SPECTRUM
ENVIRONMENTAL QLD

ENVIRONMENTAL ASSESSMENT REPORT

SPECTRUM ENVIRONMENTAL QLD
Sunshine Coast, QLD
spectrumenviro@outlook.com
Phone 0417 322 552

Theodore Centenary Pathway Alignment Impact Management Plan

Theodore

September

2023

DOCUMENT ISSUE APPROVAL			
Rev.	**Issue Date**	Description	Approved
Draft V1	**14th/09/2023**	**Theodore Centenary Pathway Alignment Impact Management Plan**	**Bonnie Lawson** **Principal Environmental Scientist**
Report V1	**18th/09/2023**	**Theodore Centenary Pathway Alignment Impact Management Plan**	**Bonnie Lawson** **Principal Environmental Scientist**
Report V2	**22nd/09/2023**	**Theodore Centenary Pathway Alignment Impact Management Plan**	**Bonnie Lawson** **Principal Environmental Scientist**

Table of Contents

1. Introduction

A Protected Plants Clearing permit application will be made to the Department of Environment and Science (DES**) for working in close proximity to *Livistonia nitida* mapped within the High-Risk PP Trigger Mapping Areas within the project area for the centenary pathway alignment- reserve area**. No active or actual clearing is required for the project with a zero net loss achieved as apart of the Impact Management Plan and avoidance strategies of the pathway alignment.

1,1 Background information

Banana Shire Council (the client) has commissioned Environmental QLD to undertake a Protected Plant Survey of the Lot of a pathway alignment at Theodore township, QLD. The pathway alignment consists of five stages; Stage 1: Dawson Avenue, Stage 2: Walloon Street, Stage 3: Bridge Underpass, Stage 4: Fifth Avenue and Stage 5: a vegetated walkway area on the bank of Castle Creek (429DW246 (RESERVE - 2.63ha).

Figure 1 illustrates the locality of the pathway alignment in relation to surrounding environmentally significant areas of Castle Creek, Dawson River and their associated wetland and regulated vegetation values.

The project area is situated in the Banan Shire Council area, Bioregion Brigalow Belt, subregion Dawson Rivers Downs in the Fitzroy Catchment.

The study site is located on the following parcels of land: 429 DW246 (Bushland adjacent to Castle Creek), west and eastern section of Dawsons Avenue (Road Corridor), southern section of Walloon Street, and a small section of the southern side of fifth Avenue South.

Protected Plant Trigger Mapping is located within Castle Creek Vegetated Walkway Area- Department of Environment and Science (DES) requires a Protected Plant (CEVNT Protected Plant Flora Survey of the area- 100m radius from the center line of the pathway alignment in this area. The site is Zoned as a Rural Residential Zone on Banana Shire Planning Zone map, with the bushland area adjacent to Castle Creek mapped as Regulated vegetation.

During the two days of field surveys (5th and 6th September, 2023) a comprehensive Protected Plants Flora Survey was undertaken on the lot and surrounding clearing impact area, across the time span of 17.5 survey hours. A total of 20 Near Threatened (CEVNT) flora species were detected at the southern extent of the bushland adjacent to Castle Creek within the Reserve area.

The activity of operational works associated with laying and construction of a concrete footpath will result in nil clearing or direct or indirect impact on the Near threatened *Livistonia nitida* Dawsons Creek Palms resulting in zero net loss for the species. A total of 18 of the Palm species were recorded to be juvenile species, with only one canopy tree recorded to the immediate west of the bridge onsite.

The pathway alignment is at all times (with the exception of a single plant being located 7.8m from the pathway at the bridge underside RL140.78) situated more than 10m in distance from the palms and has been located specifically in areas devoid of native vegetation and only comprises of exotic grass removal and some dead limbs to be trimmed from existing trees due to a safety risk. Some minimal ground and native vegetation disturbance will occur as a part of the footpath construction and consequently an Impact Management Plan (IMP) has been prepared for the project.

The completion of an Impact Management Plan (IMP) as well as the conditions of the Protected Plants Clearing Permit will ensure works can proceed within the reserve area and long term conservation values are maintained for the Protected Plants during approved development works. The primary focus of all operational works onsite is to avoid removal of the Protected Plants and achieve a zero net loss of the species. The IMP for site will mitigate the direct and indirect risks of operational works of installing the foot path within the reserve area and under bridge area.

The primary impact on the project site within the reserve being Lot 429 DW246 as being GRASSLAND (PRIMARILY EXCOTIC) REMOVAL WITH SOME MINOR DEAD LIMB TRIMMING REQUIRED FOR FOOTH PATH CONSTRUCTION- ALL OPERATIONAL WORKS WILL OCCOUR MORE THAN 10M DISTANCE (WITH THE EXCEPTION OF ONE SINGLE PLANT BEING LOCATED 7.8M FROM THE PATHWAY AT THE NRIDGE UNDERSIDE RL140.78) FROM THE JUVUNILE PALMS NEAR THREATENED LIVISTONA NITIDA. The total area of the understory grass to be impacted as a part of the footpath construction is from Walloon St to the under-bridge section (adjoining the already existing footpath) is 2088m² (1044m in length, 2m wide). Within the area closer to protected plants Lot 429 DW246 the pathway is an estimated 550m in length and 2m wide with a total impact area of understory grasses (mostly exotic species) being 1100m2.

The project environmental scientist Bonnie Lawson has delineated appropriate foot path setbacks from the protected plant locations across the specific areas that contain protected plants onsite and operational works will be required adjacent to PP, with the appropriate IMP provisions in place and determine set back of the operation pipeline works (excavation) from the PP to ensure no net loss occurs.

Figure 1: Project Area Theodore Centenary Pathway Alignment (total project area stage 1-5)

Figure 2: Protected Plant Permit Location within the Project Area Stage 5: a vegetated walkway area on the bank of Castle Creek (429DW246 (RESERVE - 2.63ha).

1.1 Avoid and Minimise Clearing

Every opportunity to avoid clearing (relocation) of the protected plants situated within the 8.6km of irrigation pipeline was made by the permit applicant, avoidance strategies produced a range of changes to the original pathway configuration

Avoidance will occur for all operational works within the Mapped areas of high risk PP Trigger Mapping as well as the three locations within the project area in which operational works must occur adjacent to known locations of protected plants.

1.2 Foot Path Alignment In the Three Locations That Are in Close Proximity to Protected Plants

The pathway alignment has been selected and configured to ensure minimal tree/shrub disturbance occurs as a part of the project, to impact the exotic grasses in the understory requiring removal as a part of the Centenary Pathway project. The footpath will engage community to exercise and have a great physical connection with the township areas, mobility to the main street, a visual amenity and recreational activity in the town and a bushwalking experience. Signage about the Livistona nitida can also raise the communities awareness of the Near Threatened Plam in the local community catchment-

encouraging long term conservation outcomes for the species.

Photo 1: : Protected Plant Survey Area Bushland Adjacent to Castle Creek- White pegs Delineate Community Consultation for Pathway Alignment

1.3 The Role of Protected Plants Regulation

A protected plant survey (PPS) is a legislative instrument under the Qld Nature Conservation Act 1992 designed to manage the loss of protected flora species i.e.. those listed as Near Threatened, Vulnerable, Endangered and Critically Endangered.

The aim of the protected plants legislative framework under the Act is to ensure the survival of viable populations of protected plants in the wild, particularly threatened species or near threatened species, and to identify and reduce or remove the effects of threatening processes.

Protected plants and their habitat are to be conserved to the greatest possible extent. Clearing and harvesting proposals should only be approved if the taking of plants from the source population will not adversely affect the survival in the wild of the plant species.

In particular:

- For threatened species, it will not reduce the ability of a plant population to expand; and
- For near threatened species, it will not affect the ability of a plant population to survive.

2. Proposed Development

Banana Shire Council (the client) has commissioned Environmental QLD to undertake a Protected Plant Survey of the Lot of a pathway alignment at Theodore township, QLD. The pathway alignment consists of five stages; Stage 1: Dawson Avenue, Stage 2: Walloon Street, Stage 3: Bridge Underpass, Stage 4: Fifth Avenue and Stage 5: a vegetated walkway area on the bank of Castle Creek (429DW246 (RESERVE - 2.63ha).
Figure 1 illustrates the locality of the pathway alignment in relation to surrounding environmentally significant areas of Castle Creek, Dawson River and their associated wetland and regulated vegetation values.

The study site is located on the following parcels of land: 429 DW246 (Bushland adjacent to Castle Creek), west and eastern section of Dawsons Avenue (Road Corridor), southern section of Walloon Street, and a small section of the southern side of fifth Avenue South.

All areas of the pathway alignment is situated on high modified road corridors zoned as residential area devoid of native vegetation, with the exception of several native trees on the street scaped turf. The bushland areas adjacent to Castle Creek is classified as a Reserve area and zoned as open space recreational area.

Protected Plant Trigger Mapping is located within Castle Creek Vegetated Walkway Area- Department of

Environment and Science (DES) requires a Protected Plant (CEVNT Protected Plant Flora Survey of the area- 100m radius from the center line of the pathway alignment in this area.

During the two days of field surveys a total of 20 Near Threatened plant species were detected on the project lot or Clearing Impact Area, Livistonia nitida. The activity of operational works associated with laying and construction of a concrete footpath will result in nil clearing or direct or indirect impact on the Near threatened Livistonia nitida Dawsons Creek Palms resulting in zero net loss for the species. A total of 18 of the Palm species were recorded to be juvenile species, with only one canopy tree recorded to the immediate west of the bridge onsite.

The pathway alignment is at all times situated more than 10m in distance from the palms and has been located specifically in areas devoid of native vegetation and only comprises of exotic grass removal and some dead limbs to be trimmed from existing trees due to a safety risk. Some minimal ground and native vegetation disturbance will occur as a part of the footpath construction and an Impact Management Plan has been prepared to ensure no direct or indirect disturbances or impacts to the Palms occur onsite. The conservation value of the Palms will be ensured throughout the footpath construction- and preservation of the palms can occur through their mapping and ongoing protection onsite.

Photo 1: Protected Plant Survey Area Bushland Adjacent to Castle Creek- White pegs Delineate Community Consultation for Pathway Alignment

3. Protected Plants Located in the Study Site

The entire clearing extent was surveyed for flora species, Critically Endangered, Vulnerable, Near Threatened (CEVNT) flora species, CEVNT Fauna species and wetland/waterway characteristics.

A field assessment was undertaken to ground-truth the vegetation community present within the study area, also within the extent survey area. A flora survey was undertaken, detailing vegetation community descriptions, floristic structure, baseline flora assessment, vegetation condition and disturbance level.

A timed meander survey methodology was adopted, and the entire site was surveyed by foot transverse, with particularly focus given to ensure all vegetation assemblages (2 different RE mapped within the clearing impact area on adjacent lot) as determined by the Nature Conservation Act, 1992 Flora Survey Guidelines – Protected plants.

A total of 20 Near Threatened Plants were recorded within the bushland adjacent to Castle Creek onsite.

The results from the field survey determine that a Clearing Exemption Permit is to be applied for from DES as the vegetation clearing for the single dwelling is located in High Risk Protected Plant Trigger mapping; however, no net loss will occur to CEVNT plants as there was no presence surveyed across the CIA.

An impact management plan is required for the very minor vegetation clearing-trimming required for the foot path alignment in the bushland area adjacent to Castle Creek due to the CEVNT species recorded onsite.

Photo 2: Livistona nitida surveyed outside of Pathway Alignment by more than 40m

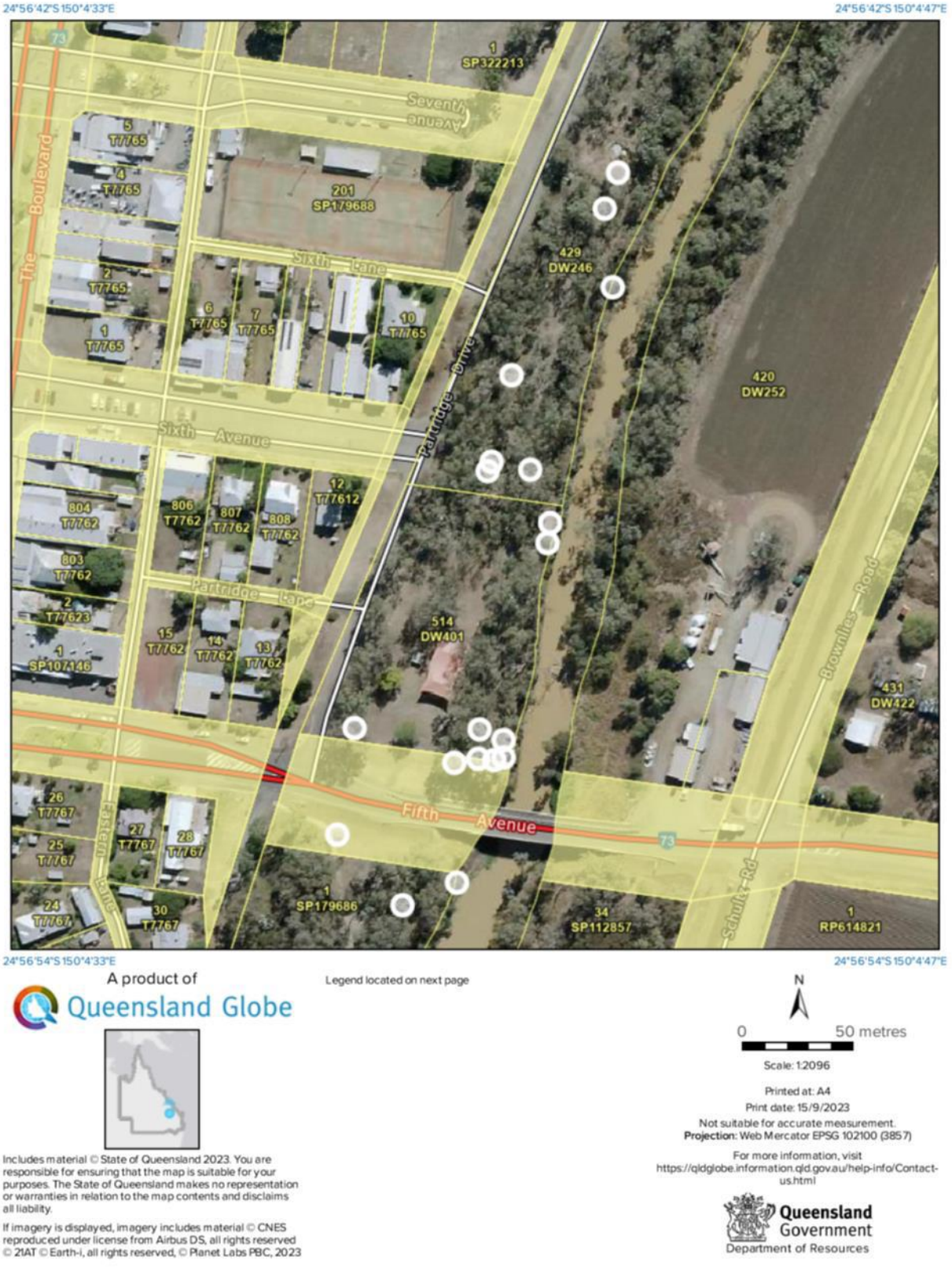
Photo 3: Livistona nitida located northern extent of plants surveyed within the Reserve adjacent to Castle Creek 2 X juvenile plants

Photo 4: Livistona nitida Mature Palm Leaf Adjacent to Bridge

Figure 3: protected Plant Location Data within the Project Site

Protected Plant Growth Form Description Livistonia nitida	Latitude	Longitude	Description
Juv Palm	-24.9455	150.0783	X 2 juv palm sp. dropped by bird seed no mature tree
Juv Palm	-24.9456	150.0783	Single small palm 7m from pathway comm
Juv Palm	-24.9459	150.0783	Small Palm creeks edge single
Juv Palm	-24.9462	150.0779	Small single Palm wash out a 9.5 m from pathway comm
Semi Mature Palm	-24.9465	150.0778	Semi mature beside center gully drainage line
Semi Mature Palm	-24.9466	150.0778	Semi mature no fruit or flowers
Single Palm	-24.9468	150.078	Single Palm next to creek
Protected Palm	-24.9466	150.078	Single protected Palm creek side of gully
Single Palm	-24.9468	150.078	Single Palm juv riparian zone
Juv Palm	-24.9475	150.0778	Single juv Palm adjacent front creek side of skate park
Juv Palm	-24.9476	150.0777	Single juv close to bridge
Juv Palm	-24.9476	150.0778	Single creek side near bridge
Juv Palm	-24.9476	150.0778	Single creek side beside e. Tereticornis near bridge
Juv Palm	-24.9476	150.0778	Single beside creek under iron bark
Juv Palm	-24.9476	150.0776	Single adjacent bridge 6m from pathway alignment
Mature Palm	-24.9481	150.0777	Mature Palm no fruit or flowers
Juv Palm	-24.9482	150.0774	Juvenile other side of bridge off comm path
Semi Mature Palm	-24.9479	150.0772	Adjacent to existing footpath
Semi Mature Palm	-24.9475	150.0772	Small edge of park

Figure 4:Mapped Location of the Livistonia niida within the project site



NO WORK IS SO IMPORTANT THAT IT CANNOT BE DONE SAFELY

THE BOULEVARD

ELEVENTH AVENUE

WALLOON STREET

EASTERN LANE

HOUSE No. 39 LOT 4 RP T77618

HOUSE No. 41 LOT 3 RP T77618

HOUSE No. 43 LOT 2 RP T77618

HOUSE No. 45 LOT 1 RP T77618

HOUSE No. 47 LOT 545 RP DW558

HOUSE No. 20 LOT 2 RP T77613

HOUSE No. 22 LOT 1 RP T77613

HOUSE No. 15 LOT 18 RP T77613

HOUSE No. 110 LOT 5 RP DW123

PROPOSED 2m WIDE CONCRETE FOOTPATH

PROVIDE RESIDENTIAL DRIVEWAY CROSSOVER TO CMDG-R-041

NEW CONCRETE CROSSOVER WITH GUTTER LAYBACK CROSSING

EXISTING DRIVEWAY TO BE REPLACED

TIE IN NEATLY TO EXISTING FOOTPATH

PROPOSED KERB RAMPS TO NEW FOOTPATH CROSSING OVER MEDIAN ISLAND. NEW FOOTPATH PLACED NEATLY BETWEEN EXISTING STREET TREES AND LIGHT POLES

CH0.000 CH20.000 CH40.000 CH60.000 CH80.000 CH100.000 CH120.000 CH140.000

PROPOSED 2m WIDE CONCRETE FOOTPATH

NOTE
LOCATION OF ALL EXISTING TREES TO BE CONFIRMED ON SITE

CAUTION - EXISTING SERVICES
THE CONTRACTOR IS TO DETERMINE THE EXACT LOCATION OF ALL EXISTING SERVICES IN THE VICINITY OF THE PROPOSED WORKS PRIOR TO THE START OF ANY CONSTRUCTION. THE COST OF ANY RECTIFICATION WORKS DUE TO DAMAGE OF EXISTING SERVICES SHALL BE BORNE BY THE CONTRACTOR.

LEGEND - EXISTING

- EXISTING PROPERTY BOUNDARY
- EXISTING WATERMAIN
- EXISTING GRAVITY SEWER
- EXISTING STORMWATER
- EXISTING ELECTRICAL
- EXISTING TELECOMMUNICATIONS
- EXISTING IRRIGATION
- EXISTING TOP OF BANK
- EXISTING FENCE
- EXISTING BITUMEN
- EXISTING KERB & CHANNEL
- EXISTING SWALE
- EXISTING TREE
- EXISTING TREE - PROTECTED SPECIES LIVISTONIA NITIDA
- EXISTING SIGN

LEGEND - PROPOSED

- PROPOSED FOOTPATH COUNCIL SETOUT OPTION
- PROPOSED FOOTPATH COMMUNITY CONSULTATION SETOUT OPTION
- PROPOSED ROAD SURFACE
- PROPOSED INLET PIT
- PROPOSED STORMWATER
- PROPOSED HEADWALL
- PROPOSED ROAD SHOULDER
- PROPOSED KERB
- PROPOSED CENTERLINE
- PROPOSED SWALE
- PROPOSED SURFACE CONTOURS (4.80)

No.	Revision	Date
D	FOOTPATH LAYOUT ADJUSTED	22-09-2023
C	ISSUE FOR APPROVAL	11-09-2023
B	80% ISSUE	24-07-2023
A	ISSUED FOR COMMENTS	07-07-2023

General Notes:

1:250 1:500 5 0 5 10 A1 A3

MTS

Designed

RPEQ XXXX XX October XX

Banana SHIRE SHIRE OF OPPORTUNITY

Barlow Shelley CONSULTING ENGINEERS

WALLOON STREET AND PARTRIDGE DRIVE, THEODORE

PAVEMENT WIDENING AND REHABILITATION WORKS

FOOTPATH LAYOUT PLAN 1 OF 6

Scale	Dwg. No.	Sheet	Issue
AS SHOWN	2320-FP01		D

NO WORK IS SO IMPORTANT THAT IT CANNOT BE DONE SAFELY

HOUSE No. 15 LOT 18 RP T77613
HOUSE No. 13 LOT 17 RP T77613
HOUSE No. 11 LOT 16 RP T77613
HOUSE No. 9 LOT 26 RP T77613
HOUSE No. 7 LOT 44 RP T77613
HOUSE No. 5 LOT 46 RP T77613
HOUSE No. 3 LOT 12 RP T77613
HOUSE No. 1 LOT 11 RP T77613
HOUSE No. 2 LOT 34 RP T77613

CASTLE STREET

WALLOON STREET

PROPOSED 2m WIDE CONCRETE FOOTPATH

2.30m
1.47m
1.78m
1.98m

CH120.000
CH140.000
CH160.000
CH180.000
CH200.000
CH220.000
CH240.000
CH260.000
CH280.000
CH300.000
CH320.000

HOUSE No. 1 LOT 1 RP SP197912
HOUSE No. 10 LOT 4 RP SP197912
HOUSE No. 8 LOT 5 RP SP197912
HOUSE No. 6 LOT 6 RP SP197912
HOUSE No. 4 LOT 7 RP SP197912
HOUSE No. 2 LOT 8 RP SP197912

STAKE RL141.52
STAKE RL141.31

NINTH AVE

NOTE
LOCATION OF ALL EXISTING TREES TO BE CONFIRMED ON SITE

CAUTION - EXISTING SERVICES
THE CONTRACTOR IS TO DETERMINE THE EXACT LOCATION OF ALL EXISTING SERVICES IN THE VICINITY OF THE PROPOSED WORKS PRIOR TO THE START OF ANY CONSTRUCTION. THE COST OF ANY RECTIFICATION WORKS DUE TO DAMAGE OF EXISTING SERVICES SHALL BE BORNE BY THE CONTRACTOR.

No.	Revision	Date
D	FOOTPATH LAYOUT ADJUSTED	22-09-2023
C	ISSUE FOR APPROVAL	11-09-2023
B	80% ISSUE	24-07-2023
A	ISSUED FOR COMMENTS	07-07-2023

General Notes:

1:250 1:500 5 0 5 10 A1 A3

MTS

Designed

RPEQ XXXX XX October XX

Banana SHIRE SHIRE OF OPPORTUNITY

Barlow Shelley CONSULTING ENGINEERS

WALLOON STREET AND PARTRIDGE DRIVE, THEODORE
PAVEMENT WIDENING AND REHABILITATION WORKS
FOOTPATH LAYOUT PLAN 2 OF 6

Scale	Dwg. No.	Sheet	Issue
AS SHOWN	2320-FP02		D

NO WORK IS SO IMPORTANT THAT IT CANNOT BE DONE SAFELY

ALIGNMENT THROUGH VEGETATION TO BE CONFIRMED ON SITE WITH ENVIRONMENTAL CONSULTANT

PROPOSED 2m WIDE CONCRETE FOOTPATH

PROPOSED 2m WIDE CONCRETE FOOTPATH AS PER COMMUNITY CONSULTATION PROCESS

PROPOSED FOOTPATH STAKES PLACED DURING COMMUNITY CONSULTATION PROCESS

WALLOON STREET

PARTRIDGE DRIVE

CH300.000
CH320.000
CH340.000
CH360.000
CH380.000
CH400.000
CH420.000
CH440.000
CH460.000
CH480.000
CH500.000
CH520.000
CH540.000
CH560.000
CH580.000

STAKE RL139.94
STAKE RL139.95
STAKE RL141.73
STAKE RL141.56
STAKE RL141.52
STAKE RL141.31

HOUSE No. 1
LOT 9
RP SP197912

HOUSE No. 2
LOT 26
RP SP224900

NOTE
LOCATION OF ALL EXISTING TREES TO BE CONFIRMED ON SITE

CAUTION - EXISTING SERVICES
THE CONTRACTOR IS TO DETERMINE THE EXACT LOCATION OF ALL EXISTING SERVICES IN THE VICINITY OF THE PROPOSED WORKS PRIOR TO THE START OF ANY CONSTRUCTION. THE COST OF ANY RECTIFICATION WORKS DUE TO DAMAGE OF EXISTING SERVICES SHALL BE BORNE BY THE CONTRACTOR.

No.	Revision	Date
D	FOOTPATH LAYOUT ADJUSTED	22-09-2023
C	ISSUE FOR APPROVAL	11-09-2023
B	80% ISSUE	24-07-2023
A	ISSUED FOR COMMENTS	07-07-2023

General Notes:

1:250 5 0 5 10 A1
1:500 A3

MTS

Designed

RPEQ XXXX XX October XX

Banana SHIRE SHIRE OF OPPORTUNITY

Barlow Shelley CONSULTING ENGINEERS

WALLOON STREET AND PARTRIDGE DRIVE, THEODORE
PAVEMENT WIDENING AND REHABILITATION WORKS
FOOTPATH LAYOUT PLAN 3 OF 6

Scale	Dwg. No.	Sheet	Issue
AS SHOWN	2320-FP03		D

NO WORK IS SO IMPORTANT THAT IT CANNOT BE DONE SAFELY

PROPOSED FOOTPATH STAKES PLACED DURING COMMUNITY CONSULTATION PROCESS

PROPOSED 2m WIDE CONCRETE FOOTPATH AS PER COMMUNITY CONSULTATION PROCESS

PROPOSED 2m WIDE CONCRETE FOOTPATH

EXISTING TREE - PROTECTED SPECIES LIVISTONIA NITIDA

PARTRIDGE DRIVE

EIGHTH AVENUE

CH540.000
CH560.000
CH580.000
CH600.000
CH620.000
CH640.000
CH660.000
CH680.000
CH700.000
CH720.000

HOUSE No. 1
LOT 27
RP SP224900

HOUSE No. 3
LOT 28
RP SP224900

HOUSE No. 2-4
LOT 1
RP SP322213

HOUSE No. 2-4
LOT 1
RP SP322213

HOUSE No. 1
LOT 201
RP SP179688

NOTE
LOCATION OF EXISTING PROTECTED TREES (SPECIES LIVISTONIA NITIDA) HAS BEEN SURVEYED ON SITE BY SPECTRUM ENVIRONMENTAL. THE SYMBOLS ON THIS PLAN IS INDICATIVE OF LOCATION ONLY AND DOES NOT REPRESENT THE ACTUAL TREE TRUCK OR CANOPY SIZE.

NOTE
LOCATION OF ALL EXISTING TREES TO BE CONFIRMED ON SITE

CAUTION - EXISTING SERVICES
THE CONTRACTOR IS TO DETERMINE THE EXACT LOCATION OF ALL EXISTING SERVICES IN THE VICINITY OF THE PROPOSED WORKS PRIOR TO THE START OF ANY CONSTRUCTION. THE COST OF ANY RECTIFICATION WORKS DUE TO DAMAGE OF EXISTING SERVICES SHALL BE BORNE BY THE CONTRACTOR.

No.	Revision	Date
D	FOOTPATH LAYOUT ADJUSTED	22-09-2023
C	ISSUE FOR APPROVAL	11-09-2023
B	80% ISSUE	24-07-2023
A	ISSUED FOR COMMENTS	07-07-2023

General Notes:

1:250 1:500 5 0 5 10 A1 A3

MTS

Designed

RPEQ XXXX XX October XX

Banana SHIRE SHIRE OF OPPORTUNITY

Barlow Shelley CONSULTING ENGINEERS

WALLOON STREET AND PARTRIDGE DRIVE, THEODORE

PAVEMENT WIDENING AND REHABILITATION WORKS

FOOTPATH LAYOUT PLAN 4 OF 6

Scale	Dwg. No.	Sheet	Issue
AS SHOWN	2320-FP04		D

NO WORK IS SO IMPORTANT THAT IT CANNOT BE DONE SAFELY

PROPOSED FOOTPATH STAKES PLACED DURING COMMUNITY CONSULTATION PROCESS

PROPOSED 2m WIDE CONCRETE FOOTPATH AS PER COMMUNITY CONSULTATION PROCESS

EXISTING TREE - PROTECTED SPECIES LIVISTONIA NITIDA

PROPOSED 2m WIDE CONCRETE FOOTPATH

PARTRIDGE DRIVE

CH700.000 CH720.000 CH740.000 CH760.000 CH780.000 CH800.000 CH820.000 CH840.000 CH860.000 CH880.000 CH900.000

SIXTH LN

SIXTH AVE

PARTRIDGE LN

HOUSE No. 1
LOT 201
RP SP179688

HOUSE No. 2
LOT 10
RP T7765

HOUSE No. 34
LOT 13
RP T7762

PROVIDE COMMERCIAL DRIVEWAY CROSSOVER TO CMDG-R-042

NOTE
LOCATION OF EXISTING PROTECTED TREES (SPECIES LIVISTONIA NITIDA) HAS BEEN SURVEYED ON SITE BY SPECTRUM ENVIRONMENTAL. THE SYMBOLS ON THIS PLAN IS INDICATIVE OF LOCATION ONLY AND DOES NOT REPRESENT THE ACTUAL TREE TRUCK OR CANOPY SIZE.

NOTE
LOCATION OF ALL EXISTING TREES TO BE CONFIRMED ON SITE

CAUTION - EXISTING SERVICES
THE CONTRACTOR IS TO DETERMINE THE EXACT LOCATION OF ALL EXISTING SERVICES IN THE VICINITY OF THE PROPOSED WORKS PRIOR TO THE START OF ANY CONSTRUCTION. THE COST OF ANY RECTIFICATION WORKS DUE TO DAMAGE OF EXISTING SERVICES SHALL BE BORNE BY THE CONTRACTOR.

No.	Revision	Date
D	FOOTPATH LAYOUT ADJUSTED	22-09-2023
C	ISSUE FOR APPROVAL	11-09-2023
B	80% ISSUE	24-07-2023
A	ISSUED FOR COMMENTS	07-07-2023

General Notes:

1:250 5 0 5 10 A1
1:500 A3

MTS

Designed

RPEQ XXXX XX October XX

Banana SHIRE SHIRE OF OPPORTUNITY

Barlow Shelley CONSULTING ENGINEERS

WALLOON STREET AND PARTRIDGE DRIVE, THEODORE

PAVEMENT WIDENING AND REHABILITATION WORKS

FOOTPATH LAYOUT PLAN 5 OF 6

Scale	Dwg. No.	Sheet	Issue
AS SHOWN	2320-FP05		D

NOTE
LOCATION OF EXISTING PROTECTED TREES (SPECIES LIVISTONIA NITIDA) HAS BEEN SURVEYED ON SITE BY SPECTRUM ENVIRONMENTAL. THE SYMBOLS ON THIS PLAN IS INDICATIVE OF LOCATION ONLY AND DOES NOT REPRESENT THE ACTUAL TREE TRUCK OR CANOPY SIZE.

NO WORK IS SO IMPORTANT THAT IT CANNOT BE DONE SAFELY

EXISTING WATERMAIN LOCATION TO BE CONFIRMED ON SITE

PROVIDE 3 x 150Ø PVC DRAINAGE OUTLETS FROM CUT OFF DRAIN UNDERNEATH FOOTPATH AND OUTLETTING TOWARDS WATERCOURSE. EXACT LEVELS TO BE DETERMINED ON SITE.

BRIDGE UNDERSIDE RL140.78

FL138.28 NS138.69

0.1%

FL138.29 NS137.85

BRIDGE UNDERSIDE RL140.79

EXISTING TREE - PROTECTED SPECIES LIVISTONIA NITIDA

7.8

STAKE RL139.14

2%

STAKE RL138.84

STAKE RL139.27

CH960.000

CH980.000

1 FP07

STAKE RL137.6

STAKE RL137.91

2%

13.4

STAKE RL138.30

STAKE RL138.57

PROPOSED 2m WIDE CONCRETE FOOTPATH AS PER COMMUNITY CONSULTATION PROCESS

FL138.94 NS139.67

PATHWAY GRADE NOT COMPLIANT WITH AS1428.1. REQUIRES INTERMITTENT FLAT LANDINGS FOR ACCESSIBILITY COMPLIANCE.

CUTOFF DRAIN BETWEEN BRIDGE EMBANKMENT AND FOOTPATH TO KEEP FOOTPATH DRY FROM DRAINAGE THROUGH SCUPPERS IN BRIDGE DECK ABOVE. SEE DWG FP07 FOR DETAIL

STAKE RL139.04

FL139.05 NS138.98

STAKE RL138.77

STAKE RL138.50

STAKE RL138.35

STAKE RL138.26

STAKE RL138.54

STAKE RL138.87

STAKE RL139.55

7.1%

2.00m

FL139.61 NS139.83

CH940.000

PROPOSED 2m WIDE CONCRETE FOOTPATH

FL140.28 NS140.28

FL140.00 NS139.91

CH900.000

2.00m

4.6%

8%

NS141.53

FIFTH AVENUE

CH920.000

10.3

CH1020.000

7.1%

2.00m

PROPOSED FOOTPATH STAKES PLACED DURING COMMUNITY CONSULTATION PROCESS

STAKE RL141.5

STAKE RL140.12

FL141.04

FL140.89

NS141.01

PARTRIDGE DR

CH1034.555

NS140.35

NS140.39

EXISTING FOOTPATH

CAUTION - EXISTING SERVICES
THE CONTRACTOR IS TO DETERMINE THE EXACT LOCATION OF ALL EXISTING SERVICES IN THE VICINITY OF THE PROPOSED WORKS PRIOR TO THE START OF ANY CONSTRUCTION. THE COST OF ANY RECTIFICATION WORKS DUE TO DAMAGE OF EXISTING SERVICES SHALL BE BORNE BY THE CONTRACTOR.

NOTE
LOCATION OF ALL EXISTING TREES TO BE CONFIRMED ON SITE

No.	Revision	Date
D	FOOTPATH LAYOUT ADJUSTED	22-09-2023
C	ISSUE FOR APPROVAL	11-09-2023
B	80% ISSUE	24-07-2023
A	ISSUED FOR COMMENTS	07-07-2023

General Notes:

1:125 2.5 0 2.5 5 A1
1:250 A3

MTS

Designed

RPEQ XXXX XX October XX

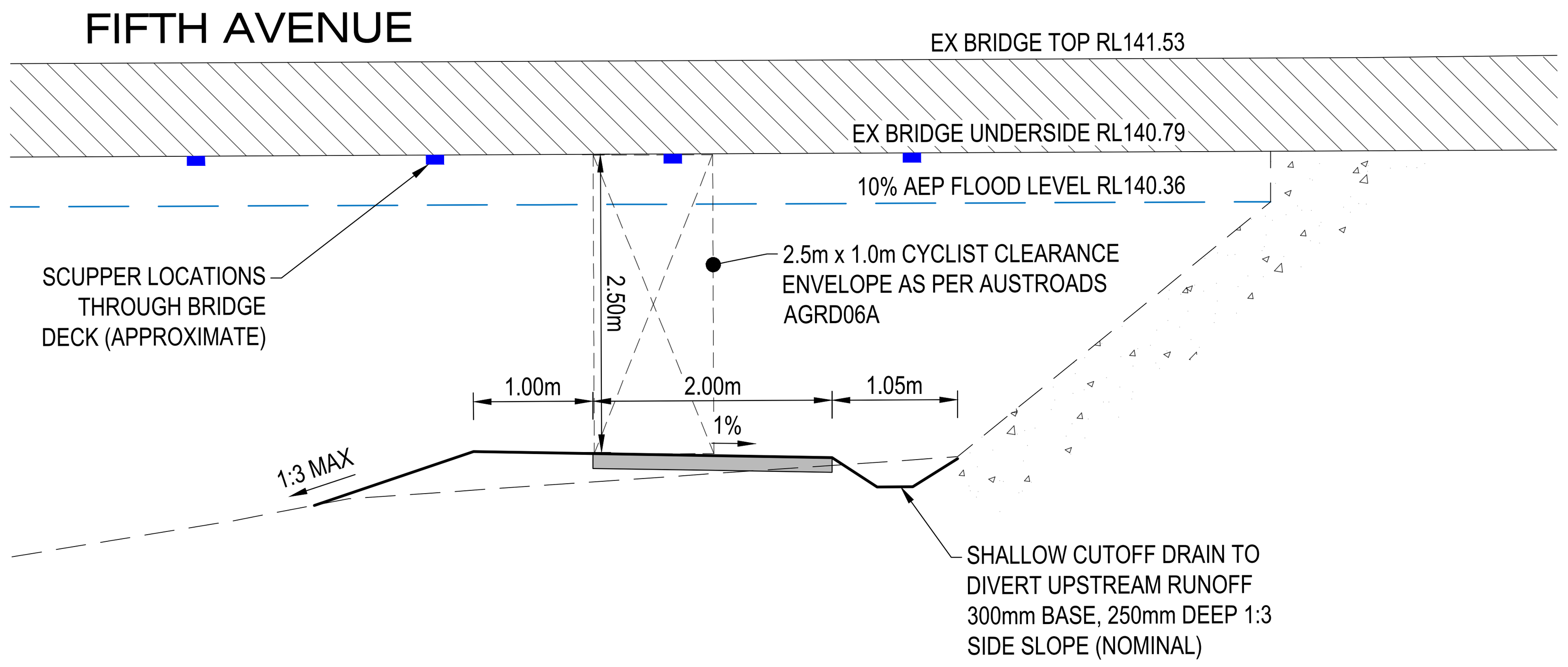
Banana SHIRE SHIRE OF OPPORTUNITY

Barlow Shelley CONSULTING ENGINEERS

WALLOON STREET AND PARTRIDGE DRIVE, THEODORE
PAVEMENT WIDENING AND REHABILITATION WORKS
FOOTPATH LAYOUT PLAN 6 OF 6

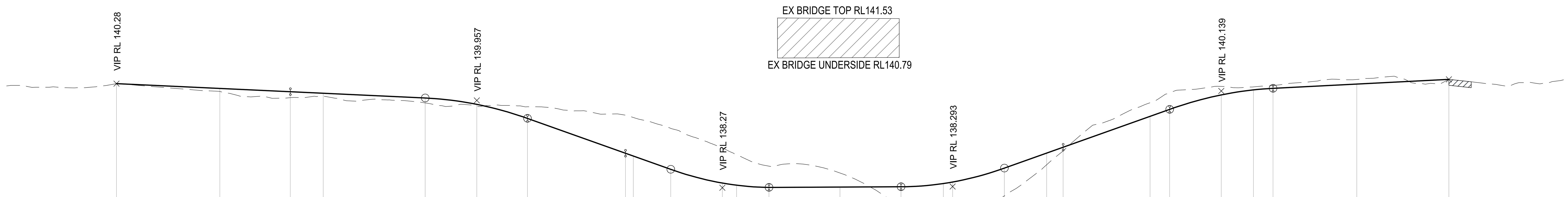
Scale	Dwg. No.	Sheet	Issue
AS SHOWN	2320-FP06		D

NO WORK IS SO IMPORTANT THAT IT CANNOT BE DONE SAFELY



SECTION 1 / FP06

SCALE 1:50



HORIZONTAL CURVE DATA: R -15; R 10; R 10

VERTICAL CURVE LENGTH (m) / VERTICAL CURVE RADIUS (m): VC 10 R 161.99; VC 10 R 138.81; VC 10 R 142.94; VC 10 R 164.49

VERTICAL GEOMETRY GRADE (%) / VERTICAL GEOMETRY LENGTH (m): -0.9% 34.86; -7.1% 23.76; 0.1% 22.28; 7.1% 25.99; 1% 22.02

DATUM RL = 135.600

CONTROL LINE CHAINAGE	FINISHED SURFACE LEVEL	EXISTING SURFACE LEVEL	CUT / FILL DEPTH
900	140.280	140.280	0.000
910	140.187	140.129	0.059
916.81	140.124	140.010	0.115
920	140.095	140.035	0.060
929.864	140.003	139.907	0.096
934.864	139.880	139.852	0.028
939.759	139.609	139.833	-0.224
949.239	138.936	139.673	-0.736
950	138.882	139.626	-0.744
953.621	138.625	139.416	-0.790
958.621	138.360	139.033	-0.672
960	138.319	138.904	-0.586
963.128	138.276	138.687	-0.411
970	138.282	138.554	-0.272
975.903	138.288	137.857	0.431
980	138.351	137.692	0.659
980.903	138.381	137.724	0.657
985.903	138.648	138.111	0.538
990	138.939	138.715	0.225
991.588	139.052	138.982	0.070
1000	139.649	139.912	-0.262
1001.896	139.784	140.103	-0.319
1006.896	140.063	140.228	-0.165
1010	140.160	140.218	-0.058
1011.896	140.190	140.245	-0.055
1020	140.273	140.362	-0.089
1030	140.364	140.364	0.000

HORIZONTAL SCALE 1:250
VERTICAL SCALE 1:50

No.	Revision	Date
D	FOOTPATH LAYOUT ADJUSTED	22-09-2023
C	ISSUE FOR APPROVAL	11-09-2023
B	80% ISSUE	24-07-2023
A	ISSUED FOR COMMENTS	07-07-2023

General Notes:

AS SHOWN

MTS

Designed

RPEQ XXXX XX October XX

Banana SHIRE — SHIRE OF OPPORTUNITY

Barlow Shelley CONSULTING ENGINEERS

WALLOON STREET AND PARTRIDGE DRIVE, THEODORE

PAVEMENT WIDENING AND REHABILITATION WORKS

FOOTPATH LAYOUT LONGITUDINAL SECTION AND CROSS SECTION

Scale	Dwg. No.	Sheet	Issue
AS SHOWN	2320-FP07		D

NO WORK IS SO IMPORTANT THAT IT CANNOT BE DONE SAFELY

SETOUT TABLE - PROPOSED FOOTPATH (COUNCIL SETOUT OPTION)

PT	CHAINAGE	EASTING	NORTHING	BEARING	RAD/SPIRAL	A.LENGTH	DEFL.ANGLE
IP 1	0.000	204781.003	7238324.820	7°20'53.55"			
IP 2	6.694	204781.859	7238331.459				
IP 3	11.039	204782.801	7238335.717		R = 42.867	8.690	11°36'54.69"
IP 4	15.384	204784.580	7238339.697				
IP 5	23.272	204788.308	7238348.036		R = 12.500	15.776	72°18'46.31"
IP 6	31.160	204797.385	7238347.018				
TC	57.899	204823.957	7238344.038	96°23'53.16"			
IP 7	64.865	204830.912	7238343.258		R = 59.000	13.931	13°31'44.34"
IP 8	71.831	204837.491	7238340.873				
IP 9	78.894	204843.977	7238338.078				
IP 10	83.473	204848.069	7238336.003		R = 59.962	9.158	8°45'03.30"
IP 11	88.052	204851.797	7238333.329				
IP 12	145.729	204898.647	7238299.686				
IP 13	151.941	204903.818	7238296.231		R = -101.000	12.424	7°02'52.93"
CC	158.153	204909.375	7238293.436	116°41'52.48"			
IP 14	173.630	204923.316	7238286.426		R = 99.000	30.954	17°54'51.67"
IP 15	189.107	204934.424	7238275.467				
IP 16	198.784	204940.966	7238268.311		R = -127.112	19.354	8°43'25.97"
IP 17	208.461	204948.518	7238262.229				
IP 18	208.551	204948.588	7238262.173		R = -2.000	0.179	5°07'53.16"
IP 19	208.640	204948.662	7238262.124				
IP 20	212.874	204952.186	7238259.772		R = -101.000	8.467	4°48'12.06"
IP 21	217.107	204955.895	7238257.725				
IP 22	222.961	204961.025	7238254.892		R = 99.000	11.707	6°46'30.55"
CT	228.814	204965.785	7238251.474	125°40'56.60"			
TC	260.401	204991.442	7238233.049	125°40'56.60"			
IP 23	271.849	205001.044	7238226.154		R = 37.300	22.895	35°10'09.34"
CT	283.297	205004.921	7238214.987	160°51'05.93"			
IP 24	301.504	205010.893	7238197.787				

SETOUT TABLE - PROPOSED FOOTPATH (COUNCIL SETOUT OPTION)

PT	CHAINAGE	EASTING	NORTHING	BEARING	RAD/SPIRAL	A.LENGTH	DEFL.ANGLE
IP 25	308.178	205017.554	7238198.199				
IP 26	312.849	205022.294	7238198.521		R = -21.008	9.344	25°29'00.98"
IP 27	317.521	205026.433	7238200.850				
IP 28	319.973	205028.577	7238202.041				
IP 29	330.986	205038.167	7238207.454				
IP 30	333.256	205040.146	7238208.567				
IP 31	335.838	205042.771	7238210.045		R = 4.000	5.164	73°58'16.40"
CT	338.420	205044.916	7238207.930	134°36'02.84"			
TC	359.282	205059.770	7238193.281	134°36'02.84"			
IP 32	363.275	205062.648	7238190.443		R = 21.000	7.987	21°47'24.69"
CT	367.268	205064.267	7238186.739	156°23'27.53"			
TC	382.516	205070.373	7238172.768	156°23'27.53"			
IP 33	406.001	205080.737	7238149.056		R = 45.000	46.969	59°48'12.08"
CT	429.485	205065.456	7238128.172	216°11'39.61"			
TC	483.046	205033.827	7238084.947	216°11'39.61"			
IP 34	486.557	205031.729	7238082.081		R = -19.000	7.022	21°10'29.79"
CT	490.068	205030.809	7238078.651	195°01'09.82"			
TC	519.330	205023.226	7238050.389	195°01'09.82"			
IP 35	522.781	205022.328	7238047.042		R = 31.000	6.903	12°45'31.10"
CT	526.233	205020.713	7238043.975	207°46'40.92"			
TC	618.571	204977.679	7237962.278	207°46'40.92"			
IP 36	619.702	204977.152	7237961.277		R = -49.000	2.262	2°38'40.45"
CT	620.833	204976.671	7237960.253	205°08'00.47"			
TC	695.549	204944.937	7237892.611	205°08'00.47"			
IP 37	698.172	204943.816	7237890.221		R = -19.000	5.246	15°49'06.37"
CT	700.795	204943.388	7237887.616	189°18'54.09"			
TC	744.015	204936.393	7237844.966	189°18'54.09"			
IP 38	748.866	204935.593	7237840.092		R = 21.000	9.701	26°28'05.20"
CT	753.717	204932.706	7237836.086	215°46'59.29"			

SETOUT TABLE - PROPOSED FOOTPATH (COUNCIL SETOUT OPTION)

PT	CHAINAGE	EASTING	NORTHING	BEARING	RAD/SPIRAL	A.LENGTH	DEFL.ANGLE
IP 39	799.176	204906.124	7237799.207				
IP 40	805.655	204902.385	7237793.916				
IP 41	810.238	204899.706	7237790.098		R = -20.000	9.166	26°15'27.59"
CT	814.821	204898.993	7237785.488	188°47'39.28"			
TC	837.429	204895.537	7237763.145	188°47'39.28"			
IP 42	839.899	204895.154	7237760.674		R = 13.000	4.941	21°46'29.20"
CT	842.370	204893.883	7237758.521	210°34'08.48"			
TC	870.383	204879.636	7237734.402	210°34'08.48"			
IP 43	874.124	204877.714	7237731.148		R = -21.712	7.483	19°44'45.15"
CT	877.865	204877.005	7237727.436	190°49'23.33"			
IP 44	930.461	204867.128	7237675.776				
IP 45	944.860	204881.149	7237672.497				
IP 46	954.109	204890.155	7237670.390				
IP 47	961.241	204898.578	7237668.420		R = 10.000	14.264	81°43'29.89"
CT	968.373	204897.841	7237659.801	184°53'20.59"			
TC	982.775	204896.614	7237645.451	184°53'20.59"			
IP 48	988.708	204896.062	7237639.006		R = 12.000	11.866	56°39'16.80"
CT	994.641	204890.375	7237635.924	241°32'37.38"			
TC	996.137	204889.060	7237635.211	241°32'37.38"			
IP 49	997.739	204887.570	7237634.403		R = -4.000	3.205	45°54'47.78"
CT	999.342	204887.113	7237632.772	195°37'49.61"			
TC	1002.866	204886.164	7237629.379	195°37'49.61"			
IP 50	1006.471	204885.056	7237625.418		R = 6.000	7.211	68°51'36.30"
CT	1010.077	204880.962	7237625.023	264°29'25.91"			
TC	1016.937	204874.134	7237624.364	264°29'25.91"			
IP 51	1019.316	204871.755	7237624.135		R = 21.000	4.759	12°59'05.91"
CT	1021.696	204869.385	7237624.446	277°28'31.82"			
IP 52	1038.974	204852.254	7237626.694	277°28'31.82"			

SETOUT TABLE - PROPOSED FOOTPATH (COMMUNITY CONSULTATION SETOUT OPTION)

PT	CHAINAGE	EASTING	NORTHING	BEARING	RAD/SPIRAL	A.LENGTH	DEFL.ANGLE
IP 1	0.000	204781.003	7238324.820	7°20'53.55"			
IP 2	6.694	204781.859	7238331.459				
IP 3	11.039	204782.801	7238335.717		R = 42.867	8.690	11°36'54.69"
IP 4	15.384	204784.580	7238339.697				
IP 5	23.272	204788.308	7238348.036		R = 12.500	15.776	72°18'46.31"
IP 6	31.160	204797.385	7238347.018				
TC	57.899	204823.957	7238344.038	96°23'53.16"			
IP 7	64.865	204830.912	7238343.258		R = 59.000	13.931	13°31'44.34"
IP 8	71.831	204837.491	7238340.873				
IP 9	78.894	204843.977	7238338.078				
IP 10	83.473	204848.069	7238336.003		R = 59.962	9.158	8°45'03.30"
IP 11	88.052	204851.797	7238333.329				
IP 12	145.729	204898.647	7238299.686				
IP 13	151.941	204903.818	7238296.231		R = -101.000	12.424	7°02'52.93"
CC	158.153	204909.375	7238293.436	116°41'52.48"			
IP 14	173.630	204923.316	7238286.426		R = 99.000	30.954	17°54'51.67"
IP 15	189.107	204934.424	7238275.467				
IP 16	198.784	204940.966	7238268.311		R = -127.112	19.354	8°43'25.97"
IP 17	208.461	204948.518	7238262.229				
IP 18	208.551	204948.588	7238262.173		R = -2.000	0.179	5°07'53.16"
IP 19	208.640	204948.662	7238262.124				
IP 20	212.874	204952.186	7238259.772		R = -101.000	8.467	4°48'12.06"
IP 21	217.107	204955.895	7238257.725				
IP 22	222.961	204961.025	7238254.892		R = 99.000	11.707	6°46'30.55"
CT	228.814	204965.785	7238251.474	125°40'56.60"			
TC	260.401	204991.442	7238233.049	125°40'56.60"			
IP 23	271.849	205001.044	7238226.154		R = 37.300	22.895	35°10'09.34"
CT	283.297	205004.921	7238214.987	160°51'05.93"			
IP 24	301.504	205010.893	7238197.787				
IP 25	308.178	205017.554	7238198.199				
IP 26	312.849	205022.294	7238198.521		R = -21.008	9.344	25°29'00.98"
IP 27	317.521	205026.433	7238200.850				
IP 28	319.973	205028.577	7238202.041				

SETOUT TABLE - PROPOSED FOOTPATH (COMMUNITY CONSULTATION SETOUT OPTION)

PT	CHAINAGE	EASTING	NORTHING	BEARING	RAD/SPIRAL	A.LENGTH	DEFL.ANGLE
IP 29	330.986	205038.167	7238207.454				
IP 30	333.256	205040.146	7238208.567				
IP 31	335.838	205042.771	7238210.045		R = 4.000	5.164	73°58'16.40"
CT	338.420	205044.916	7238207.930	134°36'02.84"			
TC	359.282	205059.770	7238193.281	134°36'02.84"			
IP 32	363.275	205062.648	7238190.443		R = 21.000	7.987	21°47'24.69"
CT	367.268	205064.267	7238186.739	156°23'27.53"			
TC	382.516	205070.373	7238172.768	156°23'27.53"			
IP 33	406.001	205080.737	7238149.056		R = 45.000	46.969	59°48'12.08"
CT	429.485	205065.456	7238128.172	216°11'39.61"			
TC	483.046	205033.827	7238084.947	216°11'39.61"			
IP 34	486.557	205031.729	7238082.081		R = -19.000	7.022	21°10'29.79"
CT	490.068	205030.809	7238078.651	195°01'09.82"			
TC	519.330	205023.226	7238050.389	195°01'09.82"			
IP 35	522.781	205022.328	7238047.042		R = 31.000	6.903	12°45'31.10"
CT	526.233	205020.713	7238043.975	207°46'40.92"			
TC	618.656	204977.639	7237962.203	207°46'40.92"			
IP 36	619.795	204977.108	7237961.194		R = 16.000	2.277	8°09'19.51"
CT	620.933	204976.438	7237960.270	215°56'00.42"			
TC	655.330	204956.252	7237932.419	215°56'00.42"			
IP 37	657.121	204955.198	7237930.965		R = -19.000	3.581	10°47'59.96"
CT	658.912	204954.436	7237929.339	205°08'00.47"			
TC	679.939	204945.505	7237910.303	205°08'00.47"			
IP 38	684.220	204943.655	7237906.360		R = -19.000	8.562	25°49'06.37"
CT	688.500	204943.707	7237902.006	179°18'54.09"			
TC	698.702	204943.829	7237891.805	179°18'54.09"			
IP 39	700.098	204943.846	7237890.405		R = 16.000	2.793	10°00'00.00"
CT	701.494	204943.619	7237889.024	189°18'54.09"			
TC	754.048	204935.113	7237837.163	189°18'54.09"			
IP 40	757.744	204934.504	7237833.450		R = 16.000	7.391	26°28'05.20"
CT	761.439	204932.304	7237830.398	215°46'59.29"			
TC	766.086	204929.586	7237826.628	215°46'59.29"			
IP 41	770.566	204926.927	7237822.937		R = 21.000	8.960	24°26'43.54"

SETOUT TABLE - PROPOSED FOOTPATH (COMMUNITY CONSULTATION SETOUT OPTION)

PT	CHAINAGE	EASTING	NORTHING	BEARING	RAD/SPIRAL	A.LENGTH	DEFL.ANGLE
CT	775.046	204922.978	7237820.679	240°13'42.83"			
TC	784.301	204914.944	7237816.083	240°13'42.83"			
IP 42	790.488	204909.491	7237812.964		R = -29.000	12.373	24°26'43.54"
CT	796.674	204905.818	7237807.867	215°46'59.29"			
IP 43	805.729	204900.524	7237800.522				
IP 44	810.873	204897.373	7237796.151		R = -14.000	10.287	42°06'02.23"
IP 45	816.016	204897.966	7237790.795				
TC	821.562	204898.576	7237785.283	173°40'41.80"			
IP 46	823.013	204898.737	7237783.833		R = 11.000	2.902	15°06'57.48"
CT	824.464	204898.514	7237782.390	188°47'39.28"			
TC	843.938	204895.537	7237763.145	188°47'39.28"			
IP 47	846.408	204895.154	7237760.674		R = 13.000	4.941	21°46'29.20"
CT	848.879	204893.883	7237758.521	210°34'08.48"			
TC	876.892	204879.636	7237734.402	210°34'08.48"			
IP 48	880.633	204877.714	7237731.148		R = -21.712	7.483	19°44'45.15"
CT	884.374	204877.005	7237727.436	190°49'23.33"			
IP 49	936.970	204867.128	7237675.776				
IP 50	960.618	204890.155	7237670.390				
IP 51	967.750	204898.578	7237668.420		R = 10.000	14.264	81°43'29.89"
CT	974.882	204897.841	7237659.801	184°53'20.59"			
TC	989.704	204896.578	7237645.033	184°53'20.59"			
IP 52	994.154	204896.164	7237640.199		R = 9.000	8.899	56°39'16.80"
CT	998.603	204891.899	7237637.887	241°32'37.38"			
TC	1002.375	204888.583	7237636.090	241°32'37.38"			
IP 53	1004.378	204886.721	7237635.081		R = -5.000	4.007	45°54'47.78"
CT	1006.381	204886.150	7237633.041	195°37'49.61"			
TC	1009.905	204885.201	7237629.648	195°37'49.61"			
IP 54	1012.909	204884.278	7237626.347		R = 5.000	6.009	68°51'36.30"
CT	1015.914	204880.866	7237626.018	264°29'25.91"			
TC	1022.774	204874.038	7237625.360	264°29'25.91"			
IP 55	1025.040	204871.772	7237625.141		R = 20.000	4.533	12°59'05.91"
CT	1027.307	204869.516	7237625.437	277°28'31.82"			
IP 56	1043.571	204853.390	7237627.553	277°28'31.82"			

No.	Revision	Date
D	FOOTPATH LAYOUT ADJUSTED	22-09-2023
C	ISSUE FOR APPROVAL	11-09-2023
B	80% ISSUE	24-07-2023
A	ISSUED FOR COMMENTS	07-07-2023

General Notes:

MTS

Designed

RPEQ XXXX XX October XX

Banana SHIRE SHIRE OF OPPORTUNITY

Barlow Shelley CONSULTING ENGINEERS

WALLOON STREET AND PARTRIDGE DRIVE, THEODORE

PAVEMENT WIDENING AND REHABILITATION WORKS

FOOTPATH SETOUT TABLES

Scale	Dwg. No.	Sheet	Issue
AS SHOWN	2320-FP08		D

3.1 Nature of the Impact

- Small area of Soil disturbance from machinery use onsite for the laying of the footpath and area preparation (removal of grasses and some overhanging dead branches);
- Dust and sedimentation onsite as apart of operational works (control measures are in place to minimize dust and control any sedimentation associated with the operational works);
- Contractor awareness of species location and exclusion fencing to ensure the protected plants are not disturbed by any machinery, water, dust, stock piles or drift from concrete dust etc.;
- No direct clearing of the *Livistona nitida* will occur as a part of the project;
- Understory grasses will be impacted by the footh path alignment (a lot of exotic grasses occur in the understory including Paspalyum, Rhodes Grass)

3.1.1 Species Profile

A tall solitary fan palm to 30 m (100ft), with bright green, deeply divided leaves, with long, drooping leaf tips, up to 4.5m (18ft) long, and which form an open crown. It has numerous glossy black fruits that are about 2 cm (0.8in) in diameter."

Functionally dioecious palm. Trunk to 35 m tall, 25-40 cm in diameter breast high, leaf scars raised; internodes narrow, grey; petiole stubs persistent in the basal 1 m or so, otherwise deciduous. Leaves 35-50 in a globose crown; petiole 170- 200 cm long, 20-26 mm wide, adaxially ridged, margins distally smooth, proximally with single, curved, dark red spines; leaf-base fibres moderately prominent, coarse, disintegrating; lamina costapalmate, regularly segmented, ± circular in outline, 160-190 cm long, coriaceous, adaxially dark green, glossy, abaxially lighter green; lamina divided for 63-70% of its length, with 68-80 segments, depth of apical cleft 60-73% of the segment length, apical lobes pendulous; parallel veins about 7 each side of midrib; transverse veins thinner than parallel veins. Inflorescences unbranched at the base, not sexually dimorphic, 150-200 cm long, not extending beyond the limit of the crown, branched to 4 orders; partial inflorescences 8-12; peduncular bract(s) lacking; rachis bracts loosely sheathing, densely scaly; rachillae 5-20 cm long, glabrous to papillose.

Flowers solitary or in clusters of 2-5, funnel-shaped, 2-3.2 mm long, cream to yellow; sepals triangular, about 1.5 mm long, fleshy, subacute; petals broadly ovate, 2.0-2.2 mm long, thick, fleshy, acute; stamens about 1.6 mm long. Fruit globose, 13-20 mm in diam., glossy jet black; epicarp with scattered lenticellular pores, suture line extends for about ½ the length of the fruit, marked with lip-like structures; mesocarp fibrous, dry; endocarp thin, brittle; pedicel to 0.5 mm long. Seed globose, 10-12 mm wide. Eophyll 5-ribbed.

Livistona nitida flowers from August to December and fruits from November to March (Dowe and Jones, 2011; Queensland Herbarium, 2012).

Pollination of Livistona nitida is probably by wind and perhaps by generalist insect pollinators such as bees. Seed dispersal is undoubtedly facilitated by birds and fruit bats, as found for related species elsewhere

Species Record with QLD Herbarium:
1957 Lonepark area QLD Herbarium completed the exact match and ID for catalogue in 1995.
2022 inland from Defense Road QLD Herbarium completed the exact match and ID for catalogue in 2022.

Photo 5: Livistonia nitida Image (species profile image)

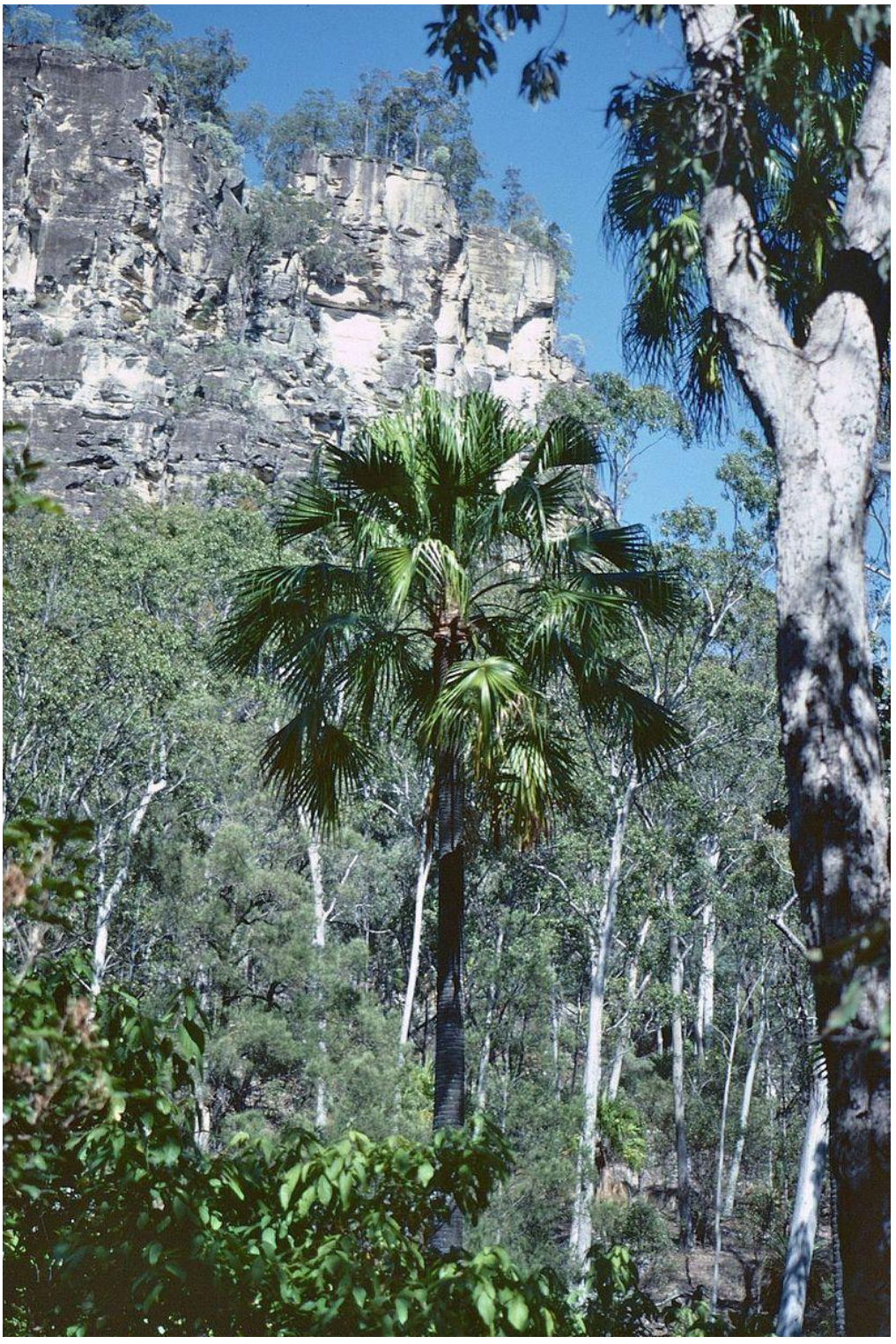


Photo 6:Species Profile Image Juvenile Plant

3.1.2 Operational Works Nature of Impact

Operational works consisting of minor removal of grasses, dead limb trimming of existing vegetation will occur for the pathway within the bushland area adjacent to Castle Creek. The pathway alignment has been configured with assistance from a community advisory group to ensure no vegetation is required to be removed for the alignment- using open areas void of trees and shrubs for the alignment onsite.

Clearing Impact Area: The clearing impact area has been reduced from the 100m Impact Area buffer due to compliance with section 5.2 and 5.2.1 of the Flora Survey Guidelines.

An estimated impact area for the pathway is an estimated xxxxx m2

3.1.3 *Livistonia nitida* Abundance Within the Impact Area

During incidental driving through the township of Theodore, more than 20 Palms have been incidentally observed on the banks of the Dawson Creek, a range of Mature palms were sighted from the road. Additional protected plant surveys in the Dawson Creek riparian area outside of the township would certainly record additional *Livistonia nitida* species.

A range of these mature palms were in flower at the time of survey.

3.2 Main Threats to *Livistona Nitida*

Processes thought to present ongoing threats to *Livistona nitida* include:

- too frequent fires that prevent seed set and kill juveniles;
- timber harvesting on leasehold land where the species occur which is likely to result in the occasional destruction of adults and juveniles,
- Habitat Loss
- Grazing animals; and
- harvesting from private land (Forster, 2010).

There are no measures currently taken to specifically reduce these threats with respect to this species (Forster, 2010).

Department of Environment and Science Species Profile notes that *Livistona nitida* requires accurate survey to determine the number of subpopulations, geographical range, area of occupancy, and number of individuals. In addition as there is little or no information available on the genetics, reproductive biology, dispersal, recruitment or population structure of this species, research into these areas is also recommended (Forster, 2009).

3.3 Mitigation Matters

- Monitor known palm locations to identify and manage threats;
- Raise community awards of population location (can be achieved through signage on the walkway;
- through the reserve- using the pathway as an educational mechanism to raise community awareness of the palm and its near threatened conservation status);
- Control invasive weeds;
- Develop and implement a fire management strategy (ensure any future burn regimes do not impact the palms location in the reserve or juvenile palms growing from seed dispersal);
- Local Government land managers informed of the existence of this species, basic ecology and its locations;
- Protective fencing around emerging juvenile plants;
- Monitor populations after clearing activities

4. Potential Impact Risk and Mitigation Measures to be Adopted to Reduce Potential Risk to Protected Plants Onsite

A risk matrix has been developed for the project with risk and associated mitigation actions to be implemented onsite.

Species conservation advice was used to assist in Impact Management Planning for the project as well as advice from the QLD Herbarium.

Table 1: Project Overview: Risk to the Protected Plants at the Work Locations from Operational Works and the Mitigation Strategies to Implement

Risk/Potential Impact	Likely to Occur for the Project	Mitigation Strategies
Knowledge of where protected plants are onsite- missed locality of some plants due to small size (recruiting juveniles and high-density understory grasses within the pathway location adjacent to Partridge Drive	Unlikely due to comprehensive surveys and mapping of locations covered prior to operational works by site contractors	• Comprehensive protected plants surveys conducted onsite to determine species absence/presence and density within the project area and adjacent impact area. • 19 juvenile plants (indicating dispersal from birds) onsite have been and 1 mature plant has been recorded onsite • Exclusion zone fencing will be installed prior to any operational works to ensure all protected plants are located and impacts are avoided and mitigated. • All staff to be trained in IMP mitigation measures prior to operational works commencing again onsite, and ensuring all contractors are aware of what the PP look like.
Accidental impact of protected plants by plant, equipment or vehicles during operational works	Low if TPZ/Exclusion Zone Fencing is installed and used correctly.	• Ensure “No Go” signs and exclusion zone fencing in accordance with Matt Ducan’s • Exclusion fence construction to ensure no trampling or direct impacts • Daily site monitoring of the protected plants onsite to ensure their health and growth is not impacted by operational works (check for dust levels on the leaf, check for sedimentation or increased/decreased water due to soil profile disturbance or mitigation measures of water applied to the area for dust suppression • IMP measures applied to site by required personnel to ensure appropriate mitigation measures and setbacks from protected plants to ensure their protection and continued health in the wild. • Photos of Exclusion Zone Fencing and Signage installed to be submitted to DES as evidence of compliance prior to operational works commencing onsite. Photo monitoring of plants before and after

		operational works to be submitted to DES to illustrate no indirect or direct impacts have occurred to the protected plants.
Impact from disturbances (fire, flood, weeds, herbivory) during works	Low after mitigation strategies and protective fencing is installed	• Ensure operational works are paused in there is a high intensity rainfall event forecasted, appropriate sediment and erosion control is in place onsite for stock piled material such as silt fencing, covering stock piles to secure them. • Equipment and machinery should be cleaned before moving to significant sites, particularly when machinery is moving between native vegetation and weed-infested areas • Do not allow pest species or weed and seed material to enter the site from operators machinery, plant or vehicles, Ensure all plant and equipment are weed free and clean prior to works commencing.
Inadequate knowledge of species ecology and biology	Possible risk of misidentification or unknown condition that required Impact Management Strategies	• With the other similar species and desktop research and study of threat abatement strategies for the species as well as adopting threat abatement and mitigation measures based on conservation advice for the species (NC Act)
Soil disturbance onsite resulting from excavation impacting the species through increased sedimentation	Low if the mitigation measures are applied and followed	• Soil disturbance and general intrusion outside of the designated clearing will be kept to a minimum as disturbance will encourage weed capable of competing with and disturbing stable native communities • Sediment and erosion control measures for stockpiled material onsite such as silt fencing • Do not store any materials or soil in exclusion zone area • Monitor operational area and individual protected plants after rainfall to ensure sediment has not moved from the construction area into protected plant area (exclusion zone) if it has -removal of the sediment to reinstate the original landform and soil profile conditions will be required.

		• Monitor protected plant drip line to ensure no erosion, scouring, or additional sediment has impacted the drip lines. • Photo monitoring of the protected plants immediately prior to construction will be used as a baseline for daily monitoring during operational works to ensure no negative impacts *direct or secondary) has occurred as a part of the project works. • Any additional soil erosion or rill erosion or runoff associated with the operational works will be rectified through levelling of the soil after operational works are completed- mulch can be laid on freshly exposed soil trenches if high precipitation events are forecasted to secure the area and prevent sedimentation or erosion impacting the protected plants. • Sensitive areas that are within 10m of the protected plant or other native vegetation can use reduced soil exposure areas by working in 20m sections to reduce soil spoilage and directly loading excess soil into trucks and designated stock pile areas outside of TPZ areas or environmentally sensitive areas. • The double excavation method- to minimize impact-by parking machine in safe zone and using the reach of the excavator to the site “impact area” instead of creating multiple tracking zones across a wider soil exposure-work area.
Dust covering the plants leaves could reduce growth capabilities	Low if mitigation measures are applied	• Dust suppression control methods will be utilised onsite which will reduce the risk of dust covering the adjacent protected plants • Daily monitoring of the protected plants during operational works to determine if there is a light film of dust covering the plants, a light watering early in the morning or at dusk will ensure the plants are not negatively impacted or photosynthesis is altered for the species. • Cover and secure sediment piles adjacent to the work area if high winds are expected onsite

Post operational works impacts on the protected plants from increased disturbance	Low if the mitigation measures are applied	• Continued monitoring of the Protected Plants within the reserve location when checks for the operational work area are conducted. • Weed control to be conducted across the 3 locations of works located adjacent to the PP to ensure the low disturbance from soil excavation • does not encourage weed incursion and potential higher density of weeds that would threaten the protected plants continued growth due to associated understory vegetation habitat loss.

Additional mitigation measures are discussed in more detail in the following sections of the IMP.

The expected success of the IMP mitigation measures is 100% success rate. This is due to detailed and comprehensive project management, project plaing, site specific training and tool box talks, staff and contractor awareness, protective fencing installed onsite to ensure no direct impacts to the plants occur and this IMP which addresses any indirect threats and the mitigation measures applied before, during and after operational works.

4.1 Exclusion Fencing

There is the potential for vehicles, machinery or equipment to damage/trample the protected plants during operational works, or accidental clearing.

Care will be taken in the stage 5 area of the project Castle Creek Bushland operational work location when clearing works of grasses and pruning of dead limbs of vegetation is undertaken to ensure that the machinery does not intrude beyond the approved width as clearing beyond proposed area can have significant impact on the *Livistona nitida* species.

Prior to operational works protective fencing will be installed to ensure the successful retention of plants in accordance with AS4790-2009 Protected of Trees on development sites and industry best practice for Palms- The TPZ of palms, other monocots, cycads and tree ferns should not be less than 1 meter outside the crown projection (juvenile species onsite some only 20cm in height some 1m in height so feature a small Structural Root Protection Zone).

The installation on designated exclusion fencing and signage as determined Tree Protection Zone protecting the Palms from any direct impacts resulting from operational works onsite a “No Go Zone “surrounding the juvenile plant area (5m radius from the protected plant and a 10m radius protection area for the single mature tree onsite)of Tree Protection Fencing will be achieved onsite. The tree protection fencing materials will comprise of a 1m high orange mesh secured with star pickets or orange bunting flags with signage displayed as “NO GO ZONE “on the outer perimeter of the fencing.

Also the adoption of specific excavation methodologies will be applied to all works undertaken to ensure protection to protected plants and reduce the risk of direct impacts resulting for machinery use in adjacent areas to the plants.

Example of TPZ signage

Example of TPZ Fencing

4.2 Indirect Impacts from Operational Works

There is a risk that indirect impacts from operational works such as soil, dust, sedimentation, erosion, weed incursion from weed material and soil matter being imported to the project site on machinery and vehicles could have negative impacts on the protected plants.

Soil disturbance and general intrusion outside of the designated clearing will be kept to a minimum as disturbance will encourage weed capable of competing with and disturbing stable native communities.

Specific modification to clearing operational works include:

- machinery parked or turned at a limited number of designated sites which do not impact native vegetation;
- materials similarly will be stockpiled at a limited number of designated sites which do not impact native vegetation;
- appropriate sediment and erosion control will be deployed for stockpiled material such as silt fencing;
- equipment and machinery should be cleaned before moving to significant sites, particularly when machinery is moving between native vegetation and weed-infested areas;
- all vehicles, plant and machinery to be free of weed and soil material All vehicles, plant and equipment must arrive to site clean and will be checked to ensure they are weed/soil/plant material free.
- any debris from clearing operations will be disposed of in a manner that does not affect native vegetation, unless it is useful as habitat for wildlife or is scattered sparsely amongst the remaining vegetation;
- use of low impact methods of clearance where possible such as minimal ground disturbance, cutting cleanly rather than breaking branches, slashing, trimming, mowing, or rolling to reduce potential weed invasion and erosion problems;
- clearing to begin with clean machinery in areas of less degraded vegetation and work towards the more degraded sites to assist in the prevention of weed spread;
- Dust suppression control methods will be utilised onsite and use of a water truck to wet down locations of work will reduce the risk of dust covering the adjacent protected plants

Specific modification to operational works to mitigate risks to protected plants;

- monitoring of threatened species before and after operational works;
- installation of exclusion fencing to identify sites with threatened plant species allowing machinery to easily avoid impact to those plant;
- monitoring of protected plants to ensure to indirect impacts are occurring such as excess dust settling on the plants- if excess dust is observed on the monitoring checklist generated for site- appropriate management action will be undertaken- watering the plants to remove excess dust early in the morning or dusk;

4.3 Site Mitigation Conservation Objectives

Objective 1: : No impact on the species will occur as a result of continued operational works onsite, with a program focus of avoidance and threat mitigation.

Objective 2: Protection measures for plants outside of the clearing permit application (permit for clearing protected plants) through installation of protective fencing around the species to be retained (star pickets and bunting) to ensure a safe exclusion zone is delineated during operational works.

- A minimal impact operational works method has been selected for the project, the width of the foot path is the only soul disturbance area with minimal tracking in and out of the site by machinery;.
- Protective fencing with exclusion zone signage will ensure no direct impact from machinery, stockpiles or other site impacts occur during works;
- All contractors are to be inducted and made aware of the locations of the near threatened plants, ensure the complete the site-specific checklist stating the mitigation measures and controls in place for protecting the species;
- All staff to be trained in IMP mitigation measures prior to operational works commencing again onsite, and ensuring all contractors are aware of what the PP look like;
- No stockpiles, equipment or machinery is to be stored in close proximity to the protected areas of the Palm due to elevated dust levels, possible unintended impacts on the species, fuel leaks etc.
- If high levels of dust occurs onsite and monitoring of the species indicated a covering of dust over the plants leaf, then the plants will require a wash down to ensure plant photosynthesis process is not interrupted. It is recommended at the end of operational works the species in close proximity to the site are washed down to ensure long term population growth and health;

If introduced or new weed incursions to the site that could impact the species. Management strategies will be developed to deal with any follow-on impacts on the protected plants.

5. Reproduction and Recovery of the Species

There is little research on the reproductive ecology of the *Livistona nitida* specifically, however the species directly seed after flowering and flowers from August to December and fruits from November to March (Queensland Herbarium, 2012).

No fauna predation was recorded for the fruit/seed pod.

Heat has a negative impact on seed setting and juvenile species occurrence and density in the wild. Over grazing can also have the same impact. Fire is a controlled action for a control burn or mosaic style cool burn in association with the reserve requirements of the lot that could occur onsite. With the high degree of residential homes along Partridge Drive and Castle Creek both bordering the location of protected Palms, the risk of uncontrolled bushfire or burns is low.

During incidental driving through the township of Theodore, more than 20 Palms have been incidentally observed on the banks of the Dawson Creek, a range of Mature palms were sighted from the road. Additional protected plant surveys in the Dawson Creek riparian area outside of the township would certainly record additional Livistonia nitida species.

6. Impact of Operational Works on the Protected Plants in the Wild

The range of mitigation measures applied in the IMP as well as the zero net zero net impact on the subpopulation. machinery parked or turned at a limited number of designated sites which do not impact native vegetation;

- materials similarly will be stockpiled at a limited number of designated sites which do not impact native vegetation;
- equipment and machinery should be cleaned before moving to significant sites, particularly when machinery is moving between native vegetation and weed-infested areas;
- any debris from clearing operations will be disposed of in a manner that does not affect native vegetation, unless it is useful as habitat for wildlife or is scattered sparsely amongst the remaining vegetation;
- direct replanting of the impact area to ensure the “like for like” outcome for the species removed from clearing works already undertaken.

installation of roadside exclusion to identify sites with threatened plant species allowing machinery to easily avoid impact to those plant;

- use of low impact methods of clearance where possible such as minimal ground disturbance, cutting cleanly rather than breaking branches, slashing, trimming, mowing, or rolling to reduce potential weed invasion and erosion problems.
- clearing to begin with clean machinery in areas of less degraded vegetation and work towards the more degraded sites to assist in the prevention of weed spread;

Excluded and restricted activities within 20m of the protected plants have been listed in the below section to ensure the risk of potential direct or indirect impacts to the protected plants are avoided and effectively mitigated and managed as a part of the project.

Restricted Actions:

- Any non- approved construction works
- Any non-approved excavation or cultivation of the ground
- Any non-approved storage
- Parking of vehicles and plant
- Refueling
- Dumping of waste
- Wash down and cleaning of equipment
- Placement of fill
- Lighting of fires Any non- approved soil level change
- Temporary or permanent installation of utilities and signs
- Physical damage to the plants

7. Plant Species Recovery

The recovery of the species required further protected plant surveys to determine the extent of the *Livistonia nitida* in the surrounding landscape for the wider Dawson Creek area. The number of juvenile species recorded during Spectrum Environmental Surveys is a very positive indicator for the species.

Objective 1: Increase knowledge of extant populations through further surveys of known populations and identification of new populations in the wider Theodore area.

Objective 2: Detailed mapping and submissions to Wildnet will ensure awarded conservation and protection of the species in the local area

Objective 3: Reduce threatening Processes locally- manage fire regime in the reserve appropriately to reduce high temperature burns too frequently

Objective 4: Research into reproductive biology of the species- to understand pollination processes, seed dispersal, reproductive ecology and population dynamics.

Objective 5: Investigate a rehabilitation strategy for direct planting of seeds and propagation for the site for future management strategies. Further conservation plantings in the local area and possibly council reserves.

The Impact Management Plan produced for future operational works for the Pipeline installation to ensure the short term and long-term conservation values are met, awarding protection for the *Livistonia nitida*.

The avoidance strategies applied to the project site of setback of pathway alignment from the protected plants location (more than 10m) and configuration changes such ensures zero plants require removal, producing a zero net loss of the protected species onsite and affords an excellent level of protection for the species occurring in adjacent areas to the operational works area.

8. References

Atlas of Living Australia. (2020), multiple species profile searched for all PP listed to be likely, known or possible to occur within the study site

Auld, T.D., Keith, D.A. & Bradstock, R.A. (2000). Patterns in longevity of soil seedbanks in fireprone communities of south-eastern Australia, Australian Journal of Botany, 48.

Australian Native Plants Society. (2020). Grevillea translocation and propagation. Native Species Series.

Department of Environment Water and Natural Resources (2012). 'Guidelines for the Management of Roadside Vegetation', South Australia.

Department of Parks and Wildlife (2014). 'Foote's Grevillea (Grevillea calliantha) Interim Recovery Plan 2014 - 2019', Western Australia.

Forster, P. (2009). Conservation Status Assessment for Livistona nitida Rare and Threatened Species Technical Committee November 2010.

Hnatiuk, R.J. (1977). Population structure of Livistona eastonii Gardn., Mitchell Plateau, Western Australia. Australian Journal of Ecology 2: 461-466.

Maher, J.M. (1996). 'Understanding and Managing Soils in the Stanthorpe-Rosenthal Region', Department of Natural Resources, Brisbane.

Neldner, VJ, Wilson, BA, Thompson, EJ and Dillewaard, HA (2012). Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland. Version 3.2. Queensland Herbarium, Environmental Protection Agency, Brisbane.

Olde, P. and Marriott, N. (1995). 'The Grevillea Book Volume 3: Species M-Z'. Kangaroo Press, Sydney, Australia

Palmpedia (Online) Livistonia nitida (2022) ://www.palmpedia.net/wiki/Livistona_nitida

Queensland Government. (2023) Clearing of protected Plants. https://www.qld.gov.au/environment/plants-animals/plants/protected-plants/clearing

Queensland Herbarium (2012). Specimen label information. Queensland Herbarium. Accessed 04/01/2012.

Rodd, A.N. (1998). Revision of Livistona (Arecaceae) in Australia. Telopea 8 (1): 96.

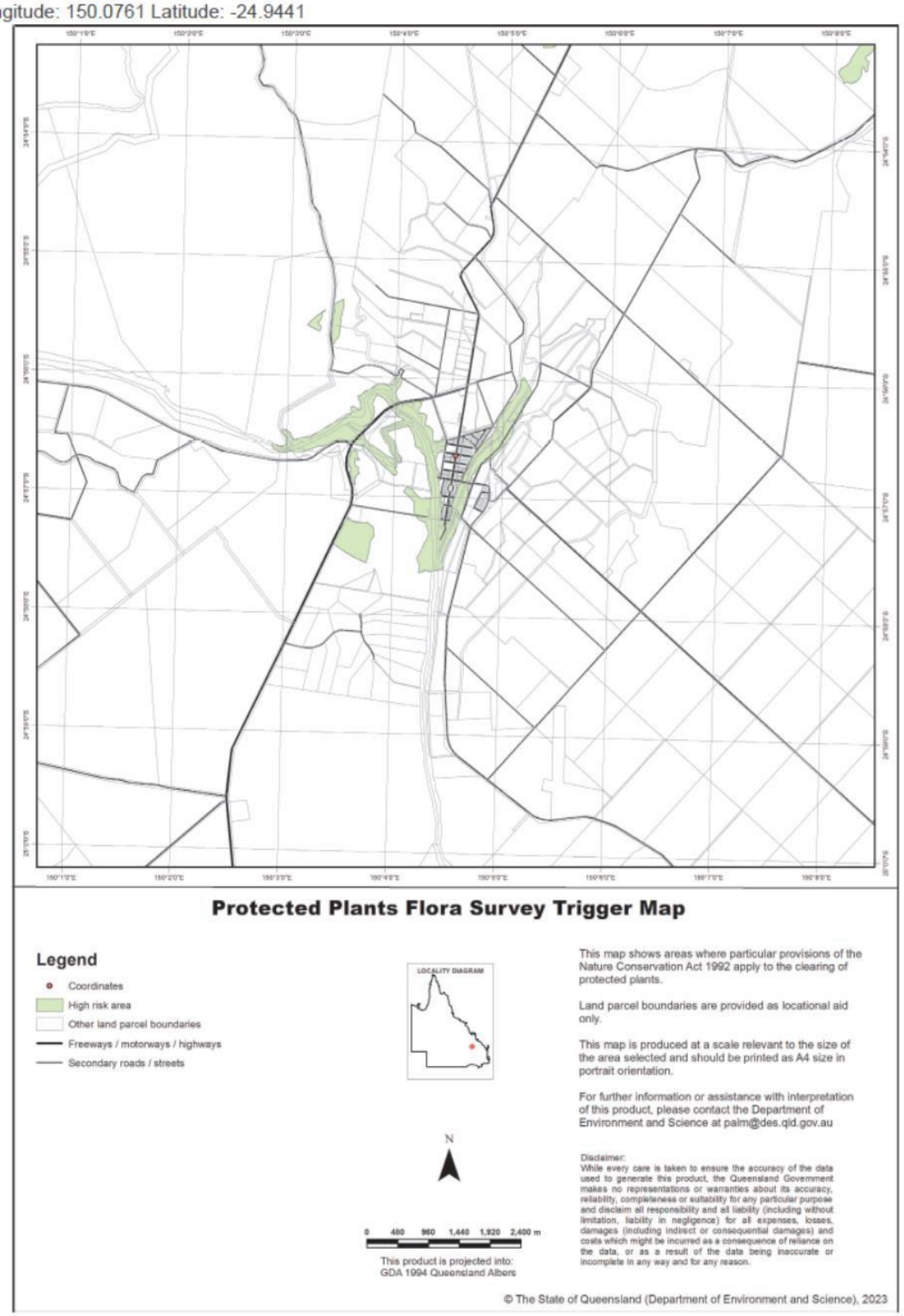
Rymer. R. (2006) University of Wollongong Seed Dispersal, Reproduction and Pollination in the Persoonia Species. file:///C:/Users/Spect/Downloads/02Whole.pdf

Vallee, L, Hogbin, T, Monks, L, Makinson, B, Matthes, M & Rossetto, M 2004, Guidelines for the Translocation of Threatened Plants in Australia - Second Edition, Australian Network for Plant Conservation, Canberra.

9 Appendices

Appendix 1: Protected Plant Trigger Mapping Project lot

26/08/2023 12:43:12
Longitude: 150.0761 Latitude: -24.9441



Check list of IMP Measures Applied to Operational Works Onsite

Site Operational Works Checklist Livistonia nitida Checklist

Mitigation Measures Notes	Compliant	Non-Compliance	Responsibility
Protective Fencing In place for PP not being impacted			Site Manager
Protective Fencing has Signage for Exclusion Zone in place			Site Manager
Protective Fencing Secure prior to works starting			Site Manager/
All staff has signed the site-specific induction detailing activities excluded from site where PP exclusion zones fencing and signage			
All staff signed site induction with a map of PP locations in and adjacent to work area			Contracted Workers
Protected Plants Clearing Permit copies onsite at all times			Site Manager/ Contracted Workers
PP retained onsite checked for dust coating, unintentional impacts direct or non-direct activities in the work site			Site Manager
Daily check that all Approval Conditions of the Protected Plants Clearing Permit has been met			Site Manager
Actions taken to rectify any issues with PP once notified to DES officer has occurred, explaining the issues and seeking Advice for the correct outcome i.e.. Dust visibly built up on protected plant leaves- wet down plants to ensure dust is removed.			Site Manager