Note: Scope of Levee works has been reduced. Refer to Hydrological Mitigation Report for updates to Levee Scope.

ADDITIONAL CROSSING OF THE CLARENCE RIVER AT GRAFTON

Appendix K – Technical Paper: Levee works landscape and visual appraisal

AUGUST 2014

CONTENTS

1 INTRODUCTION

This report has been prepared by Arup Pty Ltd (Arup) on behalf of Roads and Maritime Services (Roads and Maritime) to undertake an appraisal of the potential impacts that may arise due to the levee raising works proposed as part of the additional crossing of the Clarence River at Grafton (the project)."

Roads and Maritime is proposing to construct an additional crossing of the Clarence River at Grafton (the project), supplementing the existing bridge. This is a State Significant Infrastructure Project for which approval is sought under Part 5.1 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

PROJECT DESCRIPTION

A description of the project is provided in Chapter 5 and Chapter 6 of the Environmental Impact Statement (EIS). A summary of the main components of the project are provided below:

- Construction of a new bridge over the Clarence River about 70 metres downstream (east) of the existing road and rail bridge, comprising two traffic lanes
- Construction of a new road to link the new bridge with Iolanthe Street in South Grafton
- Construction of a new road to link the new bridge with Pound Street in Grafton
- An approach viaduct, about 58 metres long, on the South Grafton side of the Clarence River and 29 metres long on the Grafton side.
- Upgrades to the road network in South Grafton to connect the new bridge to the existing road network, including:
    - Widening Iolanthe Street to four lanes
    - Widening the Gwydir Highway to four lanes between Bent Street and the Pacific Highway
    - Realigning the existing Pacific Highway to join Iolanthe Street near Through Street
    - Providing a new roundabout at the intersection of the Pacific Highway and Gwydir Highway
    - Providing a new roundabout at the intersection of Through Street and Iolanthe Street
    - Limiting Spring Street and the Old Pacific Highway to left in and left out only where they meet Iolanthe Street
    - Realigning Butters Lane
- Upgrades to the road network in Grafton to connect the new bridge to the existing road network, including:
    - Widening Pound Street to four lanes between Villiers Street and the approach to the new bridge

    - Providing traffic signals at the intersection at Pound Street and Clarence Street
    - Closing Kent Street where it is crossed by the bridge approach road
    - Realigning and lowering Greaves Street beneath the new bridge
    - Realigning Bridge Street to join directly to the southern part of Pound Street (east of the new bridge approach). There would be no direct connection between Pound Street south and the new bridge approach
    - Widening Clarence Street to provide formal car park spaces
    - Minor modifications to the existing Dobie Street and Villiers Street roundabout.
- Replacement of the existing three span concrete arch rail viaduct which crosses Pound Street in Grafton with a single span steel truss bridge
- Construction of a pedestrian and cycle path to provide connectivity between Grafton, South Grafton and the new bridge
- Provision of two pedestrian crossings with lights in South Grafton to improve safety for pedestrians crossing Iolanthe Street and Gwydir Highway
- Construction of new pedestrian links to connect the new bridge with the existing bridge
- Provision of designated car park spaces in Pound Street and Clarence Street, including some off street parking, to maintain a similar number of existing car park spaces currently available in those two streets
- Flood mitigation works, which include raising the height of sections of the existing levee upstream from the new bridge in Grafton and South Grafton
- Construction of a stormwater detention basin and pump station in Grafton to manage local flooding
- Public utilities adjustments
- Ancillary facilities required for the construction of the project, including some or all of the following: site compounds, concrete batching plant, pre-cast facilities, and stockpile areas for materials and temporary storage of spoil and mulch.

FLOOD MITIGATION WORKS

Flood impact assessment carried out for the project identified that upgrades to the existing flood levee system are required to mitigate potential flood impacts.

The upgrade consists of raising about 3.7 kilometres of levee on the north bank and 7 kilometres of levee on the south bank of the Clarence River by a maximum of 0.2 metres upstream from the proposed bridge.

The existing levee consists of a combination of earth embankments, concrete and block walls, and existing buildings that form part of the levee system.

The levee system would be upgraded before any construction works occur within the Clarence River (such as piling work for the new bridge). Alternatively, the construction contractor may choose to stage the levee raising works progressively as the bridge construction work within the Clarence River progresses. The likely construction activities would depend on the existing levee type and the proposed method for raising the levee. The likely construction activities could involve:

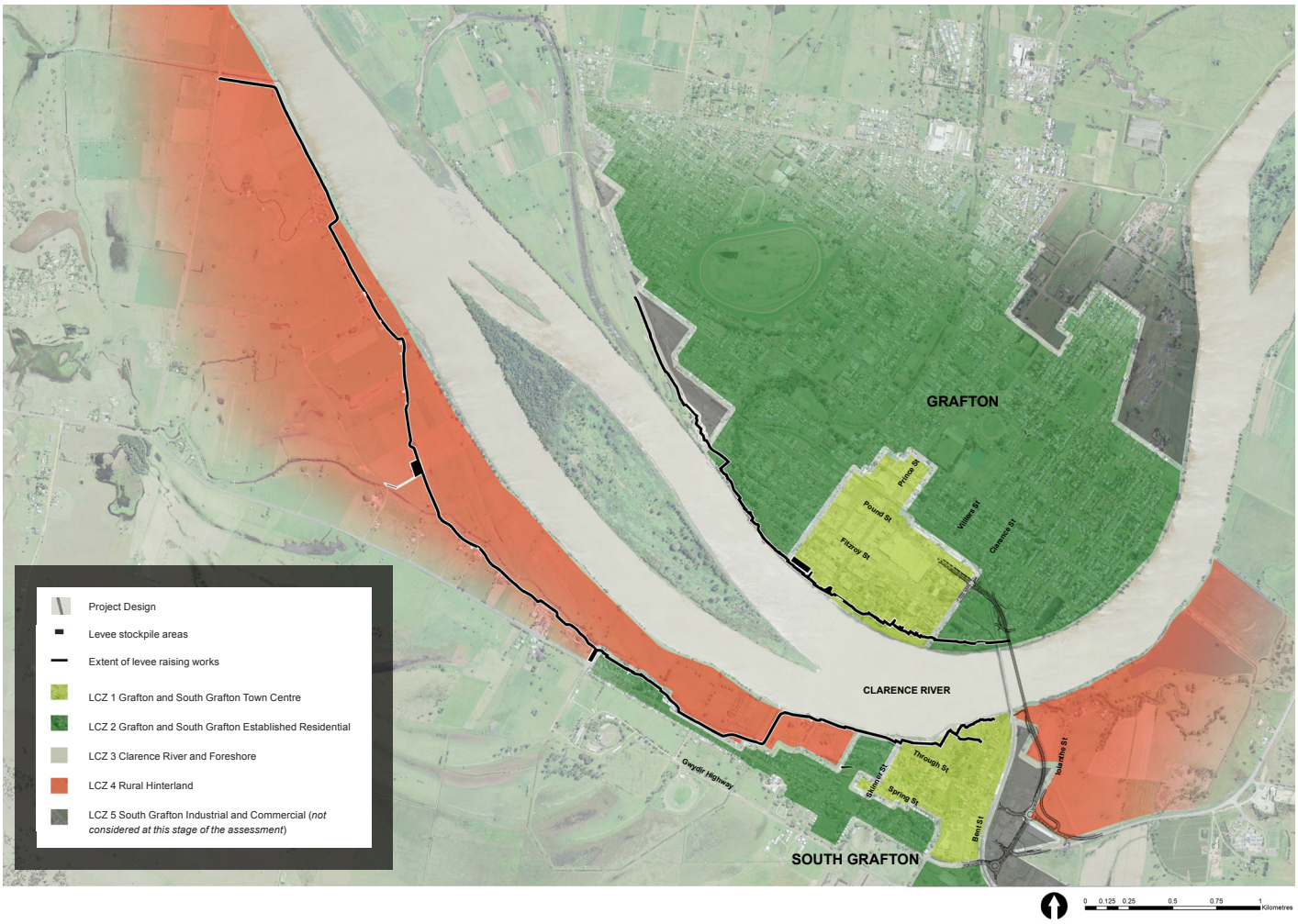
- Stripping topsoil and storing it at stockpile sites
- Removing vegetation and unsuitable material
- Stabilising and preparing existing material for placement of new material
- Placing and compacting fill material to the required level
- Reviewing ground conditions for the construction of new concrete walls and for raising existing concrete walls
- Excavating for footings of new concrete walls and removing unsuitable material. Suitable material would be re-used (where possible) for raising earth embankments
- Building new concrete walls and raising existing concrete walls. This work would involve placing steel reinforcement, erecting formwork and pouring concrete.

PURPOSE OF THIS REPORT

This report has been prepared by Arup on behalf of Roads and Maritime to undertake an appraisal of the landscape character and visual amenity in the vicinity of the existing river levee and seeks to capture the potential impacts that may arise due to the levee raising works.

Due the conceptual stage of the project, the potential impacts have been provided to highlight any early design considerations and assist with identifying opportunities to reduce impacts where possible. These opportunities will be investigated and explored further during the detailed design stages of the project, however, a number of early design options have been provided.

This appraisal would be subject to revision as the design progresses and further information becomes available.


GRAFTON
CLARENCE RIVER
SOUTH GRAFTON
Prince St
Pound St
Fitzroy St
Villiers St
Clarence St
Gwydir Highway
Skinner St
Through St
Spring St
Bent St
Solitary St
Project Design
Levee stockpile areas
Extent of levee raising works
LCZ 1 Grafton and South Grafton Town Centre
LCZ 2 Grafton and South Grafton Established Residential
LCZ 3 Clarence River and Foreshore
LCZ 4 Rural Hinterland
LCZ 5 South Grafton Industrial and Commercial (not considered at this stage of the assessment)
0 0.125 0.25 0.5 0.75 1 Kilometres

2 METHODOLOGY

The methodology adopted for this study follows the '*Guideline for Landscape Character and Visual Impact Assessment'* (Roads and Maritime, 2013), however, due to the conceptual stage and the absence of detailed information, the focus of the study is to determine potential areas of concern and highlight opportunities to reduce impacts during the detailed design stage. The landscape and visual appraisal includes;

- A desktop review of aerial photography, photographic material and topography maps with reference to the following documents:
  - *Additional Crossing of the Clarence River at Grafton – Urban Design and Landscape Concept Report – Landscape Character and Visual Impact Assessment (May 2014)*
  - *Additional Crossing of the Clarence River at Grafton – Route Options Development Report Technical Paper – Landscape and Urban Character* (September 2012)
- A review of potential landscape and visual impacts that may arise as part of the levee works
- Identification of potential landscape and visual opportunities to integrate the proposed works and recommendations to inform the future design development stages

LANDSCAPE CHARACTER ZONES

The *Urban Design & Landscape Concept Report including Landscape Character and Visual Assessment 2014* (Refer to Appendix J in the EIS report) identifies five Landscape Character Zones (LCZ) for the Grafton Bridge project. Four of the LCZs are in close proximity to the proposed levee works and are considered to be relevant to this appraisal. These include:

- LCZ1 - Grafton and South Grafton town centre.
- LCZ2 - Grafton established residential
- LCZ3 - Clarence River and foreshore
- LCZ4 - Rural Hinterland

The Industrial LCZ, at this stage, has not been considered as part of this appraisal as the proposed works would be located beyond this LCZ boundary. A summary of the LCZs has been provided based on the information contained in Appendix J in the EIS and the R*oute Options Development Report*. The summary is supported with a description of the existing levee alignment in the context of each LCZ.

LANDSCAPE CHARACTER ASSESSMENT

The landscape character zones facilitate the assessment of the character of the study area, of the proposal within it, and of the magnitude, sensitivity and potential impact likely to arise as a result of the proposed works.

MAGNITUDE

In landscape character assessment, magnitude refers to the type of proposal and its compatibility with the existing landscape character. The scale of the elements (height, length), as well as its location or setting (on floodplain, near the town), have a bearing on the magnitude of the physical presence of the works. The following judgements have been used to inform the assessment of magnitude of change:

- A high magnitude results if the proposal is a major development that contrasts highly with the surrounding landscape, or entails heavy modification of the existing landscape.
- A moderate magnitude rating would result if the proposal is moderately integrated into the landscape.
- A low magnitude rating would occur if the project is of a small scale and integrates well into the landscape.

The magnitude impact rating also considers whether the proposal has a positive or negative impact on the landscape character of the zone. For example, a proposal may be of a large scale but may provide beneficial outcomes such as increased open space, enhancement of the areas 'sense of place', and better connectivity and a safer road environment.

SENSITIVITY

Sensitivity refers to how sensitive the character of the setting is to the proposed change. A judgement has been made as to the value of the landscape, its cultural and historical importance to the community, scenic quality, and overall composition of the place and its inhabitants. The following sensitivity judgements have been used as the basis for this assessment:

- Places with high social, recreational, and historical significance to local residents have higher sensitivity.
- Areas of unique scenic quality have higher sensitivity.
- Areas with valued characteristics such as landscape features, notable aesthetics, perceptual or experiential qualities, have a higher sensitivity

IMPACT

Impact is the combination of the magnitude and sensitivity rating in accordance with the Impact Assessment Grading Matrix table on page 9.

VISUAL IMPACT ASSESSMENT

The extent of visual impact would be subject to detailed design and the construction methodology, however, at this stage the impacts are expected to be restricted to the immediate vicinity of the existing alignment, with views expected from neighbouring properties (Residential), recreational facilities and footpaths (Recreational) and road and rail users (Transport). Transport receptors are not specifically mentioned as a category within the RMS guidance, however, they are considered to be relevant in the context of this project. Representative viewpoints have been selected under these visual receptor categories.

MAGNITUDE

Magnitude represents the contrast in scale, form and type of proposal to the location and context to which it is to be placed.

- A high magnitude results if the proposal is of a major scale and is considered out of context, scale or uncharacteristic of the existing visual character, or if there is considerable modification to the existing landscape.
- A moderate magnitude would result if the proposal is prominent but not considered to be substantially uncharacteristic with the existing visual character.
- A low magnitude results if there is minimal alteration to the existing view and the proposal is of a scale and nature that is consistent with the existing visual character.

SENSITIVITY

Sensitivity is the measure of the visual importance of the nominated view and is dependent on:

- Distance between the viewer and the proposal
- The category of viewer, for example, residence, workplace, shops, open space, roads and footpaths
- Importance of the view, for example identified in tourist guides, do people deliberately seek the view.

Visual sensitivity includes the consideration of the perceived cultural and historical values of the visual environment and the elements within it.

Sensitivity \ Magnitude	High	Moderate	Low	Negligible
High	High Impact	High-Moderate Impact	Moderate Impact	Negligible Impact
Moderate	High-Moderate impact	Moderate Impact	Moderate - Low Impact	Negligible Impact
Low	Moderate Impact	Moderate - Low Impact	Low Impact	Negligible Impact
Negligible	Negligible Impact	Negligible Impact	Negligible Impact	Negligible Impact

Impact Assessment Grading Matrix

Generally, viewers with a higher sensitivity include:

- Residents who have existing attractive views that would be affected by the proposal
- Users of public open space where their attention is focused on the visual landscape, for example, lookouts or other scenic natural areas
- Communities that place high cultural and historical significance on the visual landscape

Viewers with a lower sensitivity are most likely to be:

- Employees focused on their work.
- Motorists whose attention is focused on driving. Although low speed vehicles would have a slightly higher sensitivity.

IMPACT

Impact is the combination of the magnitude and sensitivity rating in accordance with the Impact Assessment Grading Matrix.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3 LANDSCAPE APPRAISAL

3.1 LCZ 1 TOWN CENTRE | GRAFTON AND SOUTH GRAFTON

LANDSCAPE CHARACTER SUMMARY

A defining characteristic of the two town centres of Grafton and South Grafton is their physical separation by the Clarence River. Both town centres were originally laid out on a square grid, with strong connections between the main commercial streets and the river itself. The relationships between Clarence River, the urban form created by the grid and the transport infrastructure of highway and railway have established the key distinguishing features of the urban landscape character of the town centres. These are:

- The experience of infrastructure in the town centre
- The wide gracious streets in the town centres
- The town centres' connection to the Clarence River

The river provides public recreation along this stretch. Future implementation of Council's Grafton Waterfront Precinct Masterplan (March 2011) would see further development of this riverfront area for public recreation.

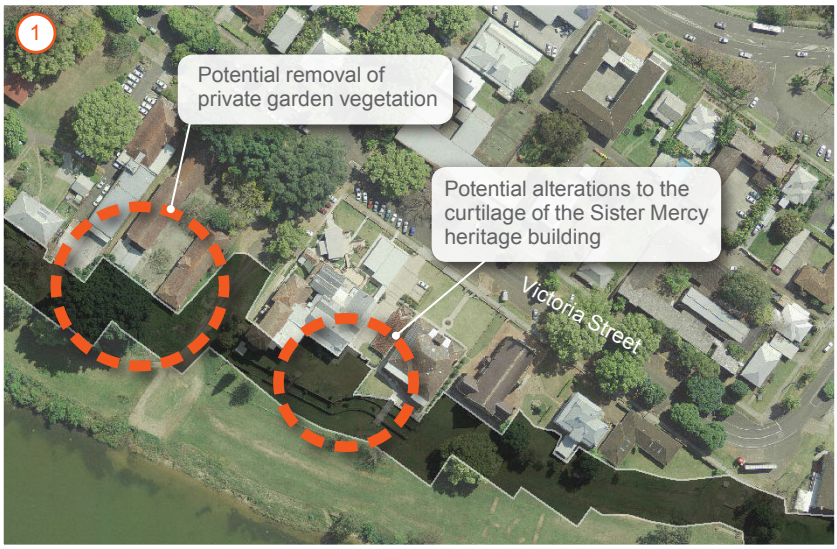
THE EXISTING LEVEE

Within the Grafton Town Centre area, the levee extends along the northern Clarence River embankment to achieve a flood immunity of around a 1 in 20 year flood event.

The alignment responds to the contours of the river environment, defined in part by earth mounds, road crests and extending into property boundaries. This is evident at the Sisters of Mercy Heritage Building, where the levee alignment uses the terraced garden walls to provide the required flood immunity level. Similarly, further west at Grafton Memorial Park, the levee follows the line of garden retaining walls and extends across Prince Street to align with the boundary of the Crown Hotel Motel.

The levee within the South Grafton Town Centre area extends along the southern bank of the Clarence River and is generally less contained along the property boundaries, with areas of open embankment and clear views across to the river.

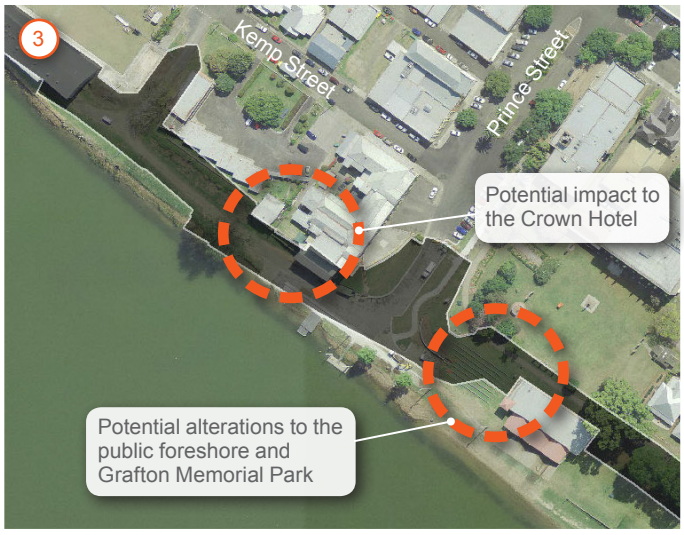
PHOTO LOCATION PLAN

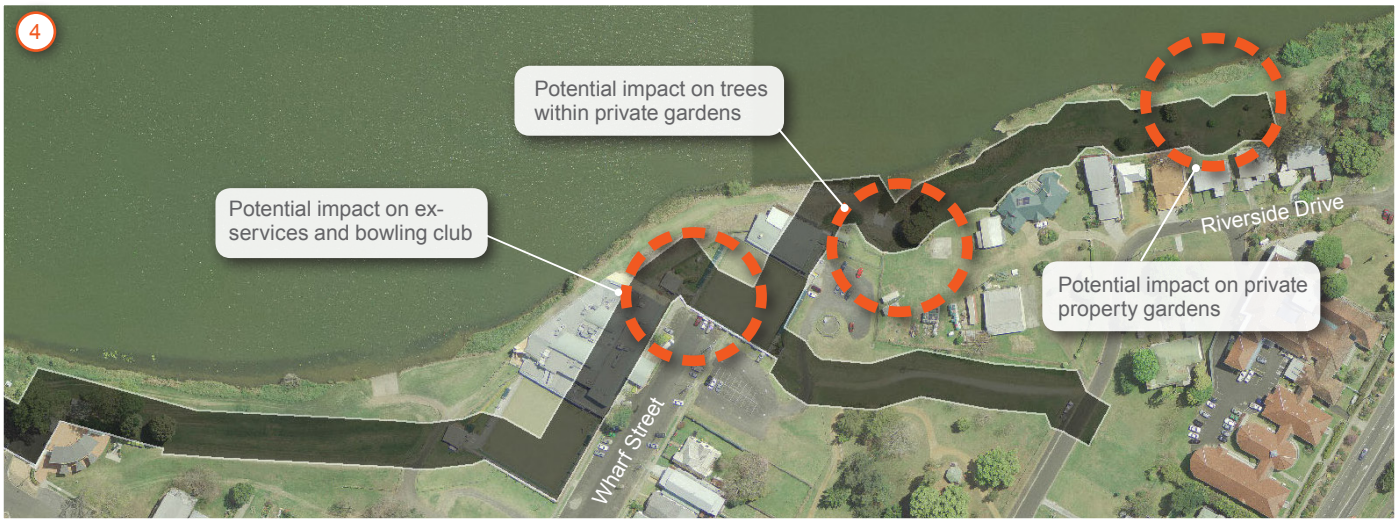


KEY PLAN

LEGEND

Potential area of levee works





POTENTIAL IMPACTS

The following impacts are anticipated within this LCZ:

GRAFTON

- Potential impact on existing vegetation within private property gardens along Victoria Street
- Potential alterations within the curtilage of heritage buildings along Victoria Street
- Potential alterations to the public foreshore and Grafton Memorial Park area
- Potential impact to the Crown Hotel
- Potential alterations and removal of vegetation within private gardens
- Potential alterations to the curtilage of Sisters of Mercy and other heritage building

SOUTH GRAFTON

- Potential impact on existing vegetation adjacent to properties on Riverside Drive
- Localised increase in embankment height and potential impact on existing vegetation
- Potential impacts to the ex-services and Bowling Club

SUMMARY

The levee is predominately an integrated, subtle feature, defined by existing components within this LCZ. The extent and significance of these impacts would be subject to detailed design which will seek to develop site specific design solutions along the alignment. The detailed design stage would be developed in consultation with Council and affected property owners.

The proposed works have the potential to be sympathetic and compatible with the existing character of this area, however impacts would be heightened during the construction phase.

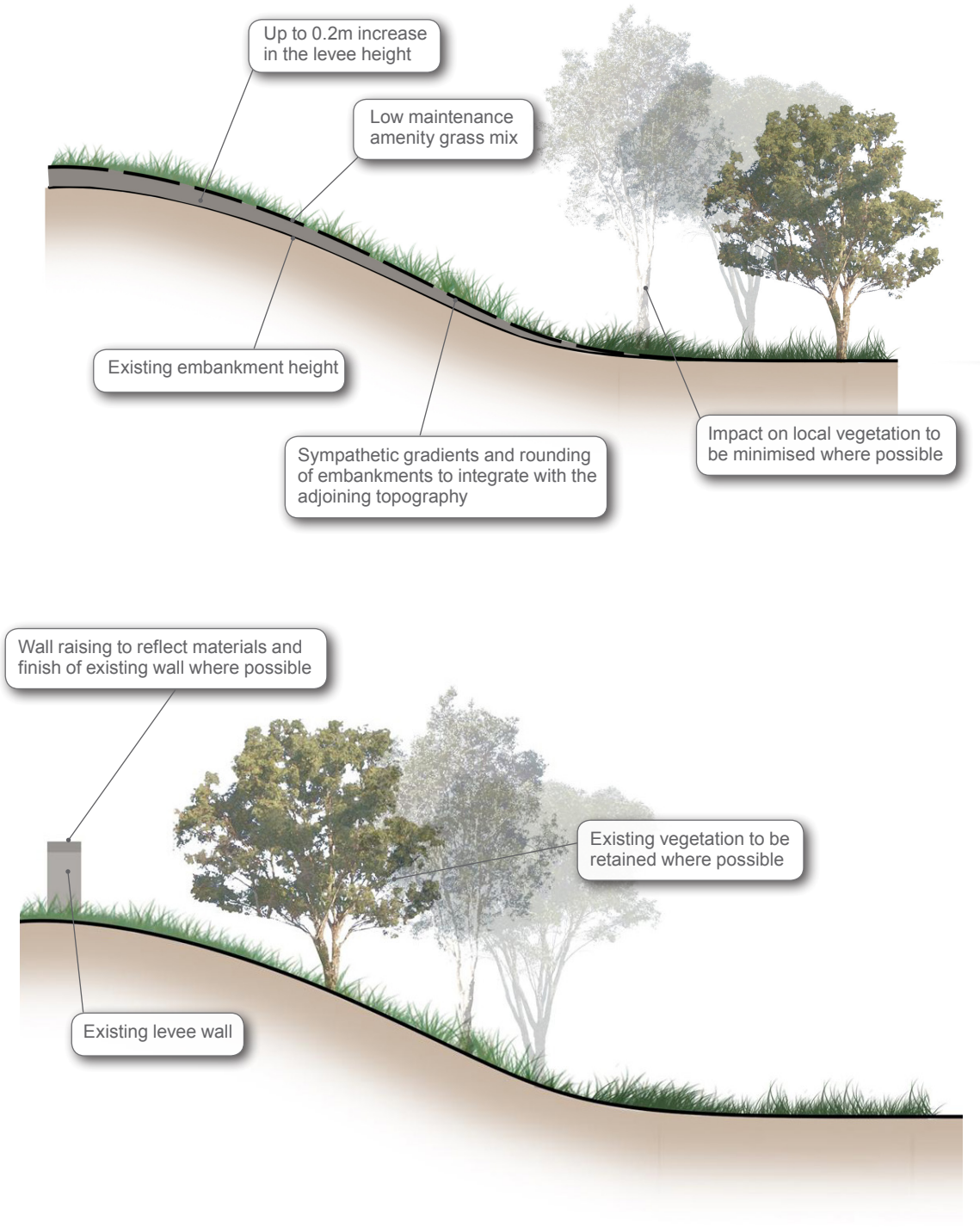
CONSTRUCTION

The construction activity could potentially involve the closing and diversion of footpaths and the presence of construction machinery, temporarily disturbing the tranquillity of the river side setting.

As stated in Urban Design & Landscape Concept Report (Appendix J of the EIS), the sensitivity of this LCZ is considered to be High. During construction the magnitude of change has the potential to be locally Moderate Adverse, resulting in a Moderate to High Adverse impact. However, the impact at this stage is considered to be conservative and could be reduced should further information regarding the construction methodology become available.

OPERATION

During operation, if design solutions are appropriate and sympathetic to the character of this LCZ, the potential for adverse impacts would be localised and would be Negligible to Minor adverse. Confirmation of the assessment would be subject to a detailed understanding of the design solutions and extent of change.



Landscape typical cross sections to inform detailed design stage

DESIGN CONSIDERATIONS

The proposed levee works would consist of increasing the height of the existing levee by a maximum of 0.2m. Where possible, the works would sensitively respond to the existing levee form and appearance. Within this LCZ, the levee largely takes the form of a grass embankment or free standing wall. Where possible, the proposed levee works would incrementally alter the height of these existing features to retain the character of this LCZ.

As illustrated, where existing embankments are required to increase in height, careful consideration would be given to the profiling and gradients to respond to the existing contours and minimise impact on surrounding vegetation. Where existing freestanding walls are required to increase in height, the design and finish would be appropriate to the local context.

Design development would progress in close consultation with Council and property owners.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3.2 LCZ 2 ESTABLISHED RESIDENTIAL

LANDSCAPE CHARACTER SUMMARY

The established urban residential areas of Grafton and South Grafton are directly connected to the two town centres. The urban and landscape character of these areas is defined by the pattern of the street layouts and the combination of building types, planting and road formation that make up the streetscapes.

The housing in the established residential areas varies in age, with the older homes generally located closest to the town centres, and the post-war and later homes generally located further north and south of the two town centres. The established residential areas are also generally characterised by established gardens, with front gardens visible to the street. There is a large number of locally significant heritage items both dwellings and recognised culturally important tree species in this zone.

Public open space within the zone consists of attractive, wide tree lined streets with wide grassed verges and footways, with connections to the existing bridge footpaths and the river foreshore area. A broad variety of street trees are located throughout this zone, with the area dominated by jacarandas. This zone is one of the key areas for tourists to visit during Grafton's Jacaranda Festival.

THE EXISTING LEVEE

The levee, to the east of the existing Grafton Bridge on the northern embankment, marks the boundary to a number of residential properties that experience direct views across and along the Clarence River. The levee is sensitively incorporated as part of the river bank with areas of private and riparian vegetation.

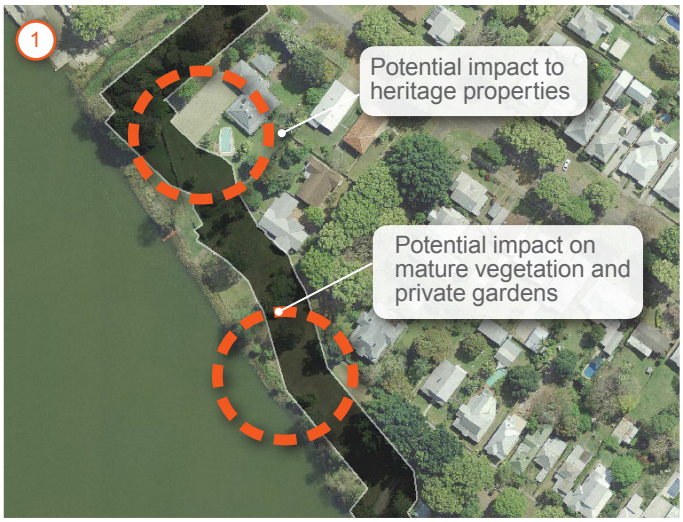
The levee to the south of the river within this LCZ becomes a more visible component, taking the form of a concrete freestanding wall along Through Street. At this location, the wall contains the road corridor and reduces views across Clarence River and beyond.

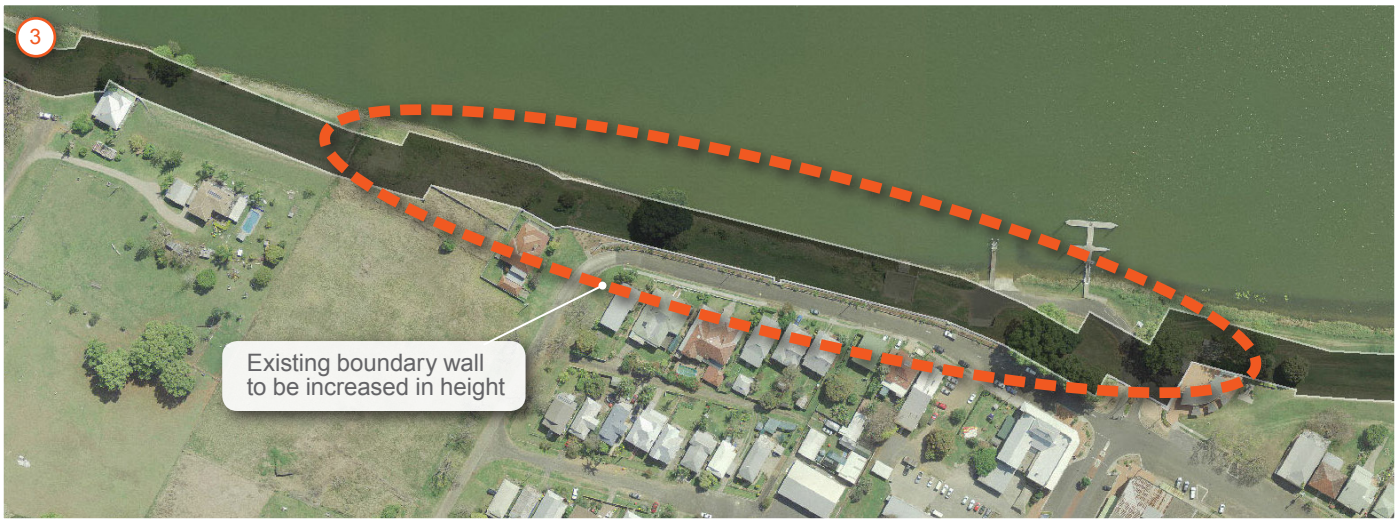
PHOTO LOCATION PLAN

KEY PLAN

LEGEND

Potential area of levee works





POTENTIAL IMPACTS

The following impacts are anticipated within this LCZ:

GRAFTON

- Potential impact on mature vegetation to the west of Grafton Bridge on the northern embankment
- Potential alterations within the curtilage of heritage properties and residential properties to the north west of Grafton Bridge
- Potential alterations to the public foreshore
- Potential alterations and removal of vegetation within private gardens

SOUTH GRAFTON

- Increase to the existing wall height along Through Street
- Potential alterations and removal of vegetation within private gardens

SUMMARY

The levee is an integrated, subtle feature, defined by existing components within this LCZ. The extent and significance of the impacts would be subject to detailed design which will seek to develop site specific design solutions along the alignment. The detailed design stage would be developed in consultation with Council and affected property owners.

The proposed works have the potential to be sympathetic and compatible with the existing character of this area, however impacts would be heightened during the construction phase.

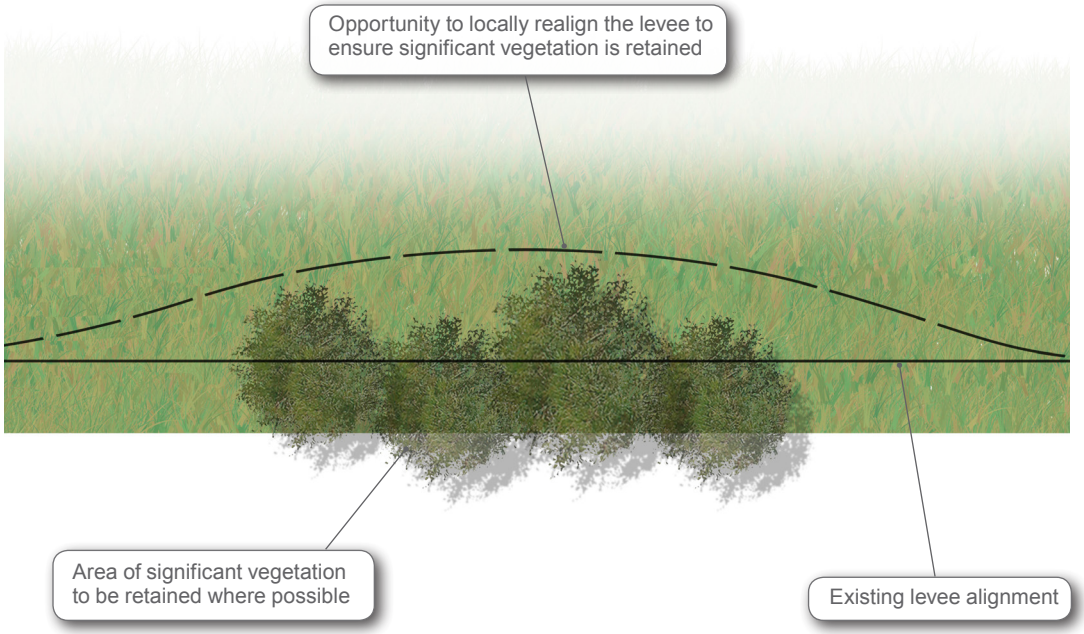
CONSTRUCTION

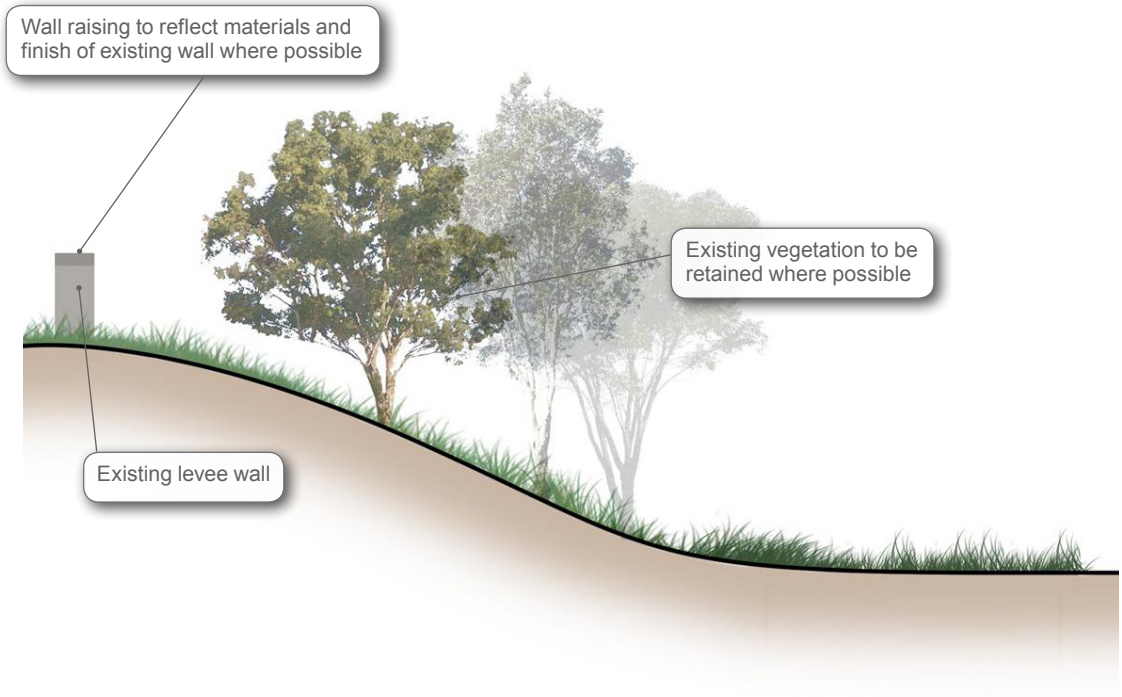
The construction activity could potentially involve the temporary closing and/or diversion of existing footpaths and the presence of construction machinery, temporarily disturbing the tranquillity of the river side setting.

As stated in Urban Design & Landscape Concept Report (Appendix J of the EIS), the sensitivity of this LCZ is considered to be High. During construction the magnitude of change has the potential to be locally Moderate Adverse, resulting in a Moderate to High Adverse impact. However, the impact at this stage is considered to be conservative and could be reduced should further information regarding the construction methodology become available.

OPERATION

During operation, if design solutions are appropriate and sympathetic to the character of this LCZ, the potential for adverse impacts would be localised and would be Negligible to Minor adverse. Confirmation of the assessment would be subject to a detailed understanding of the design solutions and extent of change.





Landscape typical cross sections to inform detailed design stage

DESIGN CONSIDERATIONS

The proposed levee works would involve increasing the height of the existing levee by a maximum of 0.2m. Where possible, the works would sensitively respond to the existing levee form and appearance. Within this LCZ, the levee largely takes the form of a grass embankment or free standing wall. Where possible, the proposed levee works would incrementally alter the height of these existing features to retain the character of this LCZ.

As illustrated, where existing freestanding walls are required to increase in height, the design and finish will be appropriate to the local context. Where vegetation is considered to be of significant value or local importance, consideration would be given to realigning the levee to protect and safeguard the vegetation. This option would be reviewed against potential construction costs and on going maintenance commitments to safeguard the integrity of the levee and ensure that on going flood immunity is maintained.

Design development would progress in close consultation with Council and property owners.

PHOTO LOCATION PLAN

3.3 LCZ 3 CLARENCE RIVER AND FORESHORE

LANDSCAPE CHARACTER SUMMARY

The Clarence River is the defining landscape feature for the city and was the fundamental reason for the establishment of the city in this location. The river is the dominant visual element in the local landscape. It has a distinctive character that is defined by its wide sweeping form as it winds across the flat river plain. The flat, open, topography of the local area reinforces the visual prominence of the river and its important role as the visual focus and landscape point of reference for the locality.

The river's edge is defined by the high levee banks that protect Grafton and South Grafton from periodic flooding of the river. The character of the river's edge varies throughout the study area. Between Grafton Bridge and Susan Island, boat sheds, launches, wharves and pontoons have been developed along the riverfront at both Grafton and South Grafton, which support the public recreation focus along this stretch of the river. Future implementation of Council's Grafton Waterfront Precinct Masterplan (March 2011) would see further development of this riverfront area for public recreation. East of Grafton Bridge, the riverfront has two distinct characters. The southern riverfront is defined by the open character of the agricultural floodplain, which consists of fields and scattered trees. The northern riverfront has a more developed character, with houses and gardens built along the top of the levee bank, with a few instances of private gardens extending beyond the ownership boundary beyond the existing levee.

THE EXISTING LEVEE

The existing levee is a visible component from this LCZ, responding to the contours of the river environment, frequently visible in the form of an earth mound or retaining wall. However, the character and form of the levee has been reviewed in the context of the surrounding LCZ. As such, there is considered to be no change to this LCZ as result of the levee works.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LANDSCAPE CHARACTER SUMMARY

The urban areas of Grafton and South Grafton are surrounded by agricultural areas that comprise the city's rural hinterland. This landscape zone has two distinctive characteristics - the flat open country on the floodplain immediately south of the Clarence River, which is visually exposed and connected to the river; and rolling hills as the land rises further to the south, which have a more enclosed character with long-range views to the river and town.

The rural hinterland is distinguished by the geometric layout of the agricultural fields, which establishes a regular pattern across the landscape irrespective of topography. The geometry of the property boundaries is clearly visible in the landscape through the long straight roads, the fence lines and lines of trees that follow the patterns of land division.

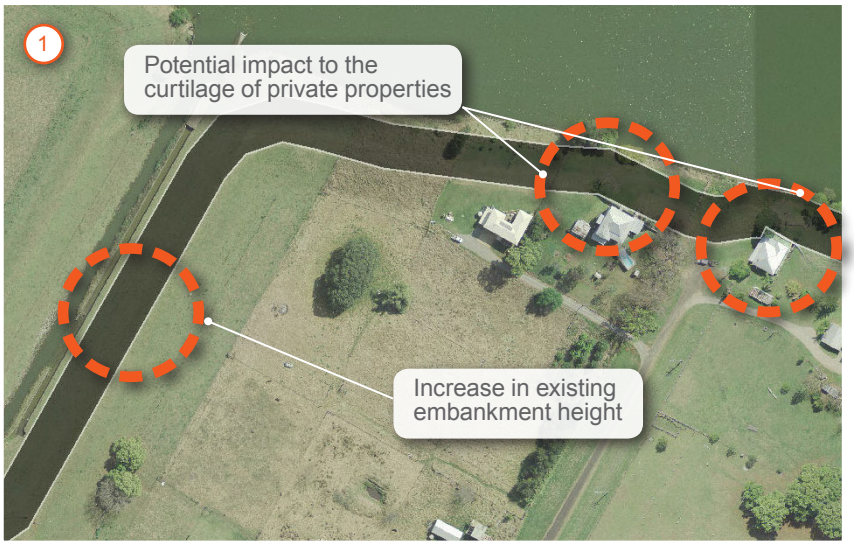
PHOTO LOCATION PLAN

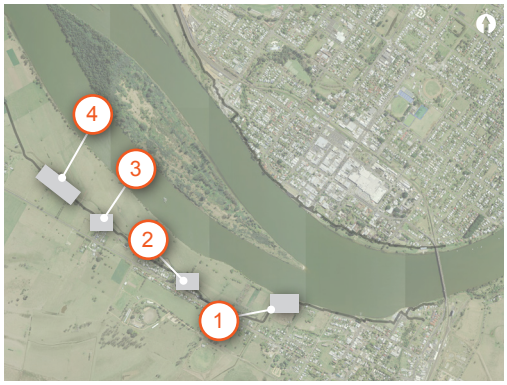
THE EXISTING LEVEE

The levee to the east joins the Established Residential LCZ in the form of a retaining wall and extends west in to the Rural Hinterland LCZ 4 to join an earth mound on the crest of the river embankment. The embankment is a notable feature in this LCZ, rising in areas to approximately 8m high and spanning 45m in width. The form of the levee changes to respond the local context, for example, the levee takes the form of a concrete wall along Gwydir Highway where the environment is more constrained. Further west, the levee takes the form of an earth mound with areas of low freestanding walls where space is available and a softer treatment is required.

Further west, the levee passes to the northern boundary of Grafton Sunset Caravan park in the form of a concrete retaining wall before extending to reform as an embankment.

As the levee moves further west of the residential area into a more open agricultural landscape, the embankment provides agricultural farming access along the crest, with post and wire fences and gates crossing over the embankment to define field parcels.

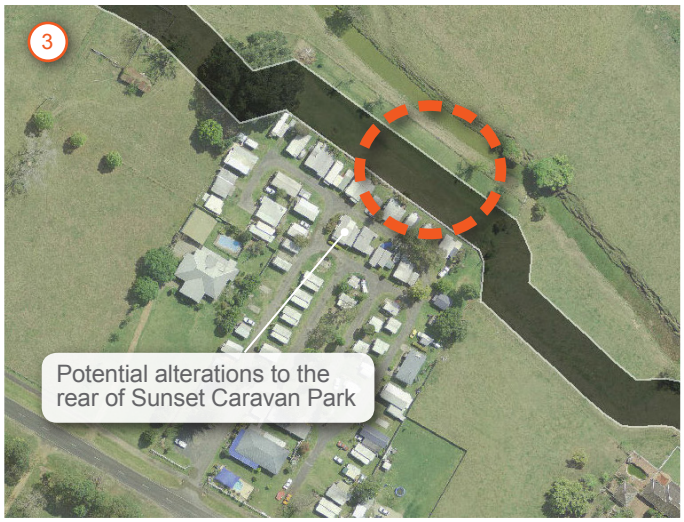


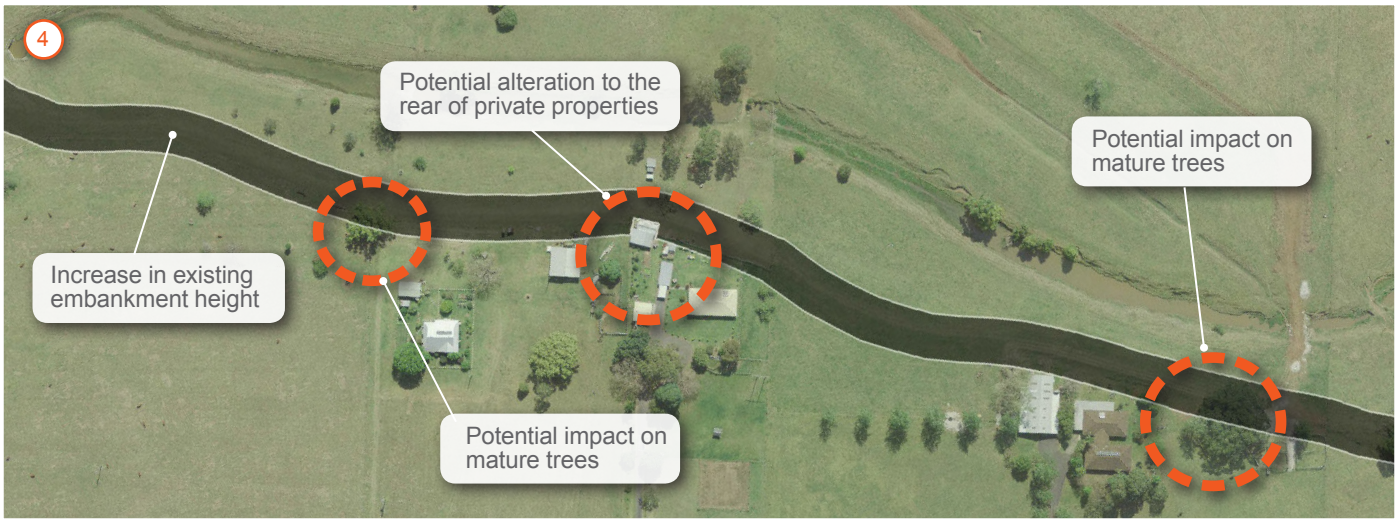


KEY PLAN

LEGEND

Potential area of levee works





POTENTIAL IMPACTS

The following impacts are anticipated within this LCZ:

- Potential elevation of boundary walls adjacent to private residential properties
- Impact on areas of scattered mature vegetation
- Increase in boundary wall height along the boundary of Sunset Caravan Park
- Potential removal of vegetation to the rear boundary of private properties along Gwydir Highway
- Temporary alteration to farmer access and field boundaries

SUMMARY

The levee is an integrated, subtle feature, defined by existing components within this LCZ. The extent and significance of these impacts would be subject to detailed design which will seek to develop site specific design solutions along the alignment. The detailed design stage would be developed in consultation with Council and affected property owners.

The proposed works have the potential to be sympathetic and compatible with the existing character of this area, however impacts would be heightened during the construction phase.

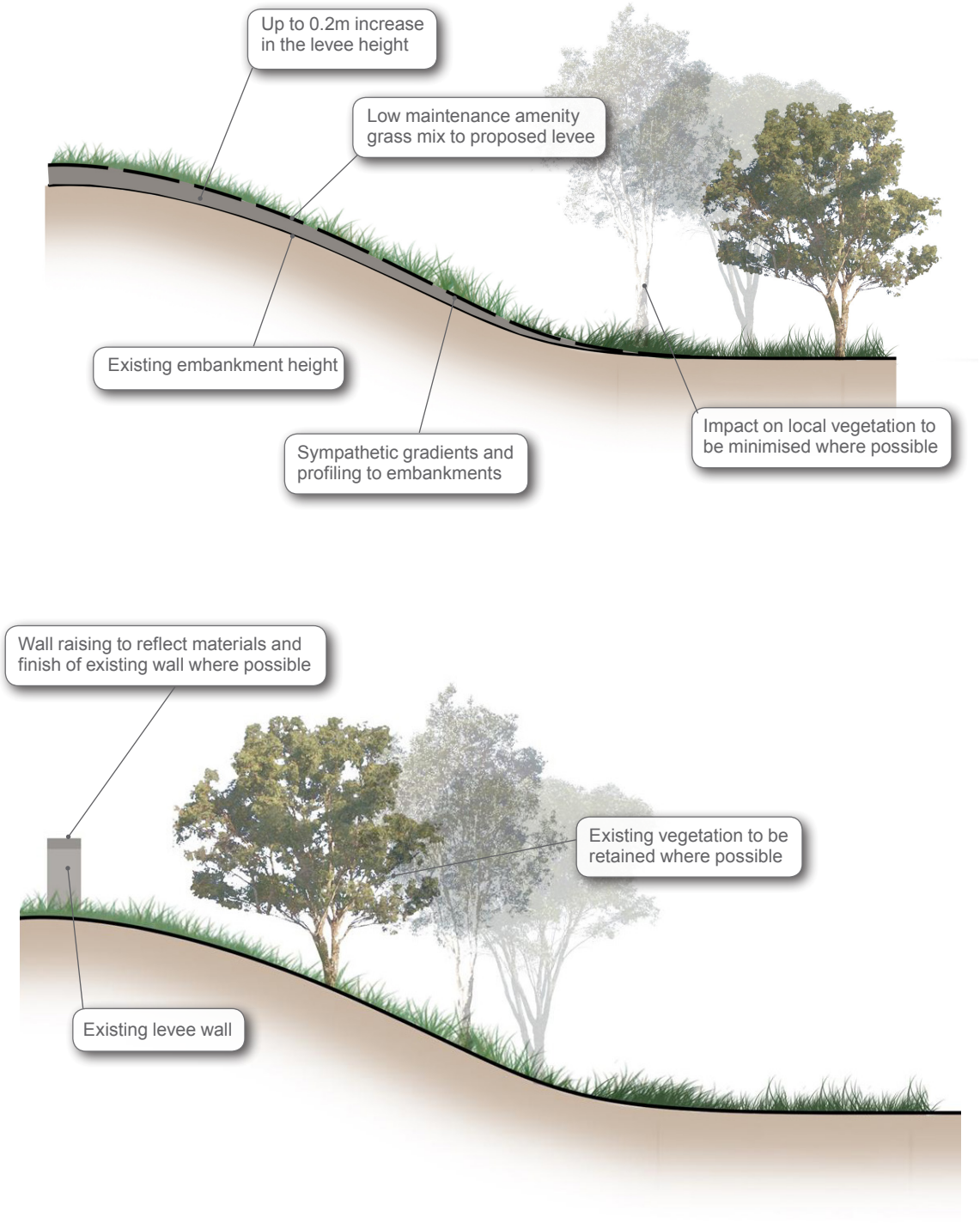
CONSTRUCTION

The construction activity could potentially involve the closing and diversion of footpaths and the presence of construction machinery, temporarily disturbing the tranquillity of the river side setting.

As stated in Urban Design & Landscape Concept Report (Appendix J of the EIS), the sensitivity of this LCZ is considered to be Moderate. During construction the magnitude of change has the potential to be locally Minor to Moderate adverse, resulting in a Low to Moderate adverse impact. However, the impact at this stage is considered to be conservative and could be reduced should further information regarding the construction methodology become available.

OPERATION

During operation, if design solutions are appropriate and sympathetic to the character of this LCZ, impacts have the potential to be locally Negligible to Minor adverse. Confirmation of the assessment would be subject to a detailed understanding of the design solutions and extend of change.



Landscape typical cross sections to inform detailed design stage

DESIGN CONSIDERATIONS

The proposed levee works would involve increasing the height of the existing levee by a maximum of 0.2m. Where possible, the works would sensitively respond to the existing levee form and appearance.

Within this LCZ, the levee largely takes the form of a grass embankment, retaining wall or free standing wall. Where possible, the proposed levee works would incrementally alter the height of these existing features to retain the character of this LCZ.

As illustrated, where existing freestanding walls are required to increase in height, the design and finish will be appropriate to the local context. Where existing embankments are required to increase in height, careful consideration would be given to the profiling and gradients to respond to the existing contours and minimise impact on surrounding vegetation.

Where vegetation is considered to be of significant value or local importance, consideration should be given to realigning the levee to protect and safeguard the vegetation. This option would be reviewed against potential construction costs and on going maintenance commitments to safeguard the integrity of the levee and ensure that on going flood immunity is maintained.

Design development would progress in close consultation with Council and property owners.


GRAFTON
Pound Street
Prince Street
Fitzroy Street
Villiers Street
Clarence Street
Bent Street
Iolanthe Street
CLARENCE RIVER
1
2
3
Gwydir Highway
Skinner Street
Trough Street
Bent Street
SOUTH GRAFTON
Iolanthe Street

4 VISUAL APPRAISAL

VISUAL CATCHMENT

The extent and size of the visual catchment would be subject to detailed design and an understanding of the construction methods, however, at this stage the proposed levee works are anticipated to be restricted to the immediate vicinity of the existing alignment, with views expected from neighbouring properties (Residential), recreational facilities and footpaths (Recreational) and road and rail users (Transport). Viewpoints have been selected under these visual receptor categories to provide an early indication on the potential impacts that may arise from the proposed works.

RESIDENTIAL

Residential properties are considered to have an inherent level of visual sensitivity due to their prolonged interest in the surrounding environment, particularly in rooms normally occupied in waking hours or daylight hours. This is in comparison to receptors that may have a brief momentary interest in the view, such as motorists or places of work.

VIEWPOINT 1: RIVERSIDE DRIVE

Properties on Riverside Drive experience panoramic views across the Clarence River towards residential properties and Grafton Town and residential properties to the north.

CONSTRUCTION

The levee work will extend in close proximity to the rear boundary of private properties. During construction, the work is likely to include the removal of vegetation and localised embankment profiling to increase the embankment height by a maximum of 0.2m. The magnitude of change during construction is judged to be Low to Moderate and of a temporary nature. However, the impact at this stage has the potential to be reduced should further information regarding the construction methodology become available. The high sensitivity in conjunction with the Low to Moderate magnitude of change would result in a Moderate temporary adverse impact.

OPERATION

It is assumed that the works in the vicinity of the property would be carefully designed to respond the contours of the landscape. Once the embankment seeding has established, it is assumed the there would be a Negligible change to the existing view, resulting in a Negligible impact.

VIEWPOINT 1 : RIVERSIDE DRIVE

RECREATIONAL

The public recreational space on the southern side of the river includes the wharf at Skinners Street and the bowling club and Ex-Servicemen's Club at Wharf Street. On the northern side of the river recreational facilities include a jetty, boat ramp, rowing club and Grafton Memorial Park at Princes Street, and a Sailing Club at Fitzroy Street. Council's *Grafton Waterfront Precinct Masterplan* (March 2013) aims to develop continuous public access along the foreshore between Clarence Street and Queen Street, to improve the public recreational amenity of this stretch of the river.

Recreational receptors are considered to have an inherent level of visual sensitivity due to their prolonged interest in the surrounding environment and focus on particular views, in this instance, views across and along the Clarence River.

Grafton Memorial Park and Rowing Club has been selected as a representative viewpoint to capture the potential impacts that may arise on recreational visual receptors.

VIEWPOINT 2: GRAFTON MEMORIAL PARK AND ROWING CLUB

Users of Grafton Memorial Park and Rowing Club experience open panoramic views across Clarence River with the amphitheatre providing terraced viewing space for rowing and water recreational activities. The existing levee takes the form of a low earth mound to the rear of the amphitheatre terraces, extending west in the form of a block retaining wall before crossing Prince Street.

VIEWPOINT 2 : GRAFTON MEMORIAL PARK

CONSTRUCTION

The levee works are likely to involve the raising of the existing earth mound and retaining wall by a maximum of 0.2m. Construction work may potentially involve alterations to the pillars that mark the memorial park boundary and the removal of existing vegetation. The magnitude of change during construction is judged to be Moderate to High and of a temporary nature. However, should careful consideration and design seek to retain the mature vegetation and limit alterations to pillars (an example could be to realign the level to the southern edge of the existing footpath), the magnitude of change would be reduced.

The High sensitivity in conjunction with the Moderate to High magnitude of change would result in a Moderate to High temporary adverse impact.

OPERATION

The permanent removal the mature vegetation would be evident in views from this location during operation, however, the construction work would be complete and the replanting opportunities would be implemented. During operation, the magnitude of change is judged to be Moderate.

The High sensitivity in conjunction with the Moderate magnitude of change is judged to result in a Moderate Adverse impact during operation.

TRANSPORT

The levee is frequently bound or defined by adjacent road corridors, including Fitzroy Street, Prince Street and Hockey Street to the north, and Through Street and Gwydir Highway to the south.

Transport receptors are considered to have a reduced sensitivity to change largely due to the momentary interest in the surrounding environment, however, scenic routes where awareness of the surroundings in an intrinsic component, sensitivity is generally heightened.

Through Street has been selected as a representative viewpoint to capture potential impacts that may arise on transport visual receptors.

VIEWPOINT 3: THROUGH STREET

Through Street is defined along the northern boundary by the levee wall, varying in height from about 3m to 6m, limited views towards Clarence River.

CONSTRUCTION

The works are likely to involve the raising of the existing levee wall by a maximum of 0.2m. The finish of the levee wall works are anticipated to be similar to the existing, with the potential to improve the appearance with the addition of a capping stone. It is anticipated that construction would be and localised and completed from the adjoining footpath. The magnitude of change during construction is judged to be Low and of a temporary nature. The magnitude of change at this stage has the potential to be reduced should further information regarding the construction methodology become available

The Moderate sensitivity in conjunction with the Low magnitude of change would result in a Low adverse impact.

OPERATION

Once the construction work is complete, and construction equipment is removed from site, the magnitude of change would reduce to Negligible. The Moderate sensitivity in conjunction with the Negligible magnitude of change would result in a Negligible impact during operation.

VIEWPOINT 3 : THROUGH STREET

5 SUMMARY

5.1 LANDSCAPE

The existing levee alignment responds to the contours of the river environment, defined in part by earth mounds, road crests and property boundaries. Through urban areas, the levee is often an integrated, subtle feature that has become part of the urban fabric. Where the levee becomes a more visible and physical feature, the form and appearance generally responds to the given context. For example, through the rural hinterland (LCZ 4), the levee takes for form of an earth mound and where land is constrained, for example along Through Street (LCZ 2), the levee takes the form of a freestanding wall.

The construction works have the potential to result in the temporary closing and diversion of footpaths, the presence of construction machinery, localised removal of vegetation and the temporary disturbance to the tranquillity of the river side setting. These impacts can be summarised as a Moderate adverse and of a temporary nature. However, this impact would be subject to a detailed understanding of the extent of vegetation removal and the contribution this vegetation had to the character of the area. Through the application of appropriate sensitive landscape design treatments and careful design consideration, there is the potential for the impact to be reduced.

During operation, impacts have the potential to be locally Negligible to Minor adverse. Confirmation of the assessment would be subject to a detailed understanding of the design solutions and extent of change.

SUMMARY

The proposal to increase the levee by a maximum of 0.2m is not considered to be incongruous and would result in an incremental change to the existing landscape character. Through the implementation of appropriate landscape treatments, the works have the potential to be sympathetically integrated, reflecting the existing use of materials and responding to the contours of the river environment.

5.2 VISUAL

As stated within the Visual Appraisal (section 4), the extent and size of the visual catchment would be subject to detailed design and the construction methodology, however, at this stage the proposed levee works are anticipated to be restricted to the immediate vicinity of the existing alignment, with views expected from neighbouring properties (Residential), recreational facilities and footpaths (Recreational) and road and rail users (Transport). Viewpoints have been selected under these visual receptor categories to provide an indication on the potential impacts that may arise from the proposed works.

RESIDENTIAL

Private residential properties to the north and south of Clarence River would experience views towards the proposed levee works, although the magnitude of change to these views would vary and would be subject to a detailed understanding of the extent of works and extent of vegetation removal.

Viewpoint 1 is used as a representative viewpoint for residential visual receptors. During construction the magnitude of change to this viewpoint is anticipated to be Low to Moderate and of a temporary nature, resulting in a Moderate adverse impact. The impact at this stage has the potential to be reduced should further information regarding the construction methodology become available.

The high sensitivity in conjunction with the Low to Moderate magnitude of change would result in a Moderate temporary adverse impact.

During operation, it is assumed that the design will take a sensitive and integrated form, resulting in a Negligible magnitude of change, resulting in a Negligible impact during operation.

RECREATIONAL

The public recreational space on the southern side of the river includes the wharf at Skinners Street and the bowling club and Ex-Servicemen's Club at Wharf Street. On the northern side of the river recreational

facilities include a jetty, boat ramp, rowing club and Grafton Memorial Park at Princes Street, and a Sailing Club at Fitzroy Street. Further recreational receptors would include users of footpaths and cycle paths across the area.

Viewpoint 2, Grafton Memorial Park and Rowing Club, is used as a representative viewpoint for recreational receptors Construction work may potentially involve alterations to the pillars that mark the memorial park boundary and the removal of existing vegetation. The magnitude of change during construction is judged to be Moderate to High , resulting in a Moderate to High temporary adverse impact. However, should careful consideration and design seek to retain the mature vegetation and limit alterations to pillars (an example could be to realign the level to the southern edge of the existing footpath), the impact has the potential to be reduced.

During operation, the permanent removal of the mature vegetation would be evident in views, resulting in a Moderate adverse magnitude and a Moderate adverse impact. If the mature vegetation could be retained, this impact would be reduced.

TRANSPORT

including Fitzroy Street, Prince Street and Hockey Street to the north, and Through Street and Gwydir Highway to the south.

Viewpoint 3, Through Street, is representative of views from transport corridors and visual receptors. During construction it is anticipated that the magnitude of change during construction would be Low and of a temporary nature, resulting in a Low adverse impact. During operation, the magnitude of change is judged to reduce to Negligible, resulting in a Negligible impact.

5.3 RECOMMENDATIONS

To inform the future stages of the design project and to accurately determine the potential adverse impacts on the landscape character and visual amenity, the following recommendations have been suggested;

- Consideration should be given to undertaking an arborist assessment to inform the design development and optimum levee design alignment
- Where the levee consists of existing structures (for example, a building) a specific levee raising design would be necessary. Roads and Maritime would consult with the infrastructure owners during the development of this design. Where feasible and reasonable, the design would:
    - Investigate opportunities to avoid modification of existing structure (eg minor realignment of levee crest)
    - Keep modifications of the existing structure to a minimum
    - Identify a construction method that would maintain the structure operational while the construction work is being undertaken (subject to safety considerations)
    - If the structure is a heritage listed item, avoid or minimise the need to modify the actual structure and investigate non-intrusive options to achieve the required levee level. Levee raising materials and finishes used would be sympathetic as to minimise impact upon the significance of the heritage item