be undertaken by Traditional Owners from the KNCHA.

5.2 On-call archaeologist

If Aboriginal heritage is encountered, the site/object will need to be protected from damage. It is not a requirement that all site works are to be ceased, but work will need to cease in that part of the Project Area where Aboriginal heritage is encountered. Work can continue in other parts of the Project Area provided there is no impact to the site/object. The site/object will need to be assessed by a suitably qualified person and additional requirements will need to be managed should it be deemed an Aboriginal site/object of significance. It is therefore advisable to have an archaeologist on site or on call to provide advice relating to Aboriginal heritage matters on an 'ad hoc' basis.

5.3 *Aboriginal Heritage Act 1988* - Section 21, 23 or 29(1)(b) application

Authorisation to commence the Project must be obtained from the Premier as it is a breach of the AH Act to disturb known and unknown sites. A permit can be applied for before commencement of works or it can be applied for if heritage is identified or disturbed during Project works.

Section 21 - the proponent requires authorisation from the Premier as the Minister responsible for Aboriginal Affairs and Reconciliation to excavate Aboriginal sites as required.

Section 23 - if a site or object of significance cannot be avoided, the proponent requires authorisation from the Premier as the Minister responsible for Aboriginal Affairs and Reconciliation.

Section 29(1)(b) - the proponent requires authorisation from the Premier as the Minister responsible for Aboriginal Affairs and Reconciliation to send samples out of SA for the purposes of scientific testing.



6 DISCUSSION AND RECOMMENDATIONS

The portions of the Marion Coastal Walk in Cell 5 and Cell 6 between Peera Street and Grey Road, Hallett Cove are predominately an artificially constructed path with much of the construction material brought onto site. There are some small portions of natural ground surface but these have been compacted and eroded from the impact of visitors to the area.

No Aboriginal sites, objects or cultural and/or spiritual histories were identified within either Cell 5 or Cell 6. This result is not unexpected given the disturbed landscape and heavy erosion along the cliff edges and gullies. It does not warrant however that there is no possibility that archaeological material will be located on site, especially as Aboriginal sites have been found elsewhere in the region in similar environments.

As a result of the cultural heritage survey, [redacted] established that:

- There are no newly recorded archaeological sites as defined by the AH Act within either Cell 5 or Cell 6;
- There are no previously recorded sites that will be impacted by the proposed upgrade works;
- The project areas have been cleared archaeologically/anthropologically by KNCHA representatives;
- The pirate ship artwork is not an authentically listed Protected Aboriginal Site under the AH Act;
- It is unlikely that unknown sites will be encountered during ground works;

As a result of the Aboriginal heritage survey, and in consultation with KNCHA representatives, the following recommendations are therefore made:

Recommendation 1: Stop work/site discovery procedure

It is recommended that all staff and contractors are provided with a stop work/site discovery procedure in the event of an unexpected find. A copy of the procedure should also be on display in the site office. An example procedure has been provided in Appendix 1.

Recommendation 2: Aboriginal monitoring during ground works

It is recommended that Aboriginal Monitors should be engaged during ground works if the Grey Road Gully is cut into to provide a potential new link or potential alternative at grade link as shown in Figure 3. Although the AH Act does not mandate the requirement for monitoring during ground works, the survey area lies across a landscape that is considered culturally significant for the Kaurna people.

[redacted]

7 REFERENCES

City of Marion (2020). Coastal Walkway Upgrade Design Services Brief, CC202034 Part B Project Brief Coastal Walkway Upgrade.

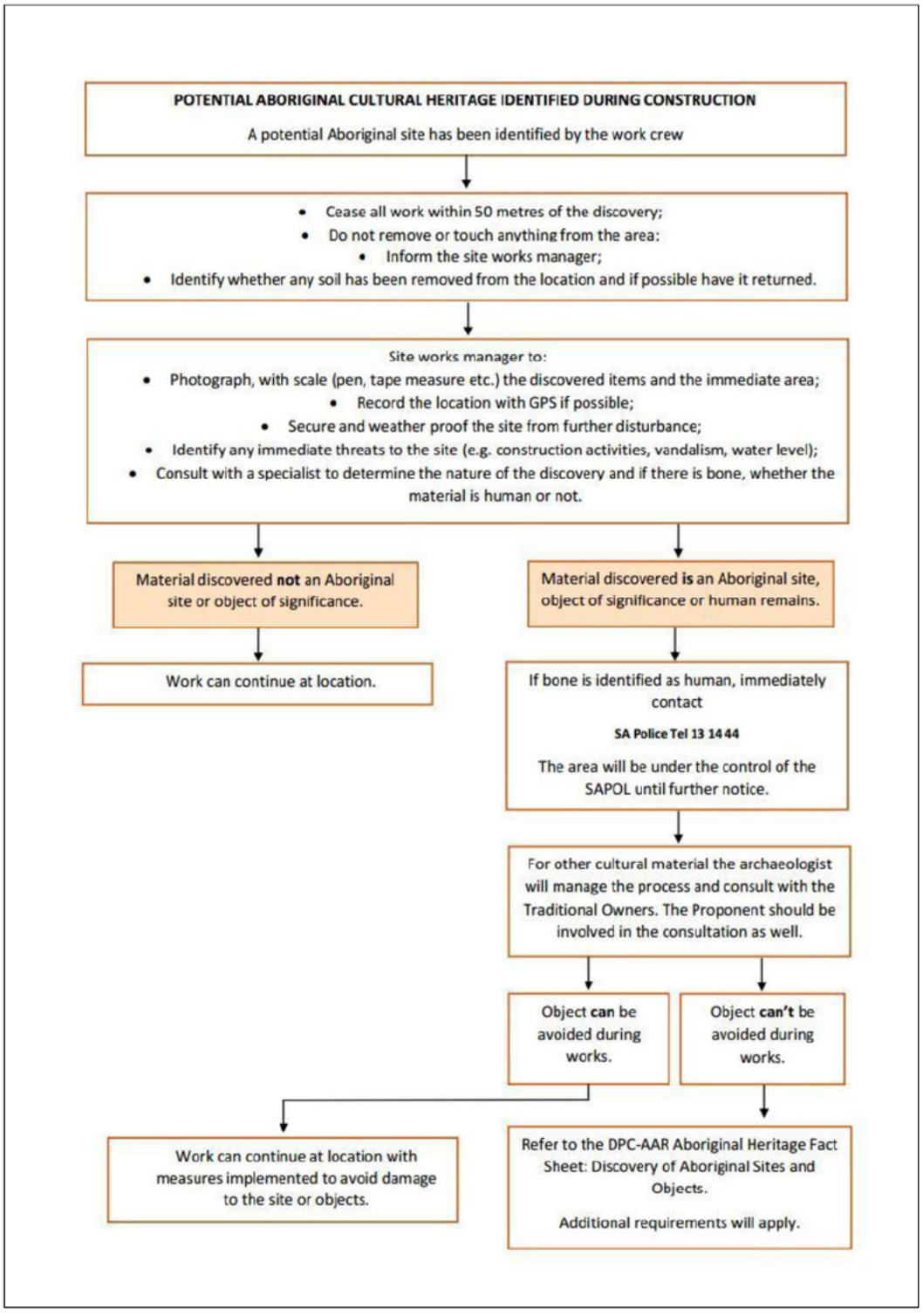
Walking SA (2020). Hallett Cove Boardwalk (Marion Coastal Walking Trail). Viewed 17 September 2020. https://www.walkingsa.org.au/walk/find-a-place-to-walk/hallett-cove-boardwalk-marion-coastal-walking-trail/



8 APPENDICES

Appendix 1 – Stop Work Procedure.




POTENTIAL ABORIGINAL CULTURAL HERITAGE IDENTIFIED DURING CONSTRUCTION
A potential Aboriginal site has been identified by the work crew
Cease all work within 50 metres of the discovery;
Do not remove or touch anything from the area:
Inform the site works manager;
Identify whether any soil has been removed from the location and if possible have it returned.
Site works manager to:
Photograph, with scale (pen, tape measure etc.) the discovered items and the immediate area;
Record the location with GPS if possible;
Secure and weather proof the site from further disturbance;
Identify any immediate threats to the site (e.g. construction activities, vandalism, water level);
Consult with a specialist to determine the nature of the discovery and if there is bone, whether the material is human or not.
Material discovered not an Aboriginal site or object of significance.
Material discovered is an Aboriginal site, object of significance or human remains.
Work can continue at location.
If bone is identified as human, immediately contact
SA Police Tel 13 14 44
The area will be under the control of the SAPOL until further notice.
For other cultural material the archaeologist will manage the process and consult with the Traditional Owners. The Proponent should be involved in the consultation as well.
Object can be avoided during works.
Object can't be avoided during works.
Work can continue at location with measures implemented to avoid damage to the site or objects.
Refer to the DPC-AAR Aboriginal Heritage Fact Sheet: Discovery of Aboriginal Sites and Objects.
Additional requirements will apply.

[redacted]

Appendix 2 – DPC-AAR Letter for Grey Road Gully (Cell 5).



ABORIGINAL HERITAGE SITES

[redacted]

[redacted]

I advise that the central archive, which includes the Register of Aboriginal Sites and Objects (the Register), administered by Aboriginal Affairs and Reconciliation (AAR), has no entries for Aboriginal sites within 1200m of this location.

The applicant is advised that sites or objects may exist in the proposed development area, even though the Register does not identify them. All Aboriginal sites and objects are protected under the *Aboriginal Heritage Act 1988* (the Act), whether they are listed in the central archive or not. Land within 200 metres of a watercourse (for example the River Murray and its overflow areas) in particular, may contain Aboriginal sites and objects.

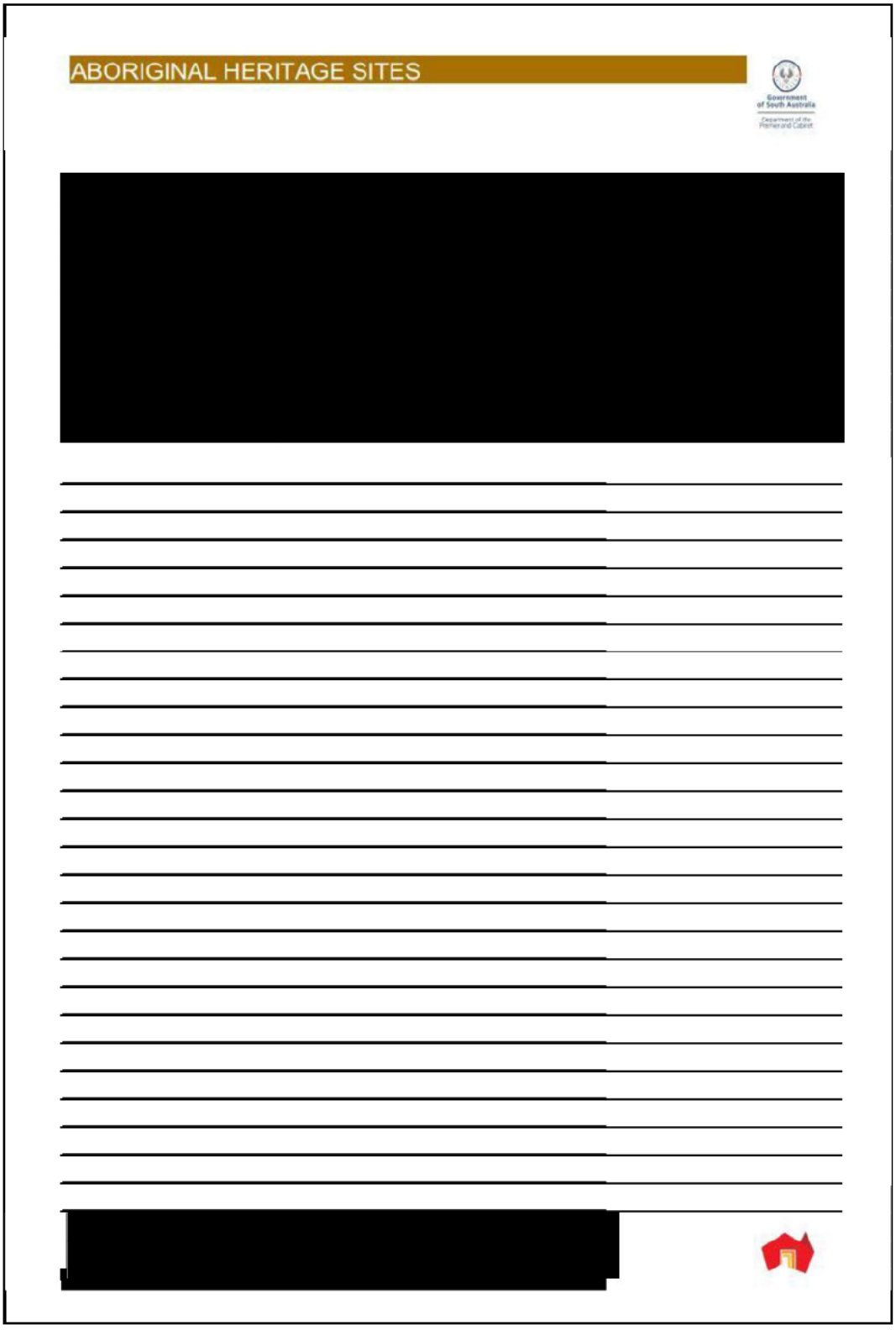
Pursuant to the Act, it is an offence to damage, disturb or interfere with any Aboriginal site, object or remains (registered or not) without the authority of the Premier. If the planned activity is likely to damage, disturb or interfere with a site, object or remains, authorisation of the activity must be first obtained from the Premier under Section 23 of the Act. Section 20 of the Act requires that any Aboriginal sites, objects or remains, discovered on the land, need to be reported to the Premier. Penalties apply for failure to comply with the Act. It should be noted that this Aboriginal heritage advice has not addressed any relevant obligations pursuant to the *Native Title Act 1993*.

Please be aware in this area there are Aboriginal groups/organisations/traditional owners that may have an interest. These may include:

[redacted]

[redacted]

[redacted]



[redacted]

Appendix 3 – DPC–AAR Letter for Kurnabinna Gully (Cell 6).



ABORIGINAL HERITAGE SITES

[redacted]

[redacted]

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Please be aware in this area there are Aboriginal groups/organisations/traditional owners that may have an interest. These may include:

[redacted]

[redacted]

ABORIGINAL HERITAGE SITES

[redacted]

[redacted]

[redacted]

