Independent
Arboricultural
Services

Arboricultural Impact Assessment

Prepared For: Economic Development Queensland

53 Seventeen Miles Rocks Road
Oxley 4075

4th May 2021

IAS7460

Independent Arboricultural Services - Disclaimer

The material contained in this document has been prepared on an independent basis free of any bias and represents the honest opinion of the consulting arborist.

Tissue or soil samples have not been collected nor submitted for testing unless otherwise stated. Excavation is limited to minor earthworks and we submit this assessment on the basis that all data is based on visual inspection of the tree/s and its/their location, species, health and condition at the time of writing unless otherwise stated. Measurements and tree locations noted in this report are approximate and have not been determined by survey unless information and analysis has been provided by the consultant or such information is otherwise noted. Please request a more detailed arborist report if further information and analysis is required. Depending on site requirements, specific alternate specialist advice including engineering consultancy and certification maybe required in combination with this assessment. This assessment contains arborist advice and associated general information only and does not purport to provide other site-specific specialist advice such as engineering certification unless arrangement to source such advice for inclusion in this assessment has been requested and authorised.

This report containing opinions, advice and recommendations based on information and data gathered from site inspections carried out by personnel from Independent Arboricultural Services as well as information provided by the client and/or its representatives, is to be relied on by the client in that context. It is assumed that all such information provided to Independent Arboricultural Services is correct. All recommended arboricultural works detailed in this assessment including pruning of tree canopy or roots, tree removal, tree transplantation or other associated works including stump grinding or the application of any prescribed treatment shall be carried out in accordance with applicable standards including Australian Standards AS 4373-2007- Pruning of amenity trees and AS 4970-2009- Protection of trees on development sites.

The invoice for this report will be issued to the person or entity as per the address advised at the time of confirmation of appointment. Assessment in this report is based on plans provided at the time of confirmation of engagement and report preparation. Additional time required for re-assessment of report detail due to subsequent re-issue of plans after report preparation will be subject to an additional fee which will be charged at our hourly rate. This report shall not be conveyed to any third party including regulatory authority/s until full payment of this invoice is received by Independent Arboricultural Services and a finalised report has been issued unless agreement to do so has been granted.

Factors including the absence of historical records or local knowledge, recognition of the variability of the integrity of a tree as a naturally living organism as well as the impact of conditions within its surrounds to which it maybe subject including the impacts of mechanical force and the occurrence of weather events, do not allow an arborist to guarantee the age of a tree, or the length of time a tree/s may live or such time as it /they may fail. There is no warranty or guarantee, expressed or implied that the problems or deficiencies of the plants or property in question may not arise in the future.

Table of Contents

Document Tracking & Information

Project Name	Arboricultural Impact Assessment		
Project Arborist	Roger Rankine (AQF Level 8)		
Client	Economic Development Queensland		
Address	53 Seventeen Miles Rocks Road, Oxley 4075		
IAS Reference	IAS7460		
Prepared By	Roger Rankine (AQF Level 8)		
Checked By	Andrew Rankine (AQF Level 5)	**Date**	3rd September 2021
Revision	3		
Andrew Rankine ***Director*** Mobile: 0412 035 396	• Diploma Arb. (AQF Level 5) • TRAQ (Qualified) • Arboriculture Australia Registered Professional Arborist	• ISA Certified Arborist & Municipal Specialist AU-0269AM • QTRA (LIC#2768) • QAA Qualified Member	
Roger Rankine ***Director*** Mobile: 0408 161 015	• Diploma Arb. (AQF Level 5) • Grad Cert Arb. (AQF Level 8) • ISA Qualified Arborist (QL-0001A) • QTRA (Lic. 4988)	• TRAQ (Qualified) • Arboriculture Australia Registered Professional Arborist • QAA Qualified Member	
Stephen Catchpoole ***Consulting Arborist*** Mobile: 0400 473 500	• Diploma Arb. (AQF Level 5) • QTRA (Qualified) • Doctor of Philosophy in Forestry (PhD)	• TRAQ (Qualified) • Bachelor of Science Forestry • Bachelor of Science (Hons Botany) • QAA Qualified Member	
Mick Maher ***Consulting Arborist*** Mobile: 0400 606 640	• Diploma Arb. (AQF Level 5) • Cert IV Project Management • Cert III Conservation and Land Management	• TRAQ (Qualified) • Cert II Horticulture (Turf Management) • QAA Qualified Member	
Garry Rangi ***Consulting Arborist*** Mobile: 0418 793 534	• Diploma Arb. (AQF Level 5) • Cert III in Civil Construction; Plant Operations, Pipe Laying, Road Construction & Maintenance • Advanced Diploma of Civil Construction • Cert III Conservation Earthworks	• TRAQ (Qualified) • Diploma Horticulture • Diploma Project Management • Diploma Business Management • Associate Diploma (Wilderness Reserves & Wildlife) • Australia Registered Arborist • QAA Qualified Member	
Sam Gilbey ***Trainee Consulting Arborist*** *Mobile: 0400 229 587*	• Trainee Consulting Arborist (Diploma Arb. AQF Level 5 Commenced)	• Bachelor of Science in Ecology and Conservation Biology	

Contact Details
(07) 3399 5865
office@independentarb.com.au
accounts@independentarb.com.au
www.independentarb.com.au

Postal address
PO Box 287, Morningside QLD 4170

ABN
65 062 099 495

Abbreviations

QSG	Queensland State Government	**RPA**	Root Protection Area
DA	Development Application	**TMP**	Tree Management Plan
VPO	Vegetation Protection Order	**CMP**	Construction Management Plan
ULE	Useful Life Expectancy	**VMP**	Vegetation Management Plan
BLF	Building Location Footprint	**AS**	Australian Standard
BLE	Building Location Envelope	**AS 4373: 2007**	Pruning of amenity trees
TPZ	Tree Protection Zone	**AS 4970: 2009**	Protection of trees on development sites
SRZ	Structural Root Zone	**DBH**	Diameter at Breast Height

All comments and recommendations in this report have been determined in accordance with Australian Standards AS 4373-2007- Pruning of amenity trees and AS 4970-2009 – Protection of trees on development sites. All recommended tree work should be carried out in accordance with these standards.

Roger Rankine

Consulting Arborist

Map

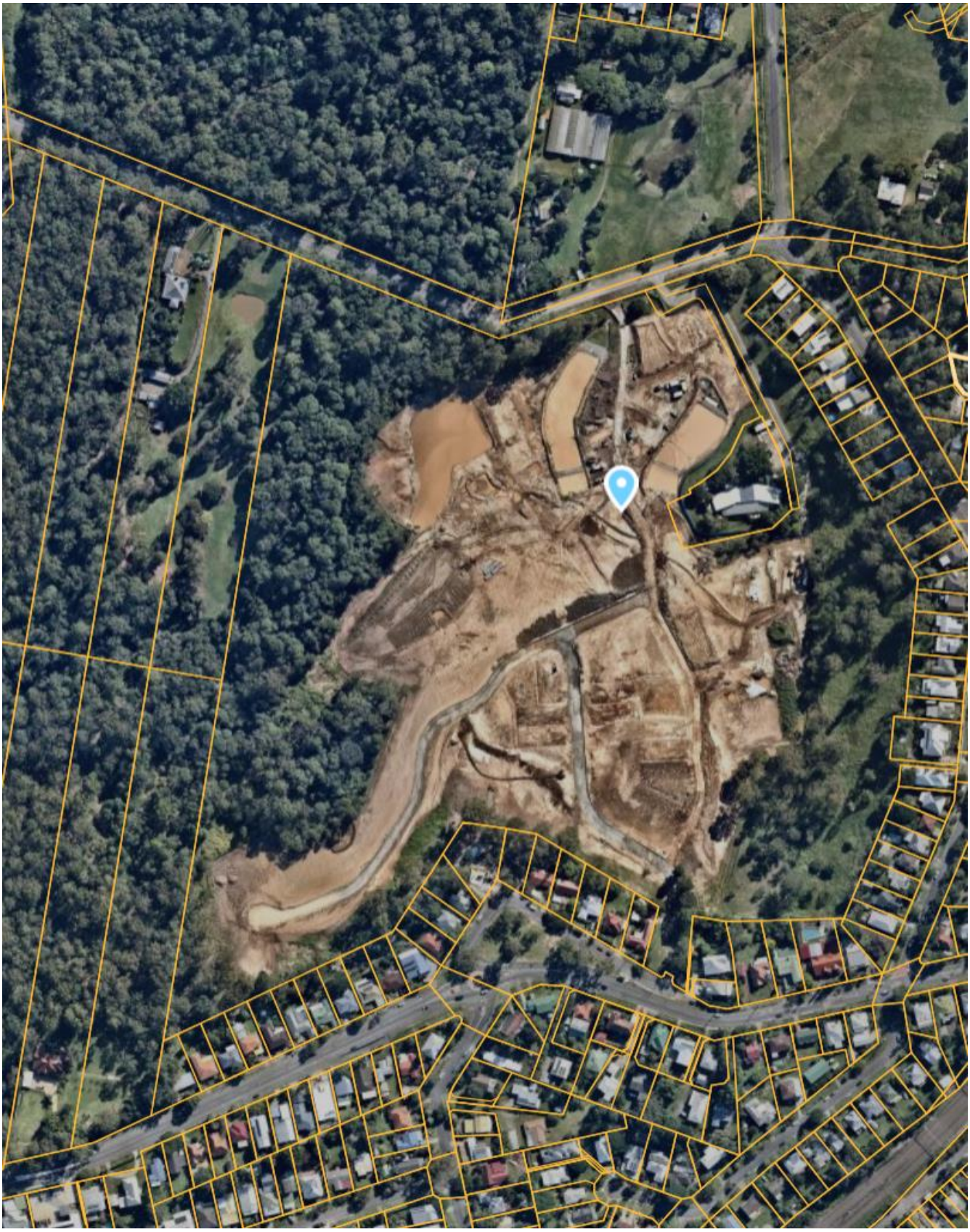


Figure 1: Subject Site (Nearmap 2021)

Introduction

This report is based on a visual inspection carried out from the ground on 16th July 2020 & 4th May 2021. No soil or tissue sampling has been conducted. Tree assessment and Qualitative Visual Tree Analysis has been carried out in accordance with TRAQ ISA guidelines. Data and information provided to the client by others has been incorporated into this report as appropriate.

All Arboricultural recommendations contained in this report have been determined in accordance with Australian Standards AS 4373-2007 - Pruning of amenity trees and AS 4970-2009 – Protection of trees on development sites.

For the purposes of this report reference to a Consulting or Project Arborist is held to mean an Arboricultural specialist who holds minimum Arboricultural qualifications of Dip Arb/AQF 5, appropriate professional insurances and has appropriate experience in the protection of trees on construction sites. Where tree work is specified, all recommended tree work is to be carried out in accordance with the above-mentioned standards by an appropriately trained and AQF qualified arborist practitioner/s with an up-to-date record of training and membership of a recognised Australian Arboricultural association, e.g. Qld Arboricultural Association (QAA), Arboriculture Australia (AA), or a recognised international Arboricultural association. No climbing spikes are to be used if pruning is to be carried out on live trees except in the instance of an emergency.

Qualifications of the report authors include Diploma of Arboriculture/AQF Level 5 and ISA Certified Arborist accreditation. Report authors hold current insurances and memberships including qualified memberships of Queensland Arboricultural Association (QAA), and Arboriculture Australia (AA) as well as current accreditation and membership of International Society of Arboriculture (ISA). Independent Arboricultural Services is a qualified registrant on the QAA Register of Consulting Arborists.

Executive Summary

Independent Arboricultural Services have been engaged by Economic Development Queensland to assess potential impacts to the nominated vegetation resulting from proposed re-development of the site located at 53 Seventeen Miles Rocks Road, Oxley 4075. Stephen Catchpoole & Sam Gilbey attended site on the 16th July 2020 & Roger Rankine (AQF Level 8) attended site on 4th May 2021 to undertake the assessment of the impact of the works.

The assessment of the impacts of proposed development near to tree 41 has been undertaken. Advice on both specific and general tree protection measures and Project Arborist Requirements have been detailed in this report. It is important as the design is refined, further reviews are undertaken by the Project Arborist and protection measures are further specified as required.

Incursion into the TPZ of Tree 41 is defined as minor incursion under AS4970-2009 Protection of Trees on Development Sites due to the proposed placement of fill within the TPZ.

As part of the design process and operational works and in order to minimise and mitigate any adverse issues for Tree 41 along with trees 38-40 & 421 it is recommended that the following is undertaken,

- Further assessment of the impacts as detail design is undertaken.
- Ensure all approvals and permits are in place before works commence.
- Undertake a pre-start meeting with contractors before works commence.
- Tree Protection Fencing is to be erected before works commence and audited by the Project Arborist (Min AQF Level 5).
- Supervision by a Project Arborist (Min AQF Level 5) and Fauna Spotter/Catcher of the approved tree removals.
- Any works proposed within the TPZ of retained trees requires supervision of a minimum AQF5 Project Arborist.
- Structural soil has been specified within the Tree Protection Zone of Trees and low-pressure water excavation (under the supervision of the Project Arborist for excavation that may be required as part of the proposed works.
- Plant Health Care program to be developed and implemented including supplementary watering as specified by the Project Arborist.
- Laydown areas and site shed/office locations are to be excluded from the Tree Protection Zones of retained trees.
- Route vehicles and equipment outside of TPZ's. If access is required within TPZ, mulch to a depth of 100mm and tree padding needs to be installed with the option of track mats as determined and signed off by a minimum AQF5 Project Arborist.
- Construction materials, spoil, stockpiles, tools and equipment are not permitted within the TPZ's of retained trees.

Arborist Comment

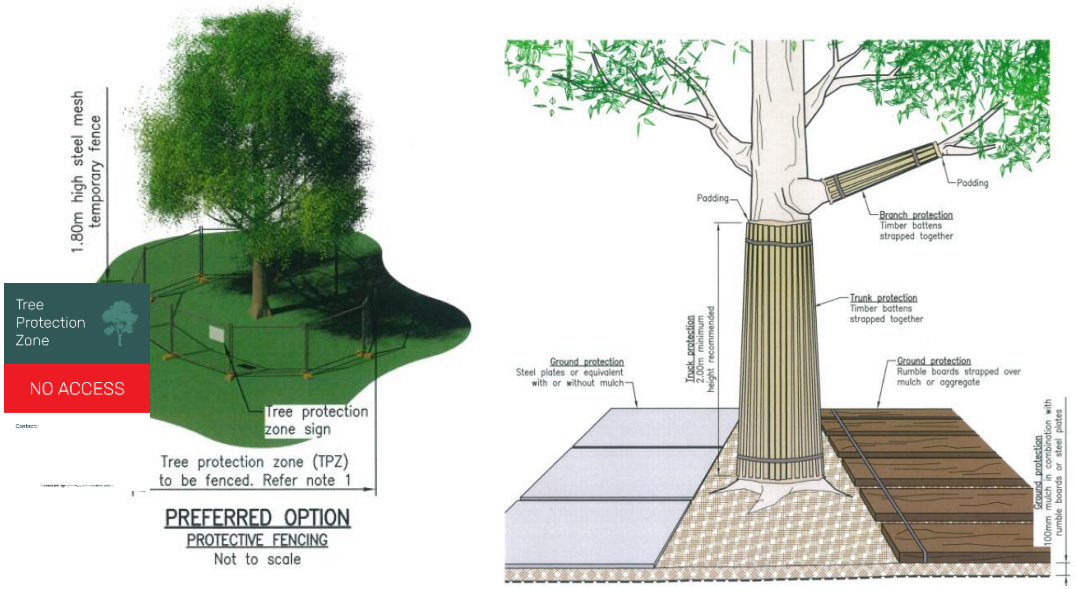
- **Protection of retained trees during construction works**
- **Impact of the proposed works on nominated trees**

Protection of Retained Trees During Construction Works

An exclusion zone is to be established along the perimeters of retained trees and cordoned off with a physical barrier of wire mesh fence, 1.8m in height, which is securely anchored. The role of these fences is to prevent any damage to the complete tree including root system (SRZ & TPZ), stem and branch structure as well as the crown or canopy. Alternatively, and on approval of a minimum AQF5 Project Arborist, plastic mesh fencing, 1.2m in height, secured with star pickets and caps with straining wire can be utilised. All TPZ fencing will require appropriate signage to signify the relevant protection zones. This will require audit and sign off prior to operational works onsite.

Impact of The Proposed Works on Nominated Trees

On review of the current plans it is determined that there is capacity to retain Tree 38, 39, 40, 41 & 421. Due to the high level of incursion by the proposed fill, it is strongly recommended that all work is supervised by the Project Arborist and fortnightly auditing of the tree is undertaken during works to retain and protected in accordance with AS4970:2009 - Protection of trees on development sites.



Tree Protection Fencing to be utilised. Where works will be undertaken close to and within Tree Protection Zones specific tree protection measures to be utilised a directed by the project Arborist.

Specific protection of Trees during construction works.

No cut or surface scraping to occur within the TPZs of Trees *41.* It is recommended to utilise Level 2 structural soils for all required fill/ All works within the TPZ of the retained trees is to be supervised by the Project Arborist and documented with photographic evidence for plan sealing.

Example of the use of Structural Soil

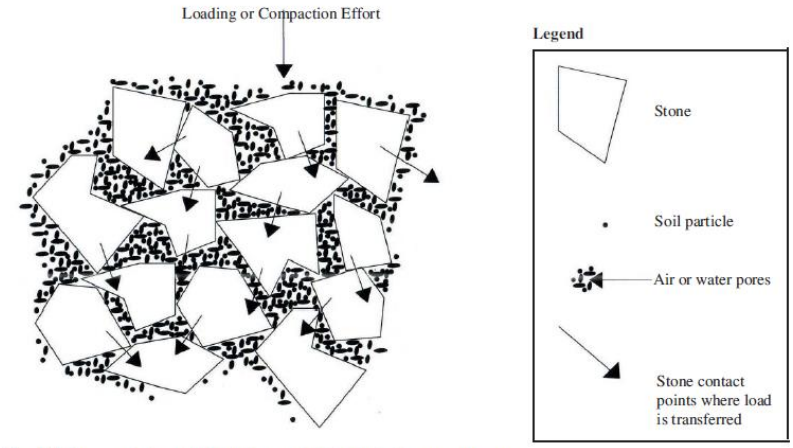


Fig.1.7 Conceptual diagram of CU-Structural Soil™ including stone-on-stone compaction and soil in interstitial spaces used as a base course for pavements.

Structural Soils – (Source: Cornell University)

Project Hold Points

Engage an AQF5 minimum Project Arborist during the project life.

- Once tree protection fencing and signage has been established and finalised. Project Arborist (minimum AQF Level 5) to audit and sign off.
- Supervision of approved tree removals in conjunction with a fauna spotter.
- Any works within the TPZ of retained trees is required.
- If tree roots are encountered over 50mm in diameter outside of TPZ's of retained trees.
- Changes to the plans occur.
- On completion of the project to conduct a final audit and summary.

(Site audits/summary reports will be conducted at each hold point interval by the Project Arborist)

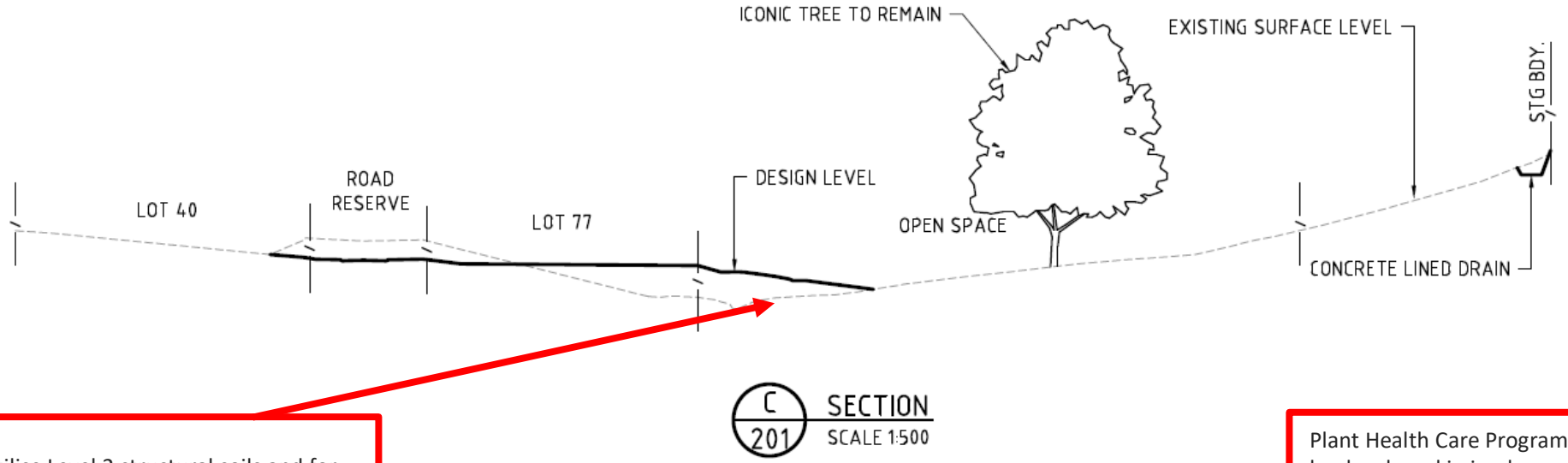
Project Arborist Requirements	
1.	Pre-Start Inspection and Audit of Tree Protection Fencing Before Works Commence
2.	Any required Tree Works to be undertaken by a minimum AQF Level 3 Arborist under the Supervision of the Project Arborist (Min AQF Level 5). Tree Services Company to be a member of Queensland Arboricultural Association or Arboriculture Australia.
3.	All works within the Tree Protection Zones of the retained vegetation to be supervised by the Project Arborist (Min AQF Level 5). Audit Reports to be completed and submitted by the Project Arborist. Any below ground incursion to be water excavated under low pressure, under the supervision of the Project Arborist.
4.	All works to be excluded from the Structural Root Zone (SRZ) and supervised if located within Tree Protection Zone.
5.	The Project Arborist to be consulted if changes to plans are made that affect any retained vegetation.
6.	At the Completion of works, Project Arborist to undertake a site assessment and an audit report compile of any further remedial actions required.

Plant Health Care Program

1. Soil and leaf samples to be taken before works commence for nutrient and biology testing.
2. Implementation of the recommendations to be undertaken by the Project Arborist before works commence
3. Supplementary watering to be undertaken as specified by the Project Arborist (AQF Level 5)
4. Aged style forest mulch (aged minimum 12 weeks) to be placed around the tree (to the drip zone) to a depth of 75-100mm.
5. Minimum monthly auditing of the trees by the Project Arborist with audit reports to be compiled and submitted as part of plan sealing.
6. Quarterly re-testing of soil and leaf samples to be taken nutrient and biology testing.
7. Mulch to be reapply every 6 months or are specified by the Project Arborist.
8. Final soil and leaf samples to be taken at the completion of works along with re-application of mulch. Any deadwood to be removed in the canopy of the tree in consultation with Toowoomba Regional Council. Any pruning works to be undertaken by minimum AQF Level 3 Arborist under the supervision of the Project Arborist (AQF Level 5).

Subset Plan

TPZ fencing and signage to be erected and compliant with AS4970:2009.



Utilise Level 2 structural soils and for any areas of fill within the TPZ of tree 41. No Excavation below current natural ground level

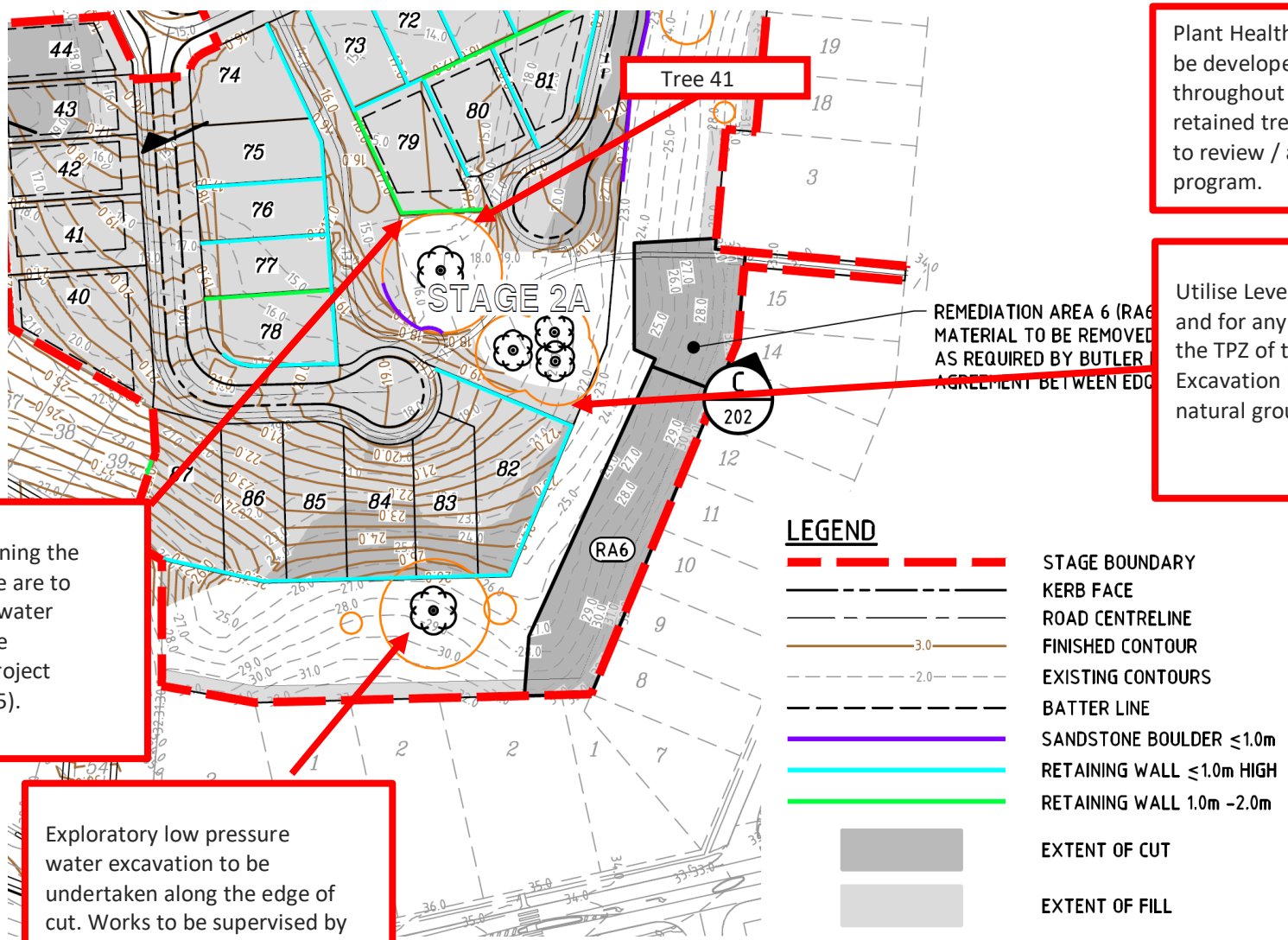
Plant Health Care Program to be developed in implement throughout the project for the retained trees. Project Arborist to review / administer the program.

Tree Protection Plan

TPZ fencing and signage to be erected and compliant with AS4970:2009.

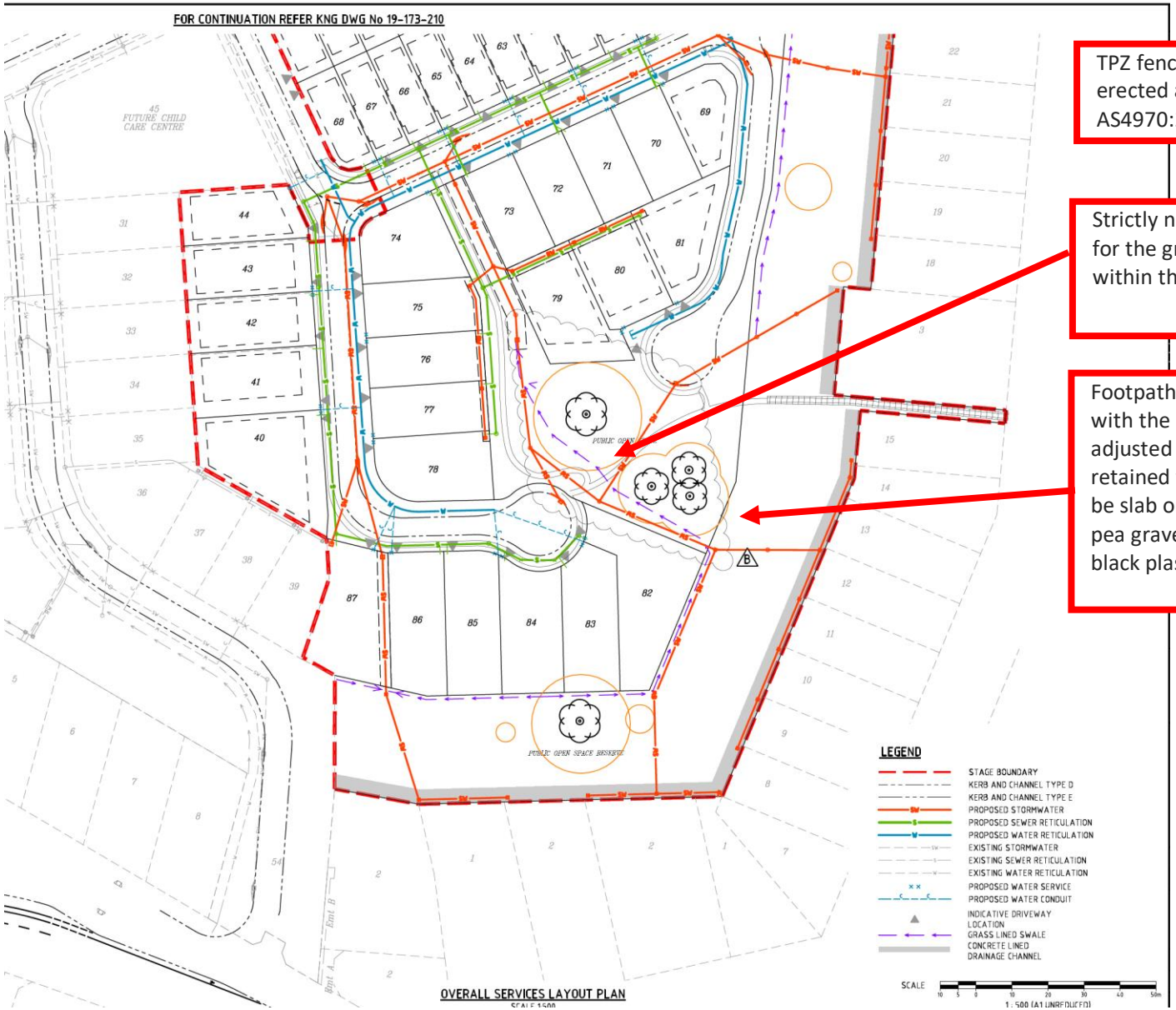
Plant Health Care Program to be developed in implement throughout the project for the retained trees. Project Arborist to review / administer the program.

Utilise Level 2 structural soils and for any areas of fill within the TPZ of tree 41. No Excavation below current natural ground level



Piers for lot 79 adjoining the Tree Protection Zone are to utilise low pressure water excavation under the supervision of the Project Arborist (AQF Level 5).

Exploratory low pressure water excavation to be undertaken along the edge of cut. Works to be supervised by the Project Arborist (AQF Level 5)

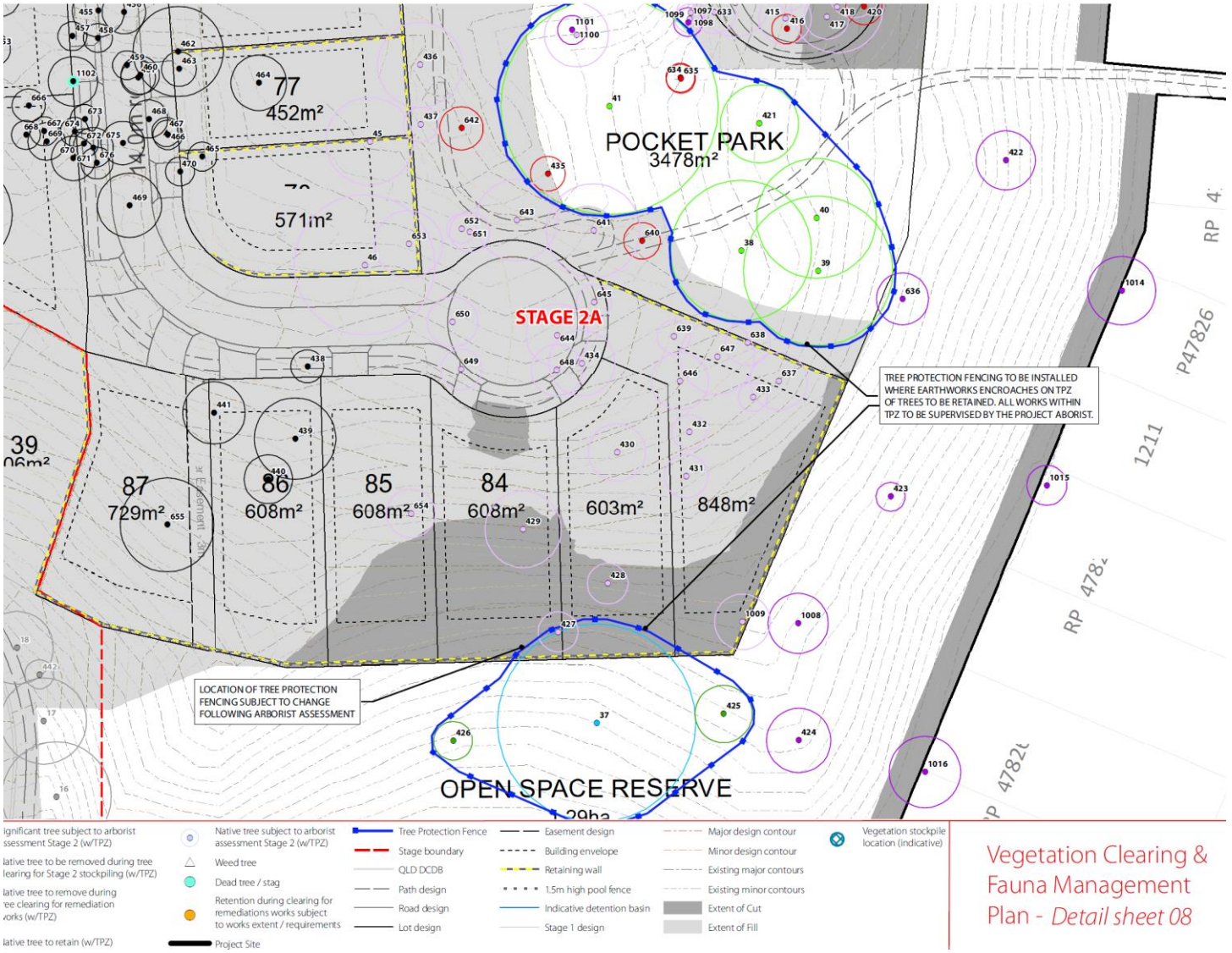


TPZ fencing and signage to be erected and compliant with AS4970:2009.

Strictly no excavation or filling for the grassed line swale within the TPZ of Tree 41

Footpath is to be confirmed with the Project Arborist and adjusted away from the retained trees. Footpath is to be slab on ground on a bed of pea gravel, lined with builders black plastic.

Subset Plan – VCFMP



Tree Detail

Tree No.	Botanical Name	Common Name	DBH (cm)	TPZ (m)	SRZ (m)	Height (m)	Spread (m)	Health	Form	Comment
38	*Eucalyptus tereticornis*	Forest Red Gum	810	9.7	3.0	33	12	F	T	Dieback in crown
39	*Eucalyptus tereticornis*	Forest Red Gum	860	10.3	3.1	27	14	F	T	
40	*Eucalyptus tereticornis*	Forest Red Gum	690	8.3	2.8	27	12	F	T	
41*	*Eucalyptus tereticornis*	Forest Red Gum	1480	15	4.5	32	8	F	T	Deadwood within the crown.
421	*Eucalyptus tereticornis*	Forest Red Gum	450	5.4	2.4	24	14	F	T	

*Tree data sourced from Saunders Havill tree retention plan and onsite visits undertaken by Independent Arboricultural Services.

Table Legend:			
Health	**Form**	**Aged Class**	**Further Detail**
G: Good	G: Good	J – Juvenile	DBH - Diameter at Breast Height measured at 1.4m above ground level
F: Fair	F: Fair	FTLM – Full to Late Maturity	DBH is the circumference divided by π
P: Poor	P: Poor	M – Mature	TPZ - Tree Protection Zone displaced as metres radius
D: Dead	T: Typical	S – Senescent	Note: TPZ - minimum area is 2.0m / maximum area is 15m

Tree Retention Recommendations

Tree No.	Botanical Name	Common Name	DBH (cm)	TPZ (m)	Impact	Recommendation
38	*Eucalyptus tereticornis*	Forest Red Gum	810	9.7	Major – Approximately 16.9%	Retain and protect – refer tree protection plan and all works within the TPZ are to be strictly supervised by the Project Arborist. Plant Health Care program to be commenced and audited by the Project Arborist. Supplementary watering to be undertaken as specified by the Project Arborist.
39	*Eucalyptus tereticornis*	Forest Red Gum	860	10.3	Major – Approximately 15%	Retain and protect – refer tree protection plan and all works within the TPZ are to be strictly supervised by the Project Arborist. Plant Health Care program to be commenced and audited by the Project Arborist. Supplementary watering to be undertaken as specified by the Project Arborist.
40	*Eucalyptus tereticornis*	Forest Red Gum	690	8.3	Minor – under 10%	Retain and protect – refer tree protection plan and all works within the TPZ are to be strictly supervised by the Project Arborist. Plant Health Care program to be commenced and audited by the Project Arborist. Supplementary watering to be undertaken as specified by the Project Arborist.
41	*Eucalyptus tereticornis*	Forest Red Gum	1480	15	Minor – 9.1%	Retain and protect – refer tree protection plan and all works within the TPZ are to be strictly supervised by the Project Arborist. Plant Health Care program to be commenced and audited by the Project Arborist. Supplementary watering to be undertaken as specified by the Project Arborist.
421	*Eucalyptus tereticornis*	Forest Red Gum	450	5.4	Minor – under 10%	Retain and protect – refer tree protection plan and all works within the TPZ are to be strictly supervised by the Project Arborist. Plant Health Care program to be commenced and audited by the Project Arborist. Supplementary watering to be undertaken as specified by the Project Arborist.

Tree Protection Measures and Guidelines

Note 1: TPZ perimeter fencing should be grouped where perimeters overlap and appropriate.

Note 2: Signage is to be installed in accordance with Australian Standard AS 4970-2009 – Protection of trees on development sites as illustrated below.

Protective Fencing

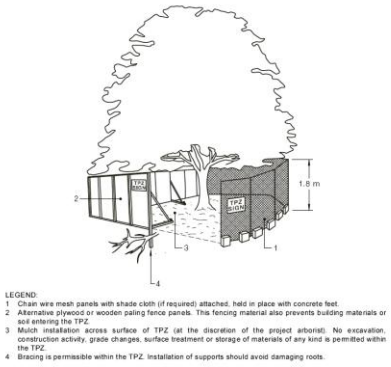


Figure 2

Examples of Trunk, Branch & Ground Protection

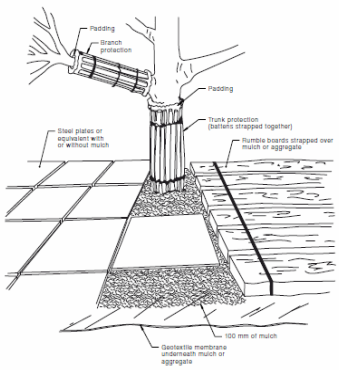


Figure 3

Tree Protection Zone Signage

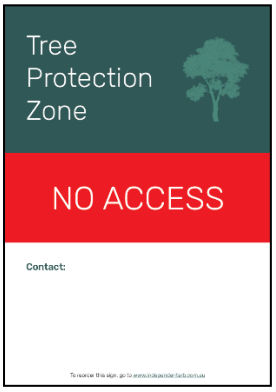


Figure 4

Low pressure Ground Excavation & Water Cutting

Figure 5

Figure 6

Figure 7

Figure 8

Example of Fauna Friendly Rigid Style Temporary Fencing

Figure 9

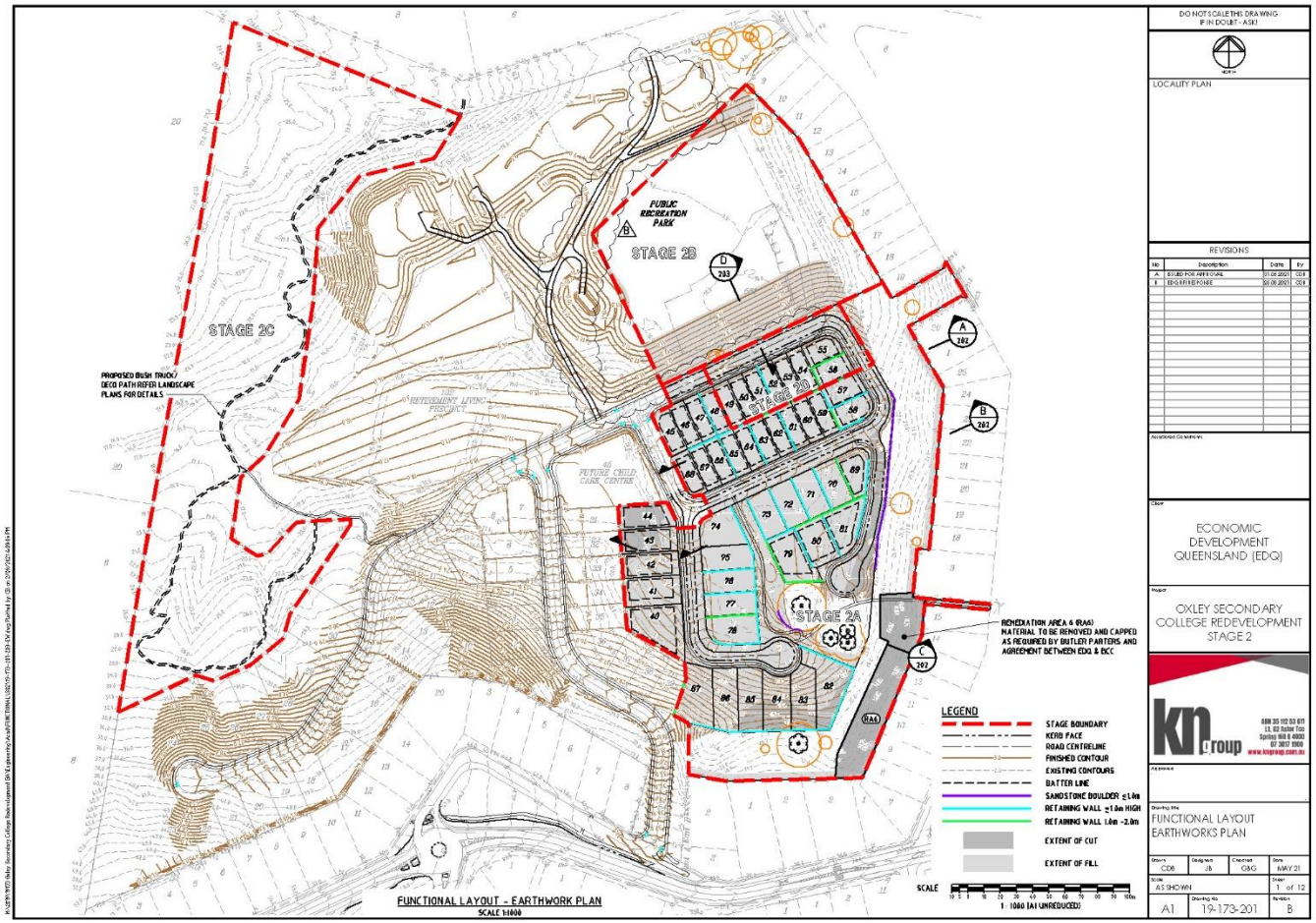
Figure 10

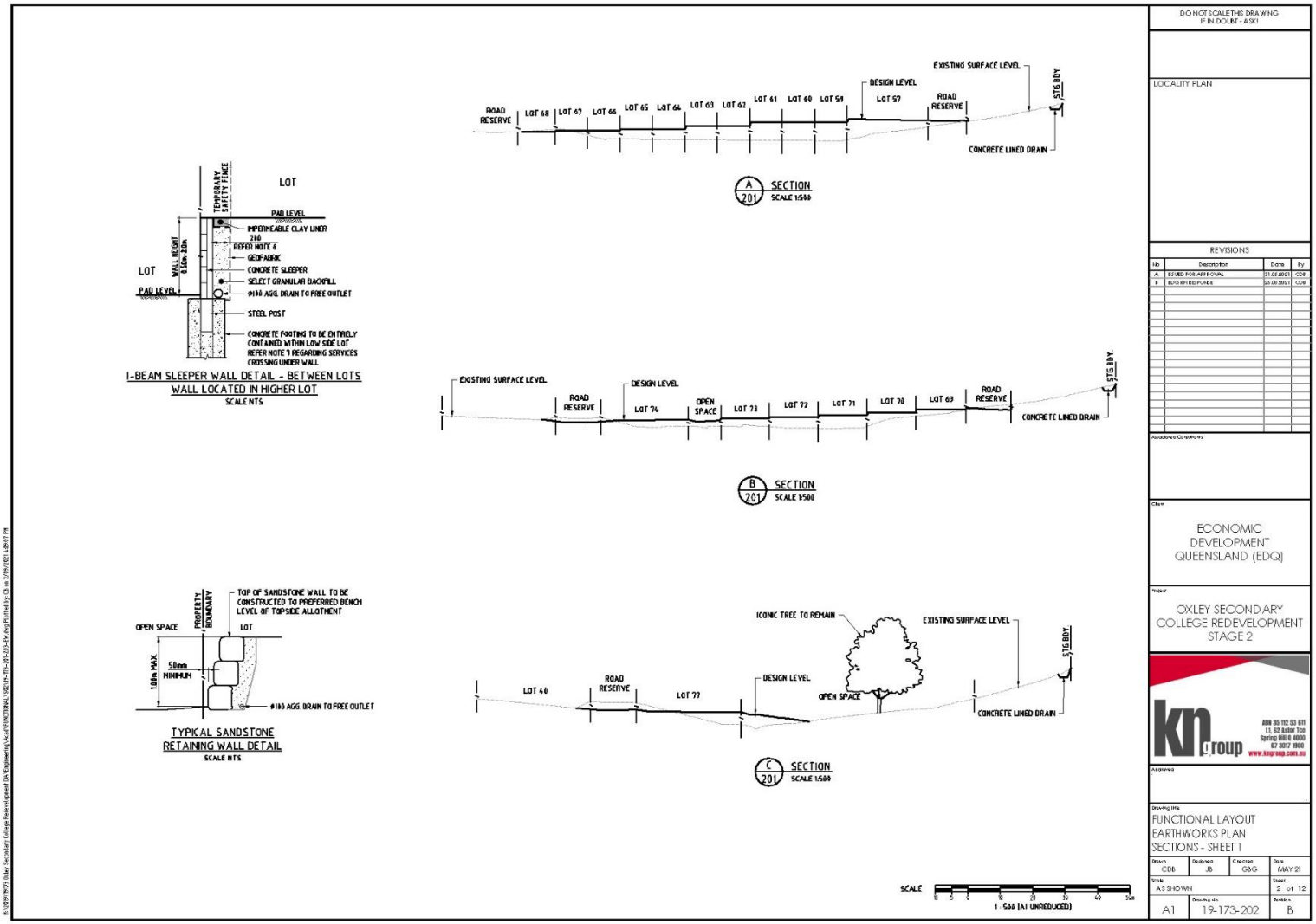
Source: AS4970-2009 Protection of Trees on Development Sites

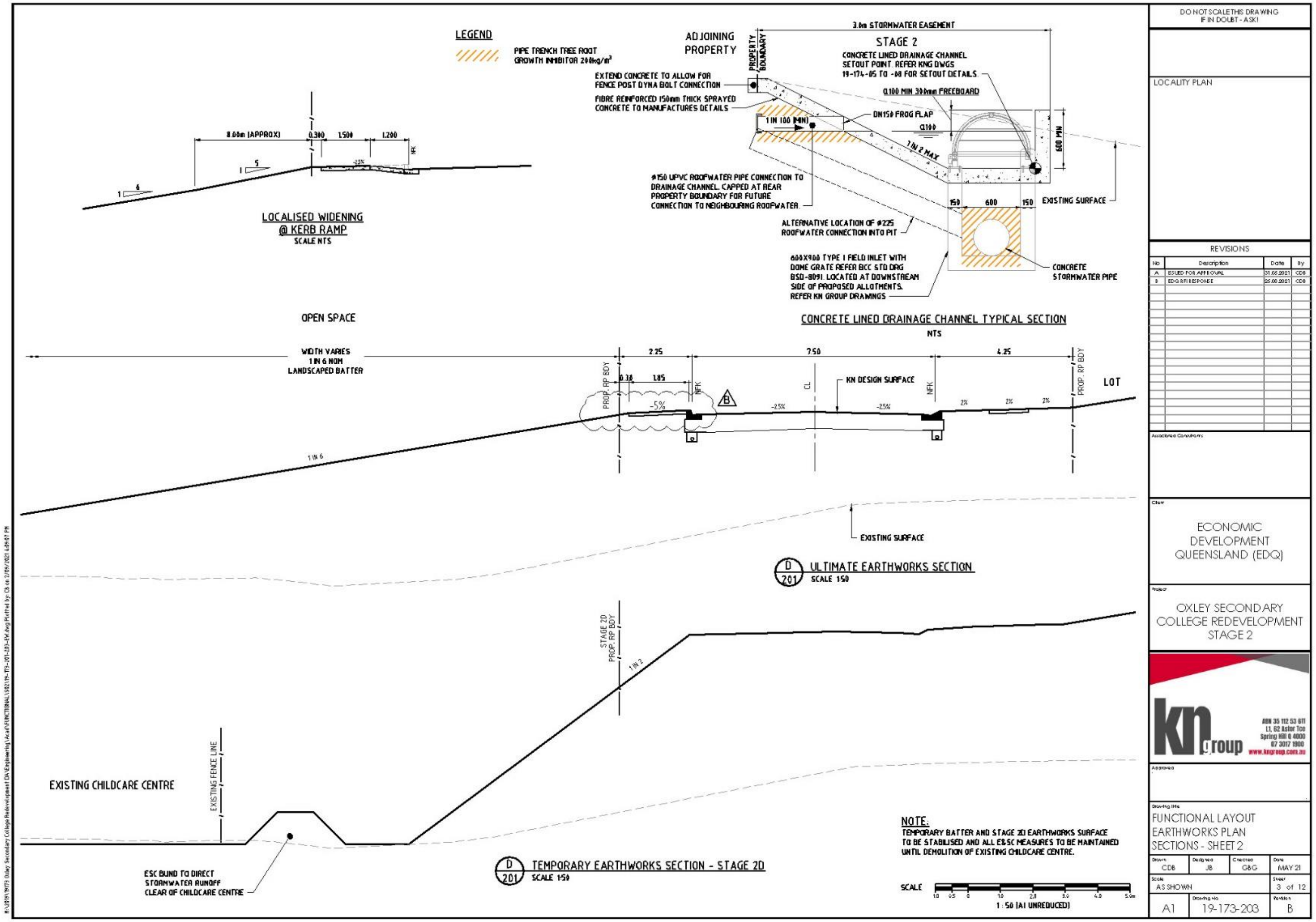
Tree Management Plan (TMP) – Works Progress: Development Phase

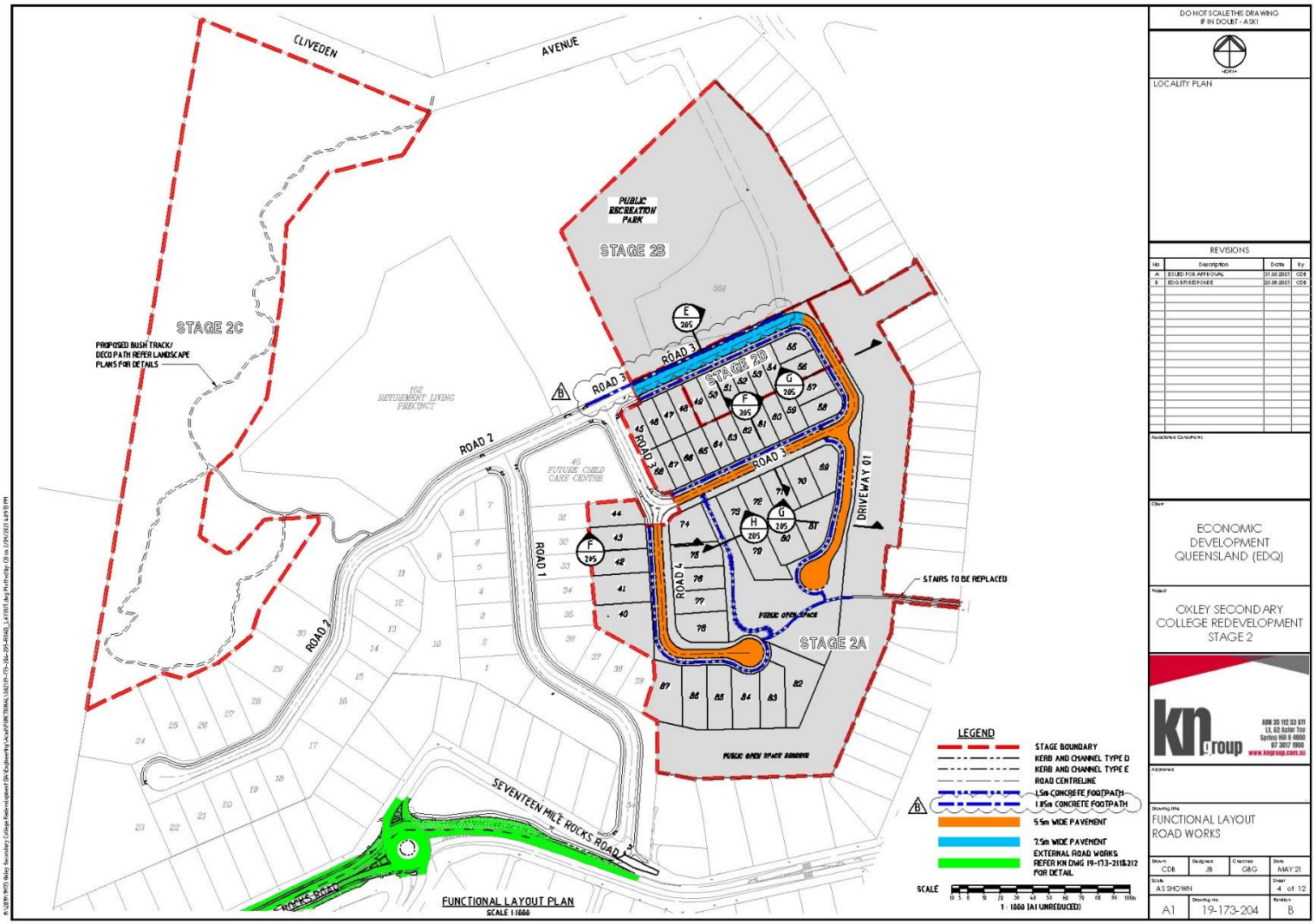
Stage	Tasks	Specific Outcomes
Pre-construction Phase		
Prepare and finalise Arboricultural Impact Assessments for submission to Council	Project Arborist to be appointed Review tree details in all approved Arboricultural reports following any new issue of plans	Submit Arboricultural reports including Arboricultural Impact Assessment for final Council Approval
Project Arborist to conduct Prestart Meeting with all representatives involved in construction	Prior to meeting: TPZ temporary protection/fencing installed **Arboricultural Report, TMP & Council approval copies to be included in CMP** and made available to onsite crews	Prestart Certification and approvals in place & available onsite with CMP
Commencement - Construction Phase		
Initial Site Preparation	Project Arborist to supervise all tree work. **Construction crew or others are not to remove any part of a tree.** Arborist prestart site inspection.	Compliance Certification of Arboricultural works for lodgement to Council Arborist certification of TPZ measures.
Prestart Toolbox Meeting	All relevant onsite crews to be briefed by Project Arborist prior to commencement of each work phase. Project Arborist must be notified and onsite at all times when construction works are within or close to TPZ. Note: Onsite attendance of Project Arborist is a condition for issue of Arboricultural Site Audit Statement/s.	Arborist Site Audit Reporting system to be in place. Copies of Arboricultural Report to be retained onsite. Arboricultural Site Audit Statement/s will not be issued retrospectively
Construction Phase		
Site Establishment	Project Arborist to monitor tree health during establishment phase including bulk earthworks, changes in hydrology etc.	Instigate remedial tree care measures if required
Construction work	Site Manager to liaise with and ensure Project Arborist is advised in time to allow them to be present for all work carried out within TPZ area including any work likely to affect identified tree/s. Any deviation/s from approved plans to be approved by Project Arborist. **Project Arborist to provide ongoing Site Audit Certification of all work within TPZ**	Any remedial tree works to be carried out by qualified arborists under supervision of Project Arborist. Project Arborist is responsible for issue of Arborist Site Audit Reports.
Practical Completion	Project Arborist to carryout review of tree health and vigour and advise on TPZ fencing.	On Project Arborist approval, carryout removal of remaining temporary tree protection measures
Post Construction Phase		
Final Arborist inspection	Carryout tree health review and provide recommendations for required tree care.	Issue of final Arborist Site Audit Compliance Statement for inclusion in final DA documentation and sealing.

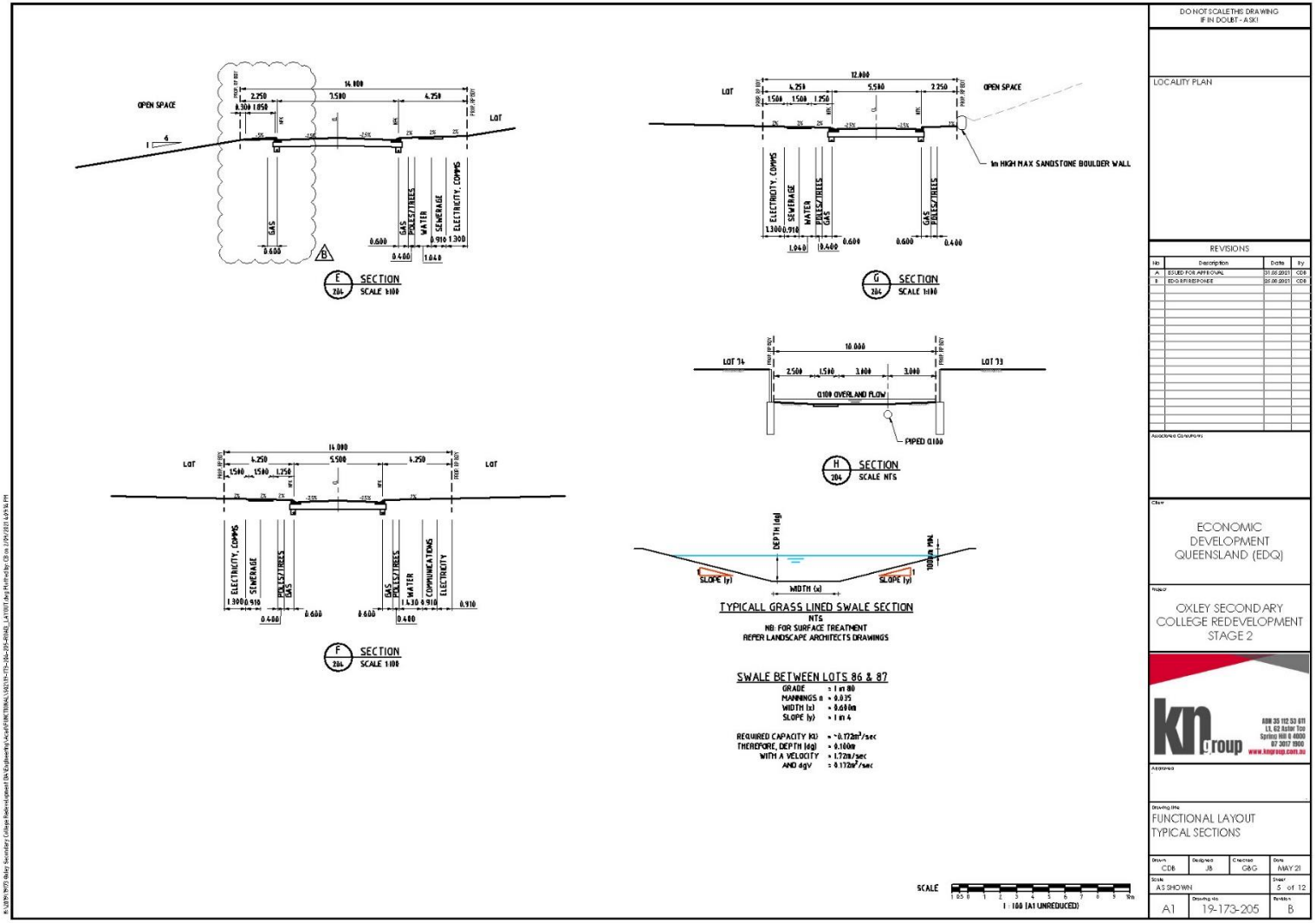
Plans


STAGE 2C
STAGE 2B
STAGE 2D
STAGE 2A
PUBLIC RECREATION PARK
PROPOSED BUSH TRACK/ DECO PATH REFER LANDSCAPE PLANS FOR DETAILS
RENEDIATION AREA 6 (RA6) MATERIAL TO BE REMOVED AND CAPPED AS REQUIRED BY BUTLER PARTNERS AND AGREEMENT BETWEEN EDQ & BCC
LEGEND
STAGE BOUNDARY
KERB FACE
ROAD CENTRELINE
FINISHED CONTOUR
EXISTING CONTOURS
BATTER LINE
SANDSTONE BOULDER ≤1.0m
RETAINING WALL ≤1.0m HIGH
RETAINING WALL 1.0m -2.0m
EXTENT OF CUT
EXTENT OF FILL
SCALE
1 : 1000 (A1 UNREDUCED)
FUNCTIONAL LAYOUT - EARTHWORK PLAN
SCALE 1:1000
DO NOT SCALE THIS DRAWING IF IN DOUBT - ASK!
LOCALITY PLAN
REVISIONS
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)
OXLEY SECONDARY COLLEGE REDEVELOPMENT STAGE 2
kn group
FUNCTIONAL LAYOUT EARTHWORKS PLAN
AS SHOWN
A1
19-173-201
B


DO NOT SCALE THIS DRAWING
IF IN DOUBT - ASK!
LOCALITY PLAN
REVISIONS
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)
OXLEY SECONDARY COLLEGE REDEVELOPMENT STAGE 2
FUNCTIONAL LAYOUT
EARTHWORKS PLAN
SECTIONS - SHEET 1
A1
19-173-202
B
EXISTING SURFACE LEVEL
DESIGN LEVEL
ROAD RESERVE
CONCRETE LINED DRAIN
SECTION
SCALE 1:500
I-BEAM SLEEPER WALL DETAIL - BETWEEN LOTS
WALL LOCATED IN HIGHER LOT
SCALE NTS
TYPICAL SANDSTONE
RETAINING WALL DETAIL
SCALE NTS
ICONIC TREE TO REMAIN
OPEN SPACE


LEGEND
PIPE TRENCH TREE ROOT GROWTH INHIBITOR 200kg/m³
LOCALISED WIDENING @ KERB RAMP
SCALE NTS
OPEN SPACE
ADJOINING PROPERTY
PROPERTY BOUNDARY
3.0m STORMWATER EASEMENT
STAGE 2
CONCRETE LINED DRAINAGE CHANNEL SETOUT POINT. REFER KNG DWGS 19-174-05 TO -08 FOR SETOUT DETAILS.
EXTEND CONCRETE TO ALLOW FOR FENCE POST DYNA BOLT CONNECTION
FIBRE REINFORCED 150mm THICK SPRAYED CONCRETE TO MANUFACTURES DETAILS
Q100 MIN 300mm FREEBOARD
DN150 FROG FLAP
1 IN 100 (MIN)
Q100
1 IN 2 MAX
600 MIN
Ø150 UPVC ROOFWATER PIPE CONNECTION TO DRAINAGE CHANNEL. CAPPED AT REAR PROPERTY BOUNDARY FOR FUTURE CONNECTION TO NEIGHBOURING ROOFWATER.
EXISTING SURFACE
ALTERNATIVE LOCATION OF Ø225 ROOFWATER CONNECTION INTO PIT
600X900 TYPE 1 FIELD INLET WITH DOME GRATE REFER BCC STD DRG BSD-8091. LOCATED AT DOWNSTREAM SIDE OF PROPOSED ALLOTMENTS. REFER KN GROUP DRAWINGS
CONCRETE STORMWATER PIPE
CONCRETE LINED DRAINAGE CHANNEL TYPICAL SECTION
NTS
WIDTH VARIES 1 IN 6 NOM LANDSCAPED BATTER
KN DESIGN SURFACE
LOT
1 IN 6
EXISTING SURFACE
ULTIMATE EARTHWORKS SECTION
SCALE 1:50
STAGE 2D PROP. RP BDY
1 IN 2
EXISTING CHILDCARE CENTRE
EXISTING FENCE LINE
ESC BUND TO DIRECT STORMWATER RUNOFF CLEAR OF CHILDCARE CENTRE
TEMPORARY EARTHWORKS SECTION - STAGE 2D
SCALE 1:50
NOTE:
TEMPORARY BATTER AND STAGE 2D EARTHWORKS SURFACE TO BE STABILISED AND ALL E&SC MEASURES TO BE MAINTAINED UNTIL DEMOLITION OF EXISTING CHILDCARE CENTRE.
SCALE
1 : 50 (A1 UNREDUCED)
DO NOT SCALE THIS DRAWING IF IN DOUBT - ASK!
LOCALITY PLAN
REVISIONS
No | Description | Date | By
A | ISSUED FOR APPROVAL | 31.05.2021 | CDB
B | EDQ RFI RESPONSE | 25.08.2021 | CDB
Associated Consultants
Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)
Project
OXLEY SECONDARY COLLEGE REDEVELOPMENT STAGE 2
ABN 35 112 53 611
L1, 62 Astor Tce
Spring Hill Q 4000
07 3017 1900
www.kngroup.com.au
Approved
Drawing title
FUNCTIONAL LAYOUT EARTHWORKS PLAN SECTIONS - SHEET 2
Drawn CDB
Designed JB
Checked GBG
Date MAY 21
Scale AS SHOWN
Sheet 3 of 12
A1
Drawing No 19-173-203
Revision B


CLIVEDEN AVENUE
PUBLIC RECREATION PARK
STAGE 2B
STAGE 2C
PROPOSED BUSH TRACK/ DECO PATH REFER LANDSCAPE PLANS FOR DETAILS
102 RETIREMENT LIVING PRECINCT
45 FUTURE CHILD CARE CENTRE
ROAD 1
ROAD 2
ROAD 3
ROAD 4
STAGE 2D
DRIVEWAY 01
STAIRS TO BE REPLACED
PUBLIC OPEN SPACE
STAGE 2A
PUBLIC OPEN SPACE RESERVE
SEVENTEEN MILE ROCKS ROAD
ROCKS ROAD
FUNCTIONAL LAYOUT PLAN
SCALE 1:1000
LEGEND
STAGE BOUNDARY
KERB AND CHANNEL TYPE D
KERB AND CHANNEL TYPE E
ROAD CENTRELINE
1.5m CONCRETE FOOTPATH
1.85m CONCRETE FOOTPATH
9.5m WIDE PAVEMENT
7.5m WIDE PAVEMENT
EXTERNAL ROAD WORKS REFER KN DWG 19-173-211&212 FOR DETAIL
SCALE
1 : 1000 (A1 UNREDUCED)
DO NOT SCALE THIS DRAWING IF IN DOUBT - ASK!
LOCALITY PLAN
REVISIONS
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)
OXLEY SECONDARY COLLEGE REDEVELOPMENT STAGE 2
FUNCTIONAL LAYOUT ROAD WORKS
A3 SHOWN
A1
19-173-204
B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LOCALITY PLAN
REVISIONS
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)
OXLEY SECONDARY COLLEGE REDEVELOPMENT STAGE 2
FUNCTIONAL LAYOUT
TYPICAL SECTIONS
SECTION SCALE 1:100
SECTION SCALE 1:100
SECTION SCALE 1:100
SECTION SCALE NTS
TYPICALL GRASS LINED SWALE SECTION
NTS
NB: FOR SURFACE TREATMENT
REFER LANDSCAPE ARCHITECTS DRAWINGS
SWALE BETWEEN LOTS 86 & 87
GRADE = 1 in 80
MANNINGS n = 0.035
WIDTH (x) = 0.600m
SLOPE (y) = 1 in 4
REQUIRED CAPACITY (Q) = 0.172m³/sec
THEREFORE, DEPTH (dg) = 0.100m
WITH A VELOCITY = 1.72m/sec
AND dgV = 0.172m²/sec
SCALE
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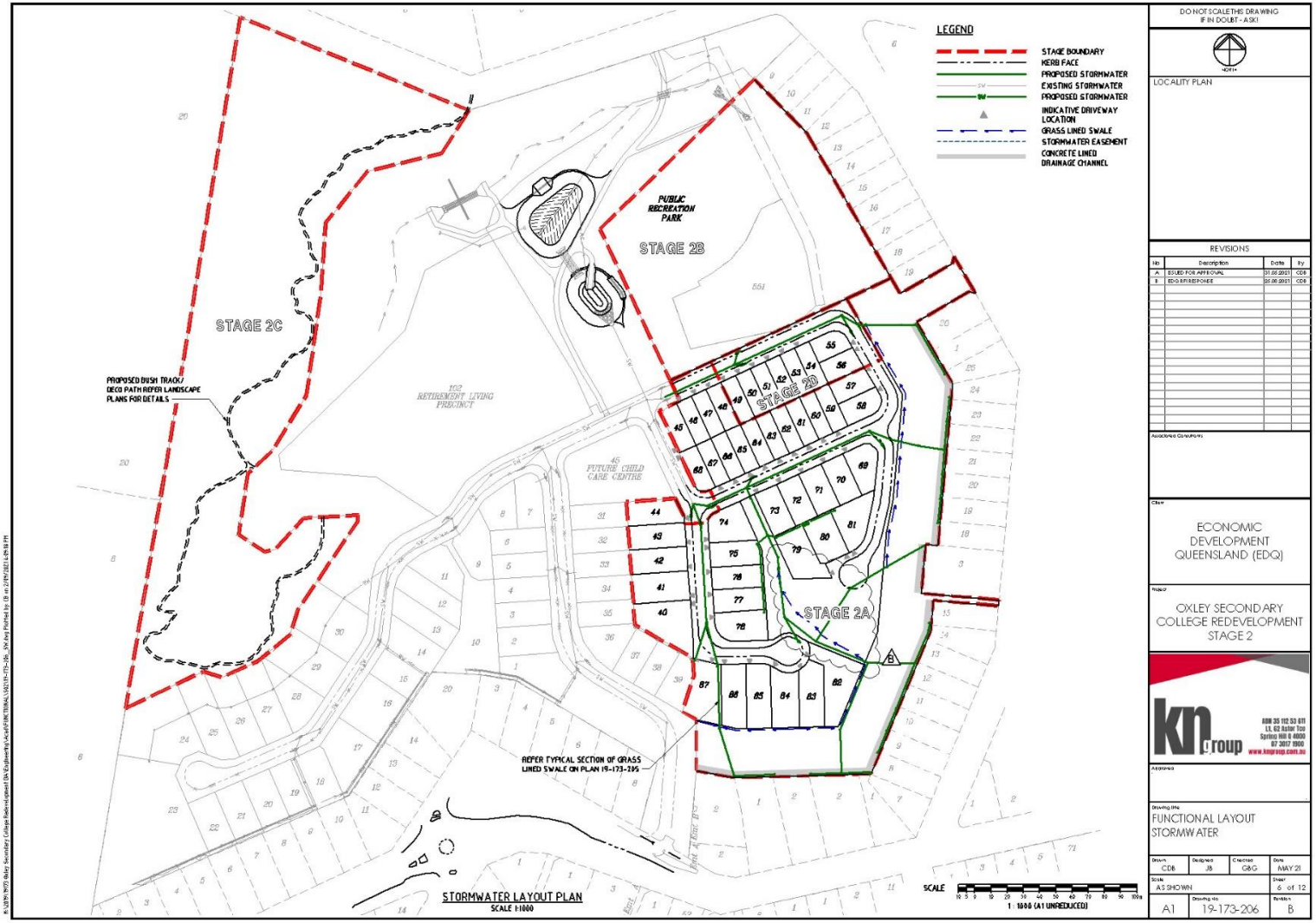
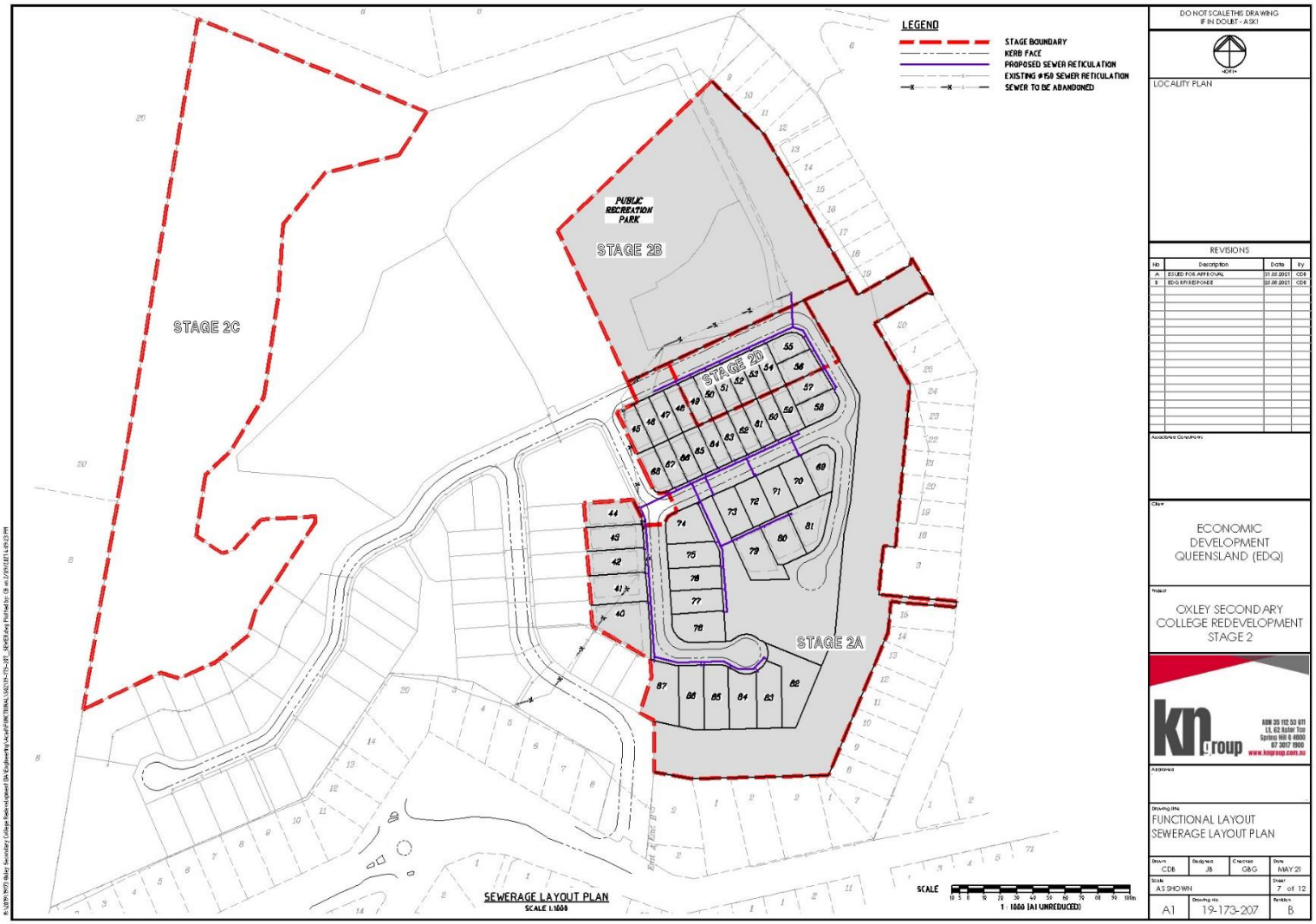
A1
19-173-205
B


LEGEND
STAGE BOUNDARY
KERB FACE
PROPOSED STORMWATER
EXISTING STORMWATER
PROPOSED STORMWATER
INDICATIVE DRIVEWAY LOCATION
GRASS LINED SWALE
STORMWATER EASEMENT
CONCRETE LINED DRAINAGE CHANNEL
PUBLIC RECREATION PARK
STAGE 2B
STAGE 2C
STAGE 2D
STAGE 2A
102 RETIREMENT LIVING PRECINCT
45 FUTURE CHILD CARE CENTRE
PROPOSED BUSH TRACK/ DECO PATH REFER LANDSCAPE PLANS FOR DETAILS
REFER TYPICAL SECTION OF GRASS LINED SWALE ON PLAN 19-173-205
STORMWATER LAYOUT PLAN
SCALE 1:1000
SCALE
1 : 1000 (A1 UNREDUCED)
DO NOT SCALE THIS DRAWING IF IN DOUBT - ASK!
LOCALITY PLAN
REVISIONS
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)
OXLEY SECONDARY COLLEGE REDEVELOPMENT STAGE 2
FUNCTIONAL LAYOUT STORMWATER
A3 SHOWN
A1
19-173-206
B


LEGEND
STAGE BOUNDARY
KERB FACE
PROPOSED SEWER RETICULATION
EXISTING ø150 SEWER RETICULATION
SEWER TO BE ABANDONED
PUBLIC RECREATION PARK
STAGE 2B
STAGE 2C
STAGE 2D
STAGE 2A
SEWERAGE LAYOUT PLAN
SCALE 1:1000
SCALE
1 : 1000 (A1 UNREDUCED)
DO NOT SCALE THIS DRAWING IF IN DOUBT - ASK!
LOCALITY PLAN
REVISIONS
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)
OXLEY SECONDARY COLLEGE REDEVELOPMENT STAGE 2
FUNCTIONAL LAYOUT
SEWERAGE LAYOUT PLAN
A1
19-173-207
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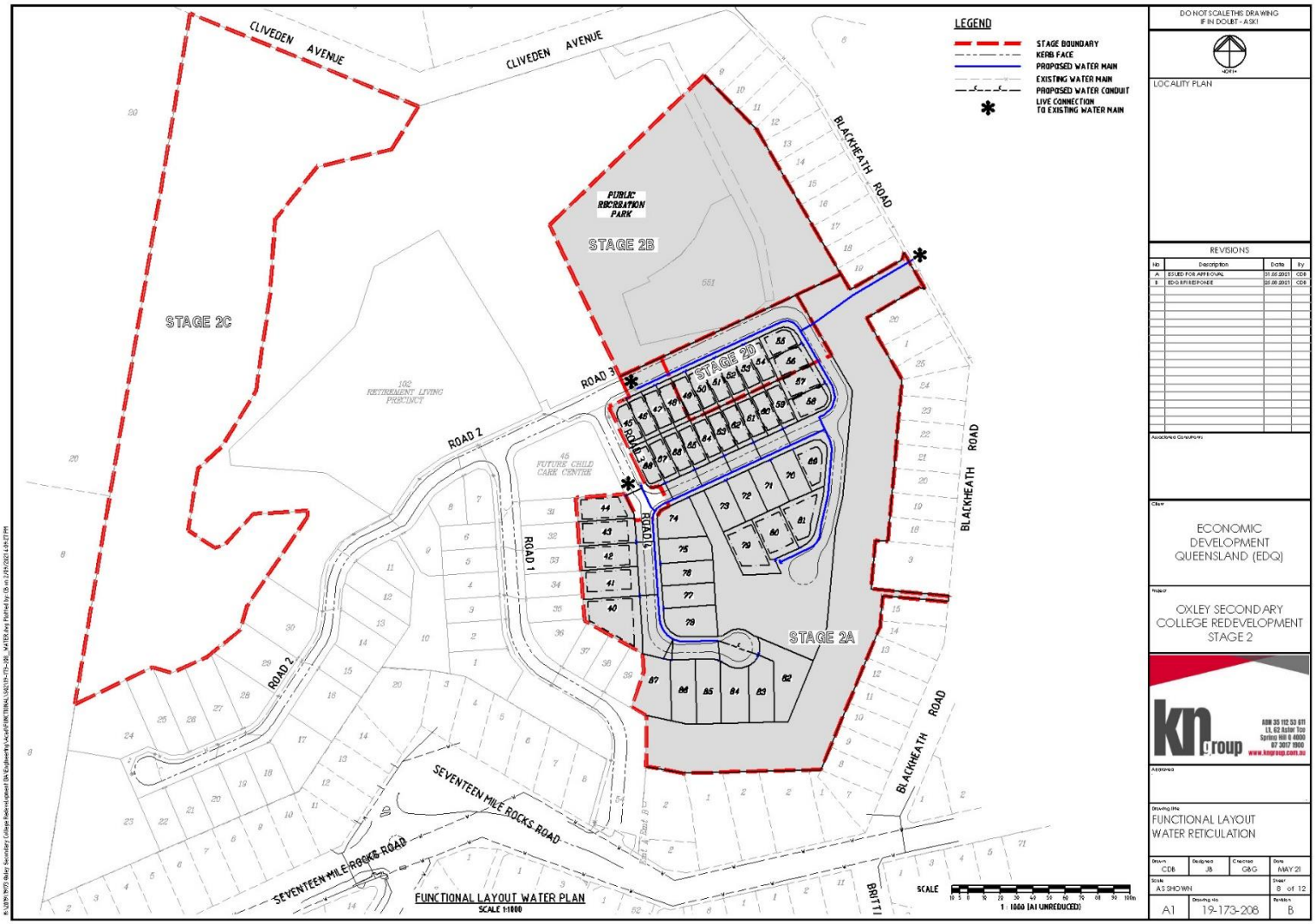
CLIVEDEN AVENUE
CLIVEDEN AVENUE
BLACKHEATH ROAD
PUBLIC RECREATION PARK
STAGE 2B
STAGE 2C
STAGE 2D
STAGE 2A
ROAD 1
ROAD 2
ROAD 3
ROAD 4
ROAD 5
RETIREMENT LIVING PRECINCT
FUTURE CHILD CARE CENTRE
SEVENTEEN MILE ROCKS ROAD
BRITTI
LEGEND
STAGE BOUNDARY
KERB FACE
PROPOSED WATER MAIN
EXISTING WATER MAIN
PROPOSED WATER CONDUIT
LIVE CONNECTION TO EXISTING WATER MAIN
FUNCTIONAL LAYOUT WATER PLAN
SCALE 1:1000
SCALE
1 : 1000 (A1 UNREDUCED)
DO NOT SCALE THIS DRAWING IF IN DOUBT - ASK!
LOCALITY PLAN
REVISIONS
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)
OXLEY SECONDARY COLLEGE REDEVELOPMENT STAGE 2
FUNCTIONAL LAYOUT WATER RETICULATION
A3 SHOWN
A1
19-173-208
B


FOR CONTINUATION REFER KNG DWG No 19-173-210
45 FUTURE CHILD CARE CENTRE
PUBLIC OPEN SPACE RESERVE
PUBLIC OPEN SPACE RESERVE
OVERALL SERVICES LAYOUT PLAN
SCALE 1:500
LEGEND
STAGE BOUNDARY
KERB AND CHANNEL TYPE D
KERB AND CHANNEL TYPE E
PROPOSED STORMWATER
PROPOSED SEWER RETICULATION
PROPOSED WATER RETICULATION
EXISTING STORMWATER
EXISTING SEWER RETICULATION
EXISTING WATER RETICULATION
PROPOSED WATER SERVICE
PROPOSED WATER CONDUIT
INDICATIVE DRIVEWAY LOCATION
GRASS LINED SWALE
CONCRETE LINED DRAINAGE CHANNEL
SCALE
1:500 (A1 UNREDUCED)
DO NOT SCALE THIS DRAWING IF IN DOUBT - ASK!
LOCALITY PLAN
REVISIONS
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)
OXLEY SECONDARY COLLEGE REDEVELOPMENT STAGE 2
FUNCTIONAL LAYOUT OVERALL SERVICES SHEET 1
A3 SHOWN
A1
19-173-209
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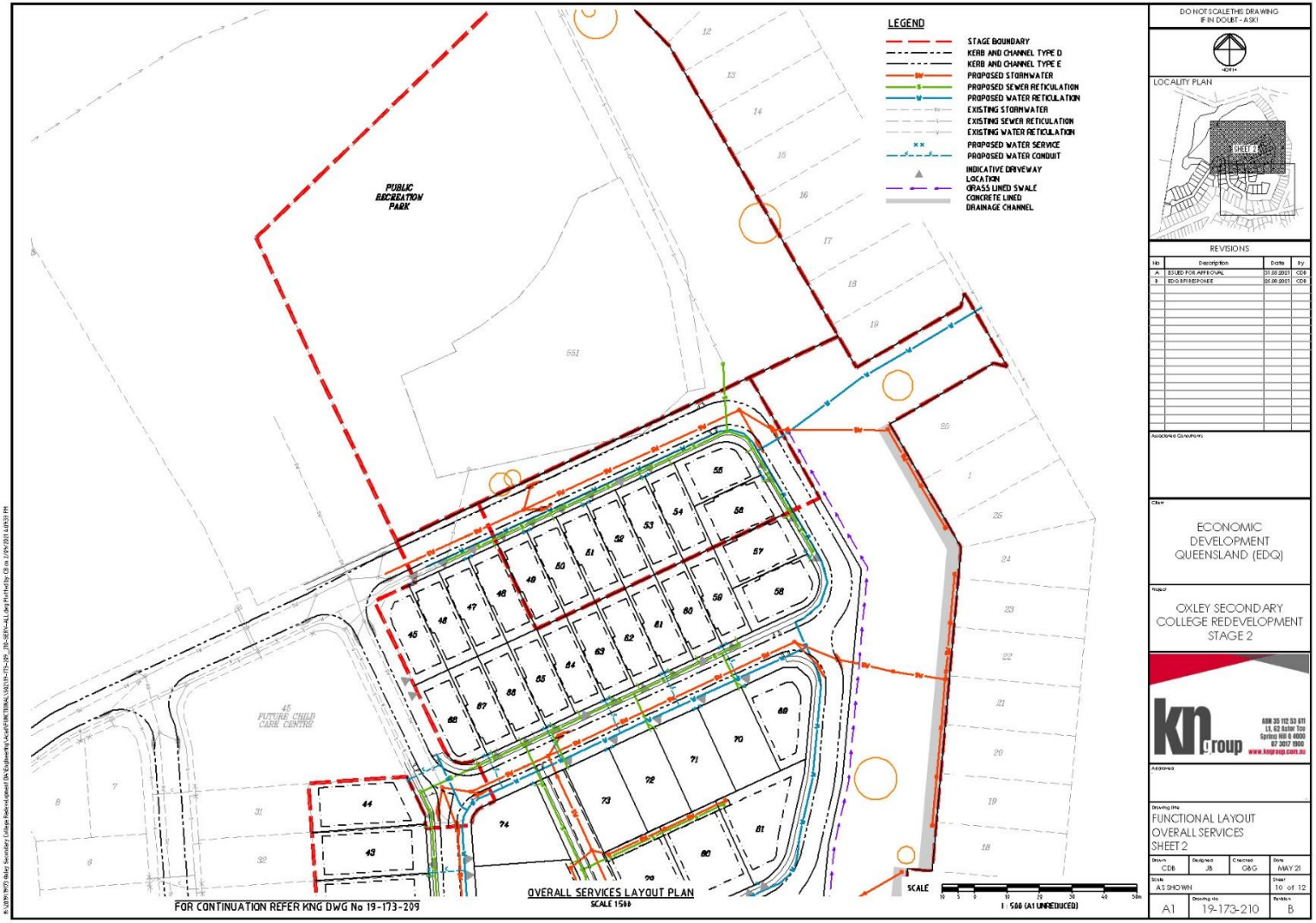
LEGEND
STAGE BOUNDARY
KERB AND CHANNEL TYPE D
KERB AND CHANNEL TYPE E
PROPOSED STORMWATER
PROPOSED SEWER RETICULATION
PROPOSED WATER RETICULATION
EXISTING STORMWATER
EXISTING SEWER RETICULATION
EXISTING WATER RETICULATION
PROPOSED WATER SERVICE
PROPOSED WATER CONDUIT
INDICATIVE DRIVEWAY LOCATION
GRASS LINED SWALE
CONCRETE LINED DRAINAGE CHANNEL
PUBLIC RECREATION PARK
FUTURE CHILD CARE CENTRE
FOR CONTINUATION REFER KNG DWG No 19-173-209
OVERALL SERVICES LAYOUT PLAN
SCALE 1:500
SCALE
1:500 (AT UNREDUCED)
DO NOT SCALE THIS DRAWING IF IN DOUBT - ASK!
LOCALITY PLAN
SHEET 2
REVISIONS
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)
OXLEY SECONDARY COLLEGE REDEVELOPMENT STAGE 2
FUNCTIONAL LAYOUT
OVERALL SERVICES
SHEET 2
A3 SHOWN
A1
19-173-210
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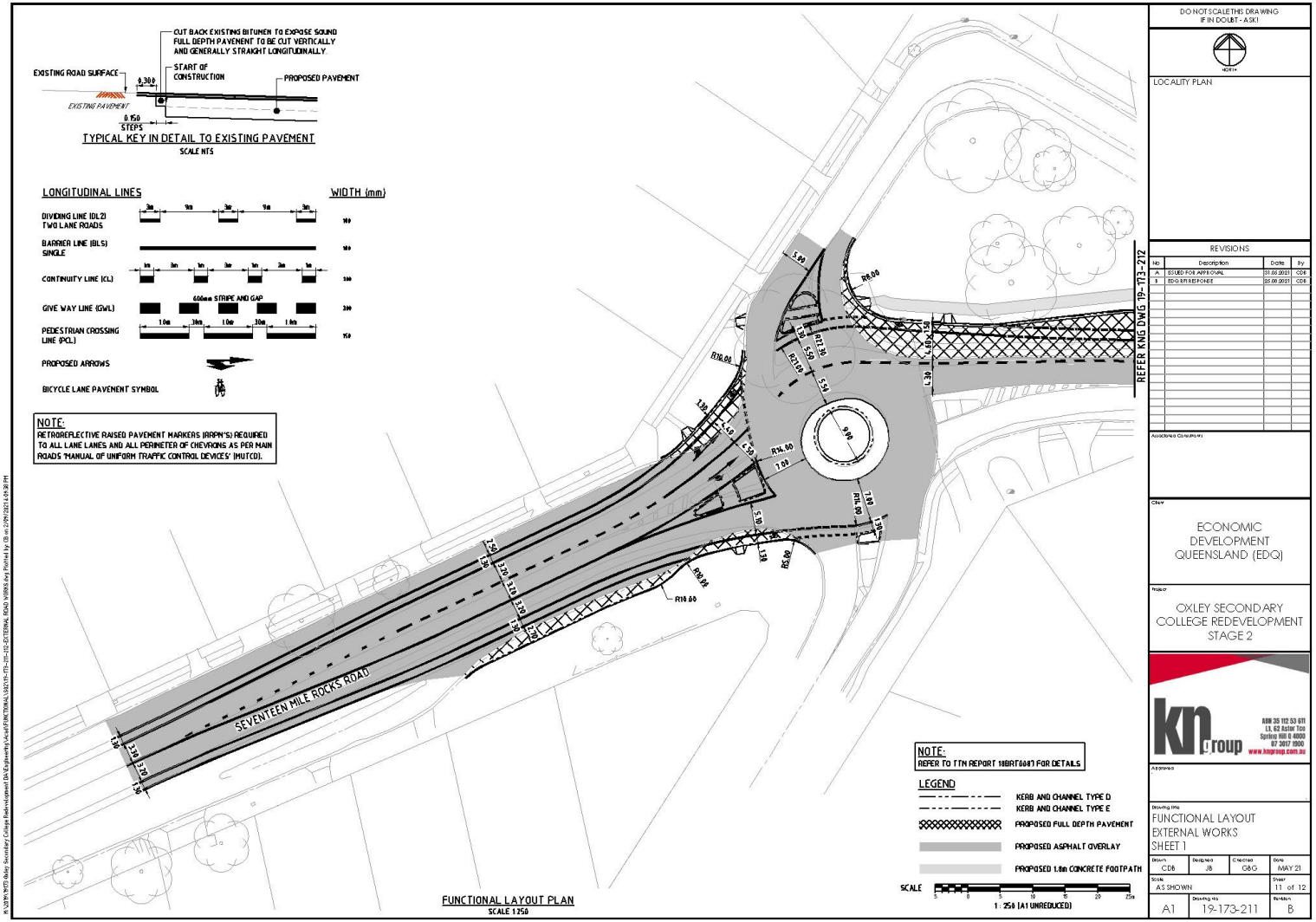
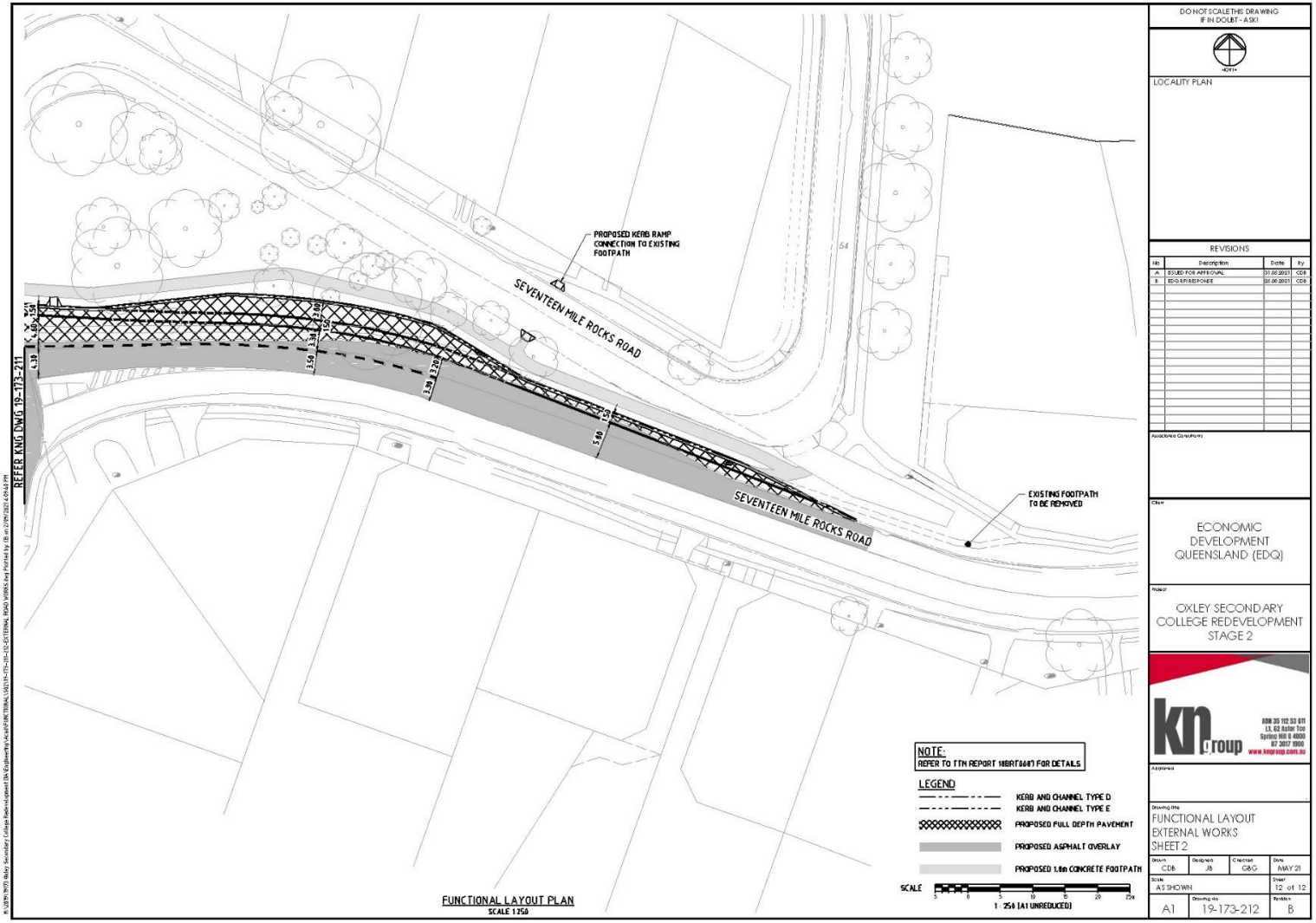
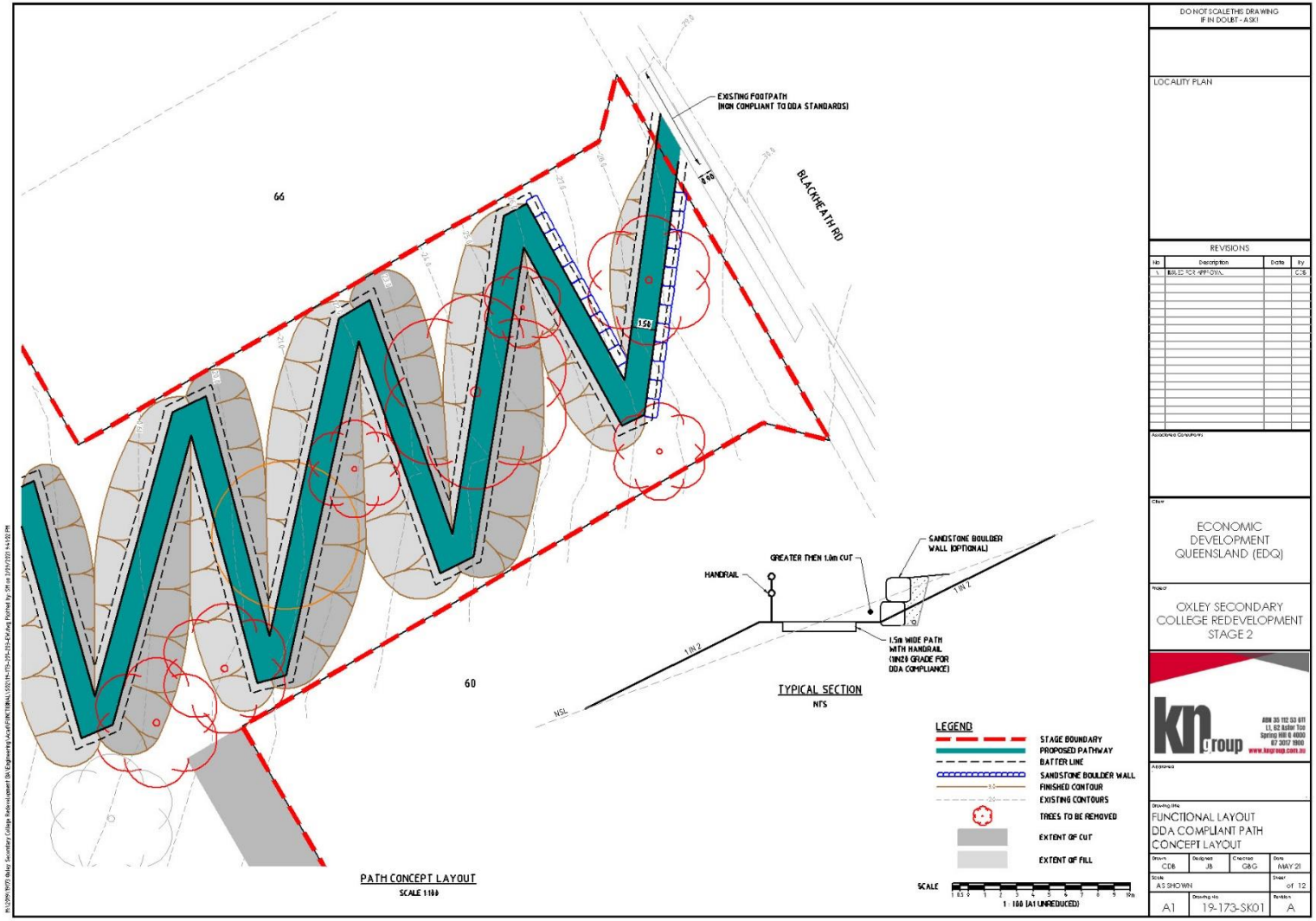
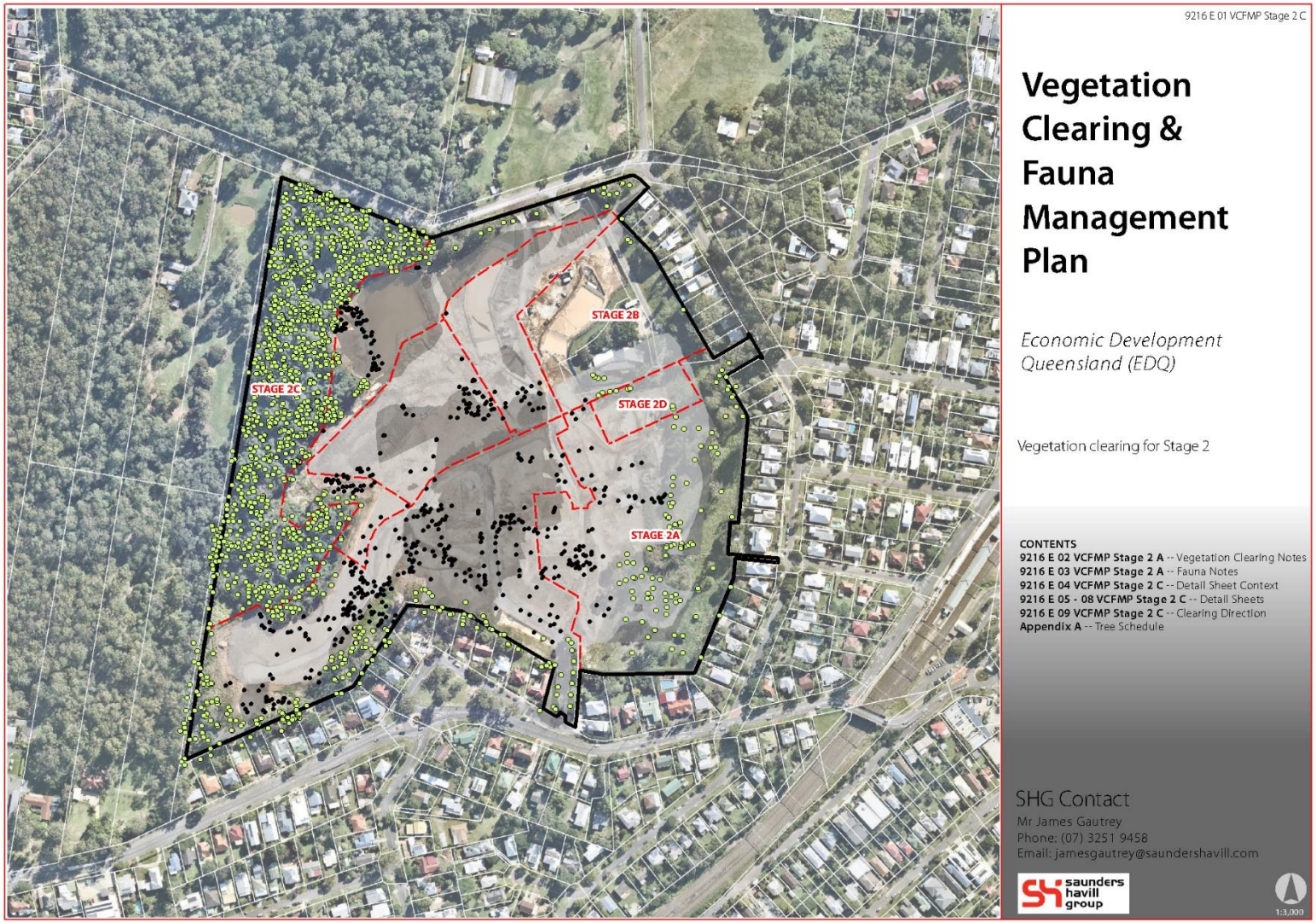

CUT BACK EXISTING BITUMEN TO EXPOSE SOUND FULL DEPTH PAVEMENT TO BE CUT VERTICALLY AND GENERALLY STRAIGHT LONGITUDINALLY.
EXISTING ROAD SURFACE
START OF CONSTRUCTION
PROPOSED PAVEMENT
EXISTING PAVEMENT
0.150 STEPS
TYPICAL KEY IN DETAIL TO EXISTING PAVEMENT
SCALE NTS
LONGITUDINAL LINES
WIDTH (mm)
DIVIDING LINE (DL2) TWO LANE ROADS
BARRIER LINE (BLS) SINGLE
CONTINUITY LINE (CL)
600mm STRIPE AND GAP
GIVE WAY LINE (GWL)
PEDESTRIAN CROSSING LINE (PCL)
PROPOSED ARROWS
BICYCLE LANE PAVEMENT SYMBOL
NOTE:
RETROREFLECTIVE RAISED PAVEMENT MARKERS (RRPM'S) REQUIRED TO ALL LANE LINES AND ALL PERIMETER OF CHEVRONS AS PER MAIN ROADS 'MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES' (MUTCD).
SEVENTEEN MILE ROCKS ROAD
FUNCTIONAL LAYOUT PLAN
SCALE 1:250
NOTE:
REFER TO TTM REPORT 18BRT0087 FOR DETAILS
LEGEND
KERB AND CHANNEL TYPE D
KERB AND CHANNEL TYPE E
PROPOSED FULL DEPTH PAVEMENT
PROPOSED ASPHALT OVERLAY
PROPOSED 1.8m CONCRETE FOOTPATH
SCALE
1 : 250 (A1 UNREDUCED)
REFER KNG DWG 19-173-212
DO NOT SCALE THIS DRAWING IF IN DOUBT - ASK!
LOCALITY PLAN
REVISIONS
No | Description | Date | By
A | ISSUED FOR APPROVAL | 31.08.2021 | CDB
B | EDQ SITE REFERENCE | 03.09.2021 | CDB
Associated Consultants
Client
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)
Project
OXLEY SECONDARY COLLEGE REDEVELOPMENT STAGE 2
kn group
ABN 35 112 53 611
L3, 62 Astor Tce
Spring Hill Q 4000
07 3017 0900
www.knqroup.com.au
Approved
Drawing title
FUNCTIONAL LAYOUT EXTERNAL WORKS SHEET 1
Drawn CDB | Designed JB | Checked G&G | Date MAY 21
Scale AS SHOWN | Sheet 11 of 12
A1 | Drawing no 19-173-211 | Revision B


PROPOSED KERB RAMP CONNECTION TO EXISTING FOOTPATH
SEVENTEEN MILE ROCKS ROAD
EXISTING FOOTPATH TO BE REMOVED
REFER KNG DWG 19-173-211
FUNCTIONAL LAYOUT PLAN
SCALE 1:250
NOTE:
REFER TO TTM REPORT 18BRT0687 FOR DETAILS
LEGEND
KERB AND CHANNEL TYPE D
KERB AND CHANNEL TYPE E
PROPOSED FULL DEPTH PAVEMENT
PROPOSED ASPHALT OVERLAY
PROPOSED 1.8m CONCRETE FOOTPATH
SCALE
1 : 250 (A1 UNREDUCED)
DO NOT SCALE THIS DRAWING IF IN DOUBT - ASK!
LOCALITY PLAN
REVISIONS
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)
OXLEY SECONDARY COLLEGE REDEVELOPMENT STAGE 2
FUNCTIONAL LAYOUT EXTERNAL WORKS SHEET 2
A3 SHOWN
A1
19-173-212
B

NOT APPROVED




STAGE 2B
STAGE 2C
STAGE 2D
STAGE 2A
9216 E 01 VCFMP Stage 2 C
Vegetation Clearing & Fauna Management Plan
Economic Development Queensland (EDQ)
Vegetation clearing for Stage 2
CONTENTS
9216 E 02 VCFMP Stage 2 A -- Vegetation Clearing Notes
9216 E 03 VCFMP Stage 2 A -- Fauna Notes
9216 E 04 VCFMP Stage 2 C -- Detail Sheet Context
9216 E 05 - 08 VCFMP Stage 2 C -- Detail Sheets
9216 E 09 VCFMP Stage 2 C -- Clearing Direction
Appendix A -- Tree Schedule
SHG Contact
Mr James Gautrey
Phone: (07) 3251 9458
Email: jamesgautrey@saundershavill.com
saunders havill group
1:3,000

Vegetation Clearing and Fauna Management Plan - *Notes*

INTRODUCTION

The Environmental Management Division of the **Saunders Havill Group (SHG)** was engaged by **Economic Development Queensland (EDQ)** to prepare a Vegetation Clearing and Fauna Management Plan (VCFMP) for proposed clearing for proposed Stage 2 development at 53 Seventeen Mile Rocks Road, Oxley (600/SP236626 & 551/SP142916).

The purpose of this plan is to manage the vegetation removal process and the protection of fauna species within proposed remediation areas. The clearing works will follow general principles for vegetation clearing documented on this sheet and *Sheet 3*.

This VCFMP has been produced by overlaying the following site datasets to determine impacts and disturbance on existing vegetation:

1. GPS accurate tree data including specimen details & features (SHG 2018-2020)
2. Survey accurate tree data (Land Partners 2018)
3. Site Remediation Layout Plans (Butler Partners 2020)
4. Staging layout Plan (Place Design Group 2021)
5. Engineering drawings (KN Group 2021)

PROJECT MANAGEMENT

Vegetation management and its processes are an integral part of the construction and operational works phases. The site supervisor is responsible for all onsite works including overseeing vegetation clearing, health and safety of fauna and adhering to relevant conditions and guidelines and Australian Standards - Protection of Trees on Development Sites AS4970-2009 and Pruning of Amenity Trees AS4373-1996.

The project arborist (with minimum AQF Level 5 in Arboriculture and minimum 5 years' experience) is responsible for: undertaking all appropriate arboricultural measures prior to the commencement of any earthworks on site to ensure the survival and long-term health of existing trees to be retained. These measures may include soil decompaction, soil aeration, fertilising, mulching, watering, root or crown reduction and hazard reduction or as otherwise determined by the arborist. The site arborist is also required to direct and supervise all works within TPZs of trees to be retained, and perform arboricultural care requirements where necessary.

SITE CONTACTS

Site and consulting contacts for queries relating to vegetation clearing include:

Client Contact:
Economic Development Queensland
Mr Kaush Singh
Ph (07) 3452 7076

Environmental Contact:
Saunders Havill Group
Mr James Gautrey
Ph (07) 3251 9458

Site Contractor:
To be advised

Site Arborist:
To be advised

Site Fauna spotter-catcher:
To be advised
(Refer to *Sheet 3* for responsibilities)

Site Bushfire Consultant:
Land and Environment Consultants
Mr Rob Janssen
Ph 0466 714 833

CLEARING PHASES AND PROCESS

PHASE 1 - Tree Protection Fencing to be installed

Fencing to be installed prior to the commencement of any clearing works on the site. Tree protection fencing to be located at or beyond 12 x diameter at breast height (DBH) (AS4970-2009 Protection of trees on development sites)—unless approved by the appointed arborist.

PHASE 2 - Pre-start Meeting

Fencing shall be in place at the time of the official pre-start meeting for inspection and sign off by EDQ Officers.

PHASE 3 - Fauna Inspections and Management

Undertake necessary fauna management requirements prior to clearing works - as a minimum, this should include the specifications listed on sheet 3, and acknowledge specific EDQ approval requirements.

PHASE 4 - Undertake Bulk Clearing

Undertake wholesale removal of vegetation once approved for removal by a qualified fauna spotter.

Clearing direction is to be managed by the appointed fauna spotter-catcher .

Vegetation clearing techniques:

i. By utilising the most appropriate machinery and equipment during vegetation clearing, the probability of injury or death of wildlife during clearing can be significantly reduced or eliminated while still maintaining an efficient vegetation removal process.

ii. Suggested techniques are as follows: (a) a vertical tree grab attachment on an excavator (30 tonne) can be used to pull entire trees in size up to 30-40cm diameter at a height measured at 1.3 metres above ground level and lay them down in a steady controlled fashion, allowing inspection by a fauna spotter-catcher (b) where large trees are too large for a vertical tree grab and have been identified, an elevated work platform or where practical, cherry picker should be used in conjunction with a chainsaw operator and fauna spotter-catcher. Alternatively, careful removal of hollow section from habitat tree and gentle lowering for inspection by fauna spotter-catcher (c) the use of bulldozers to clear vegetation is limited to vegetation that has been thoroughly inspected by a fauna spotter-catcher and is found to contain no fauna or potential habitat. Bulldozers are not to be used to push over large trees that contain hollows or other habitat features.

NOTE: Dogs are not permitted onsite at all times during construction. Construction works including clearing must occur between the hours of 6.30am and 6.30pm.

ACCESS AND STOCKPILING

A vegetation stockpiling location is to be designated in an easily accessible area outside of TPZs. Indicative vegetation stockpiling locations have been allocated at previously cleared locations near remediation areas, allowing for material to be easily delivered and stored. This location is subject to minor change according to cut/fill activities and intended location for reuse.

Cleared vegetation free of weeds is to be reused on or off the project site. Recycling techniques include mulching, tub-grinding, wood chipping and salvage (e.g. custom milling). Trees with identified hollows should have the hollow section preserved and should be suitably mounted on nearby or adjacent suitable trees.

MAINTENANCE

After tree clearing works on site, an analysis of the vegetation's health and growth should be undertaken by the project arborist to determine specific maintenance needs. Follow up maintenance works should be carried out on retained vegetation where required. If conditioned in the DA approval—the project arborist may be required to submit a report to EDQ detailing the measures undertaken during the construction period and any further work required post this period.

BUSHFIRE PROTECTION ZONE

Tree retention within the Bushfire Protection Zone is to be certified by the engaged Project Arborist (minimum AQF Level 5) and Bushfire Consultant prior to plan sealing. The certification by the Project Arborist is to include an individual tree assessment to identify specimens which may:

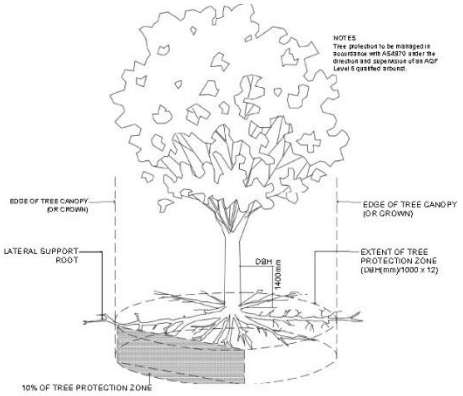
1. Contain limbs less than 2m above ground; or
2. Overhang or interfere with the building area; or
3. Contain dead/rotting limbs or be considered dangerous.

If trees are identified to meet any of the above criteria or contravene Section 6.1 of the Bushfire Management Plan, the retention or removal of these individual specimens is to be certified by the Project Arborist in consultation with the Bushfire Consultant. Evidence of the Project Arborist and Bushfire Consultant certification and final tree retention and removal status of all tree specimens within the Bushfire Protection Zone is to be provided to EDQ prior to plan sealing.

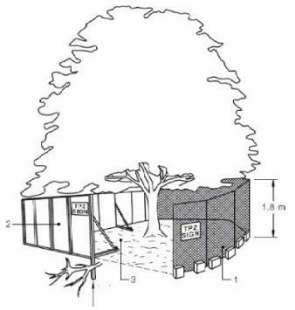
***DYSCHORISTE DEPRESSA* WEED CONTROL**

24hrs prior to vegetation clearing commencing, *Dyschoriste depressa* is to be identified on-site by a suitably qualified professional and is to be treated via foliar spray. After vegetation clearing has been completed and prior to construction works commencing, an additional survey identifying *Dyschoriste depressa* is to be undertaken. If any additional locations of *Dyschoriste depressa* are identified, they are to be treated accordingly. Prior to plan sealing, certification of *Dyschoriste depressa* eradication within the development footprint is to be provided to EDQ.

Tree Protection Zone - Detail (not to scale)



AS 4970 Tree Protection Fencing - Detail (not to scale)



LEGEND
1. Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.
2. Alternative plywood or wooden paling fence. This fencing option also prevents building materials or soil entering the TPZ.
3. Mulch installation across surface of TPZ (at the discretion of the Project Arborist). No Excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted with the TPZ.
4. Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.

CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

DISCLAIMER:

REFERENCES:
AS4970-2009 Protection of trees on development sites
Vegetation clearing techniques (Logan City Council, 2019)

AMENDMENTS:

Issue	Date	Description	Checked
A	31/05/2021	Preliminary	JG

PROJECT:
STAGE 2
SEVENTEEN MILE ROCKS ROAD
OXLEY
(600SP236626 / 551SP142916)

environmental management

PLAN OF: Vegetation Clearing & Fauna Management Plan

DATE:	31/05/2021	CHECKED:	JG
CLIENT REF:	9216	DRAWN:	MP
DRAWING No:	9216 E 02 VCFMP Stage 2 A		

Vegetation Clearing and Fauna Management Plan - *Fauna Management Notes*

INTRODUCTION

The Fauna Management specification on this *VCFMP* is designed to protect native animals and control/manage impacts during the vegetation clearing works. The clearing area is located within Stages 2A and 2B of the development footprint, in the eastern portion of the project site. Thirty-eight fauna species were recorded during diurnal and nocturnal fauna surveys, comprising amphibian, bird, reptile and mammal species. The Vulnerable *Pteropus poliocephalus* (Grey-headed Flying-fox) were observed foraging onsite however no evidence of Koala or Powerful Owl was observed despite habitat mapping over the site / historic records in the vicinity of the site (refer to Ecological Assessment Report prepared by SHG 2020). The fauna management specifications and principles incorporated in this *VCFMP* applies generically to all native animals and focuses on avoiding conflicts and incorporating measures to minimize disturbance. Compliance with this section of the *VCFMP* is compulsory and incorporates the use of expert consultants including a Fauna Spotter (holding a valid Wildlife Rehabilitation Permit issued by the **Department of Environment and Science**.

FAUNA IMPACTS

Clearing of vegetation provides an obvious source of impact to existing habitat and animal safety. More specifically the existing vegetation provides habitat, movement and protection opportunities for some fauna through both regrowth and canopy trees. These opportunities are to be altered during and post vegetation clearing works.

CONSTRUCTION IMPACTS

- Direct removal of site vegetation
- Loss of habitat
- Noise, vibration and dust
- Erosion and sedimentation
- Threats associated with open cuts etc. and fauna entrapment
- Loss of food sources
- Excavation/compaction/changes in ground levels
- Altering hydrological flows
- Fragmentation of habitat

OPERATIONAL IMPACTS

- Weed introduction (garden escapees)
- Increased hydrology with increased hardstand
- Altering of run-off chemical and nutrient components (quality)
- Barriers to fauna movement
- Vehicles and pedestrian movement and trespass
- Introduction of domestic and predatory species

Fauna Management Schedule

Ref:	Management Item	Responsibility	Timing	Reporting
1.0 PRE CLEARING				
1.1	**TEMPORARY FENCING** Prior to the commencement of works and to be inspected by the site Environmental Coordinator—Delineate areas where vegetation is proposed to be retained with exclusion fencing to prevent accidental felling. Clearing is to be undertaken in accordance with AS 4970-2009 Protection of Trees on Development Sites. ▪ Fencing shall be fauna friendly ▪ No clearing, stockpiling, site access, earthworks, storage, etc. is to occur within the temporary protection fencing. ▪ Only approved weed management works to occur within the temporary protection fencing ▪ Fencing to be reinstated immediately if damaged or knocked down, any damage to retained trees to be immediately reported to Project Arborist. ▪ Fencing to remain until the completion of all site works.	SITE SUPERVISOR	Prior to the commencement of clearing	Inspected by EDQ or the Environmental Site Coordinator
1.2	**CONTRACTOR EDUCATION & AWARENESS** All site contractors and subcontractors will be made aware of their responsibilities to protect native fauna. The Fauna Management notes on this VCFMP is provided as a working document to assist on-site management and protection of native animals. This generally will form part of education and training on a broader work place health and safety but as a minimum will include: ▪ Copy of VCFMP kept on-site (Site Office). ▪ General education and awareness notification of contractors and sub-contractors involved in activities potentially impacting native animals as part of site induction – contractors must know the location of the VCFMP, key phone numbers and who to report to if they breach the VCFMP. A list of relevant contact phone numbers as listed on these drawings is kept in a visible and accessible location in the site office.	SITE SUPERVISOR / THE PROPONENT	Prior to the commencement of clearing and as part of the site induction for new staff and sub-contractors	SITE SUPERVISOR
2.0 VEGETATION CLEARING				
2.1	**SPOTTER / RELOCATOR** Immediately prior to the commencement of clearing of native vegetation a daily visual inspection of the area must be carried out by the fauna spotter-catcher. Furthermore, the fauna spotter-catcher is to be present on site during all clearing operations to supervise and direct clearing works, and to respond to any situations that may arise in relation to fauna. In the event of an animal being located, a suitable buffer area (as determined by the fauna spotter-catcher) should be established around the animal's location that excludes machinery until it has relocated at its own accord (usually overnight). If an animal requires relocating this must be undertaken by a suitable qualified fauna expert recognized by the **Department of Environment & Science**. For some fauna, specific permit requirements may apply. If vegetation is left stockpiled overnight, the fauna spotter-catcher must inspect the vegetation prior to chipping or removal from site. Any native fauna orphaned or injured by the development process must be reported to the **Department of Environment & Science** (1300 130 372) or **RSPCA** (1300 264 625). The Site Supervisor is responsible for the safe management of site fauna and implementation of these specific fauna requirements.	SITE SUPERVISOR	Prior to the commencement, and during clearing	Inspected by EDQ or the Environmental Site Coordinator
2.2	**SPECIFIC KOALA MANAGEMENT NOTES** A Koala Spotter is a person who holds a tertiary qualification in Biology or Zoology, or who is demonstrably experienced in the identification and location of Koalas in their natural habitat. For example, a koala keeper employed by a licensed Wildlife exhibitor (i.e. a zoo) may be capable of demonstrating competence in locating Koala's. Prior to the commencement and during felling operations, it is the responsibility of the Koala spotter to be present at the site of felling operations identify any tree at the site within which a Koala is present, as well as any tree that has a crown which is intermeshed or overlapping with such a tree; and advise the person who is authorised to conduct the felling operation, or that persons' representative, of the precise location of each such tree Management Item.	SITE SUPERVISOR	Prior to the commencement, and during clearing	Inspected by EDQ or the Environmental Site Coordinator
2.3	**CLEARING PATTERN / FAUNA FLUSHING** Clearing occurs once the fauna spotter-catcher gives sign off the site is clear of significant native species. The intended clearing directions is towards the proposed Public Open Space Area along western portion of site. Clearing direction is subject to amendment by the fauna spotter-catcher. At the completion of operational works, and prior to the sealing of survey plans for the relevant stage, the fauna spotter-catcher must provide certification to EDQ officers that all works were undertaken in accordance with these fauna management requirements and specific EDQ requirements.	SITE SUPERVISOR	Prior to the commencement, and during clearing	Inspected by EDQ or the Environmental Site Coordinator

saunders havill group

CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)

DISCLAIMER:

REFERENCES:
AS4970-2009 Protection of Trees on development Sites
Ecological Assessment Report (SHG 2020)

AMENDMENTS:

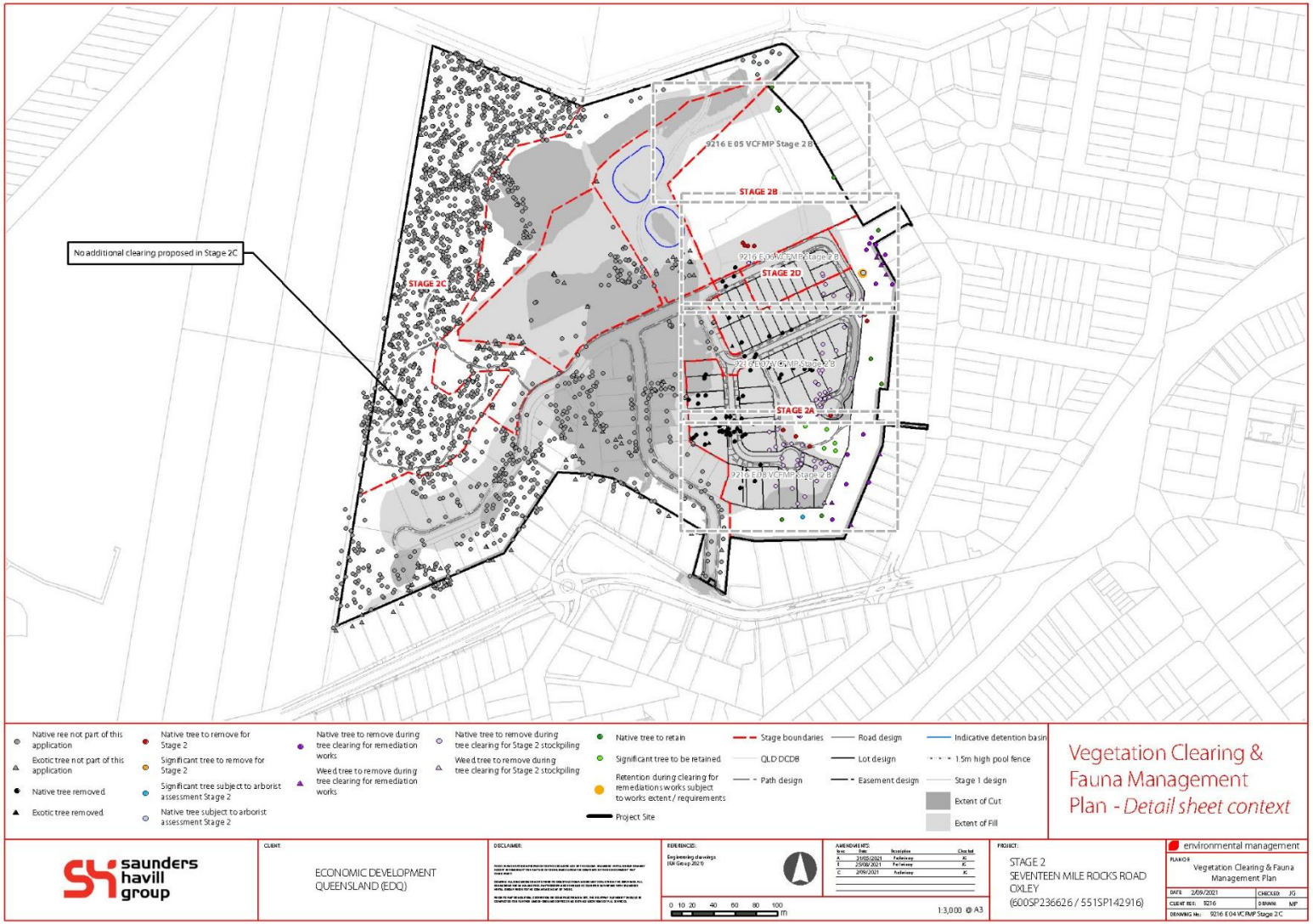
Issue	Date	Description	Checked
A	31/05/2021	Preliminary	AS

PROJECT: STAGE 2 SEVENTEEN MILE ROCKS ROAD OXLEY (600SP236626 / 551SP142916)

environmental management

PLAN OF: Vegetation Clearing & Fauna Management Plan

DATE:	31/05/2021	CHECKED:	JG
CLIENT REF.:	9216	DRAWN:	MP
DRAWING No:	9216 E 03 VCFMP Stage 2 A		


No additional clearing proposed in Stage 2C
STAGE 2B
STAGE 2C
STAGE 2D
STAGE 2A
9216 E05 VCFMP Stage 2 B
9216 E04 VCFMP Stage 2 C
9216 E07 VCFMP Stage 2 D
9216 E06 VCFMP Stage 2 B
9216 E08 VCFMP Stage 2 B
Native ree not part of this application
Exotic tree not part of this application
Native tree removed
Exotic tree removed
Native tree to remove for Stage 2
Significant tree to remove for Stage 2
Significant tree subject to arborist assessment Stage 2
Native tree subject to arborist assessment Stage 2
Native tree to remove during tree clearing for remediation works
Weed tree to remove during tree clearing for remediation works
Native tree to remove during tree clearing for Stage 2 stockpiling
Weed tree to remove during tree clearing for Stage 2 stockpiling
Native tree to retain
Significant tree to be retained
Retention during clearing for remediations works subject to works extent / requirements
Project Site
Stage boundaries
QLD DCDB
Path design
Road design
Lot design
Easement design
Indicative detention basin
1.5m high pool fence
Stage 1 design
Extent of Cut
Extent of Fill
Vegetation Clearing & Fauna Management Plan - Detail sheet context
saunders havill group
CLIENT:
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)
DISCLAIMER:
REFERENCES:
Engineering drawings (GK Group 2021)
AMENDMENTS:
A 21/05/2021 Preliminary JC
B 23/08/2021 Preliminary JC
C 2/09/2021 Preliminary JC
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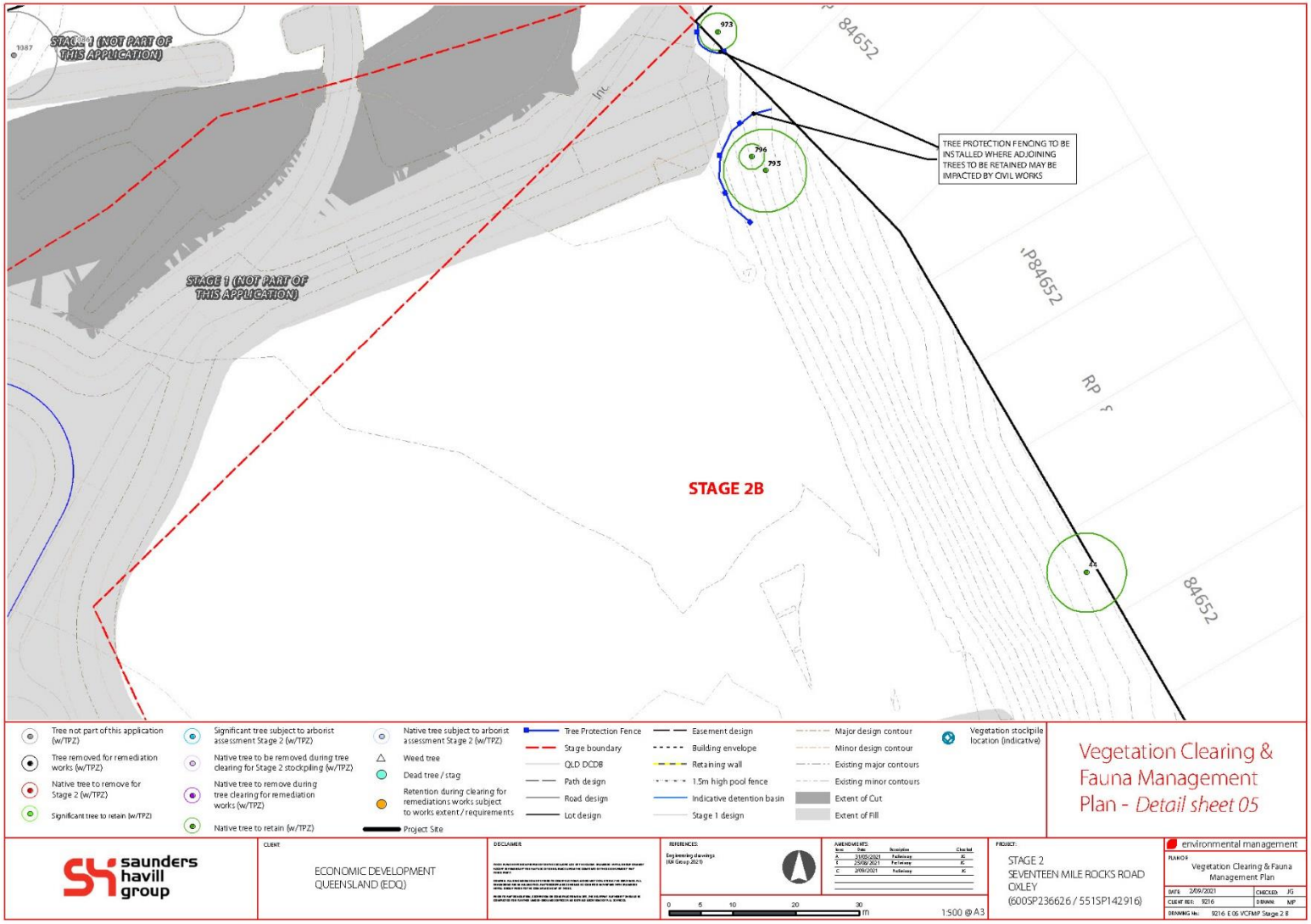
PROJECT:
STAGE 2
SEVENTEEN MILE ROCKS ROAD
OXLEY
(600SP236626 / 551SP142916)
environmental management
PLAN OF: Vegetation Clearing & Fauna Management Plan
DATE: 2/09/2021
CHECKED: JG
CLIENT REF: 9216
DRAWN: MP
DRAWING No: 9216 E04 VCFMP Stage 2 C


STAGE 1 (NOT PART OF THIS APPLICATION)
STAGE 1 (NOT PART OF THIS APPLICATION)
STAGE 2B
TREE PROTECTION FENCING TO BE INSTALLED WHERE ADJOINING TREES TO BE RETAINED MAY BE IMPACTED BY CIVIL WORKS
973
796
795
84652
RP84652
84652
Tree not part of this application (w/TPZ)
Tree removed for remediation works (w/TPZ)
Native tree to remove for Stage 2 (w/TPZ)
Significant tree to retain (w/TPZ)
Significant tree subject to arborist assessment Stage 2 (w/TPZ)
Native tree to be removed during tree clearing for Stage 2 stockpiling (w/TPZ)
Native tree to remove during tree clearing for remediation works (w/TPZ)
Native tree to retain (w/TPZ)
Native tree subject to arborist assessment Stage 2 (w/TPZ)
Weed tree
Dead tree / stag
Retention during clearing for remediations works subject to works extent / requirements
Project Site
Tree Protection Fence
Stage boundary
QLD DCDB
Path design
Road design
Lot design
Easement design
Building envelope
Retaining wall
1.5m high pool fence
Indicative detention basin
Stage 1 design
Major design contour
Minor design contour
Existing major contours
Existing minor contours
Extent of Cut
Extent of Fill
Vegetation stockpile location (indicative)
Vegetation Clearing & Fauna Management Plan - Detail sheet 05
saunders havill group
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)
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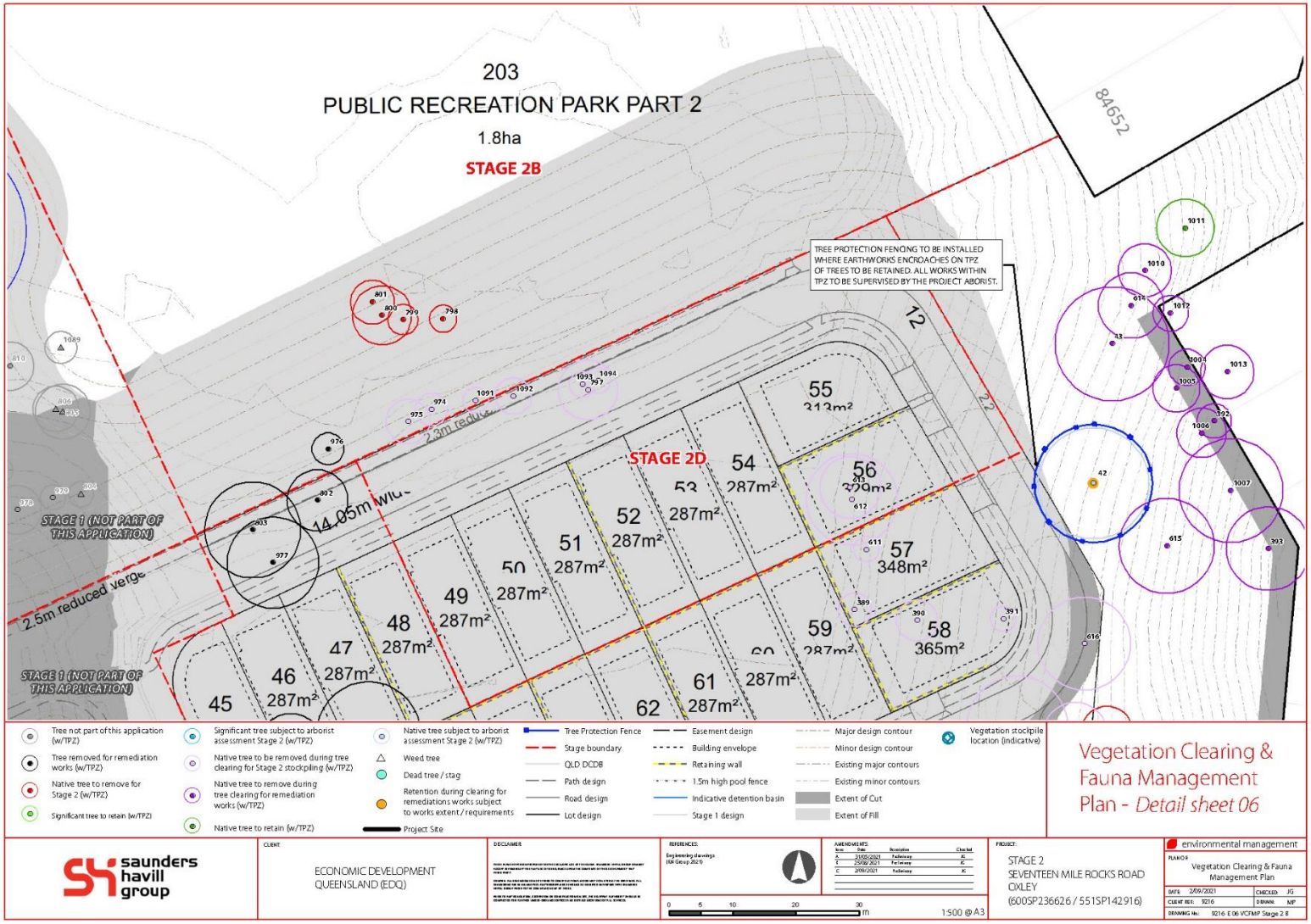
STAGE 2
SEVENTEEN MILE ROCKS ROAD
OXLEY
(600SP236626 / 551SP142916)
environmental management
Vegetation Clearing & Fauna Management Plan


203
PUBLIC RECREATION PARK PART 2
1.8ha
STAGE 2B
STAGE 2D
TREE PROTECTION FENCING TO BE INSTALLED WHERE EARTHWORKS ENCROACHES ON TPZ OF TREES TO BE RETAINED. ALL WORKS WITHIN TPZ TO BE SUPERVISED BY THE PROJECT ARBORIST.
84652
STAGE 1 (NOT PART OF THIS APPLICATION)
2.5m reduced verge
14.05m wide
45
46 287m²
47 287m²
48 287m²
49 287m²
50 287m²
51 287m²
52 287m²
53 287m²
54 287m²
55 313m²
56 329m²
57 348m²
58 365m²
59 287m²
60 287m²
61 287m²
62
Tree not part of this application (w/TPZ)
Tree removed for remediation works (w/TPZ)
Native tree to remove for Stage 2 (w/TPZ)
Significant tree to retain (w/TPZ)
Significant tree subject to arborist assessment Stage 2 (w/TPZ)
Native tree to be removed during tree clearing for Stage 2 stockpiling (w/TPZ)
Native tree to remove during tree clearing for remediation works (w/TPZ)
Native tree to retain (w/TPZ)
Native tree subject to arborist assessment Stage 2 (w/TPZ)
Weed tree
Dead tree / stag
Retention during clearing for remediations works subject to works extent / requirements
Project Site
Tree Protection Fence
Stage boundary
QLD DCDB
Path design
Road design
Lot design
Easement design
Building envelope
Retaining wall
1.5m high pool fence
Indicative detention basin
Stage 1 design
Major design contour
Minor design contour
Existing major contours
Existing minor contours
Extent of Cut
Extent of Fill
Vegetation stockpile location (indicative)
Vegetation Clearing & Fauna Management Plan - Detail sheet 06
saunders havill group
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)
STAGE 2
SEVENTEEN MILE ROCKS ROAD
OXLEY
(600SP236626 / 551SP142916)
environmental management
Vegetation Clearing & Fauna Management Plan
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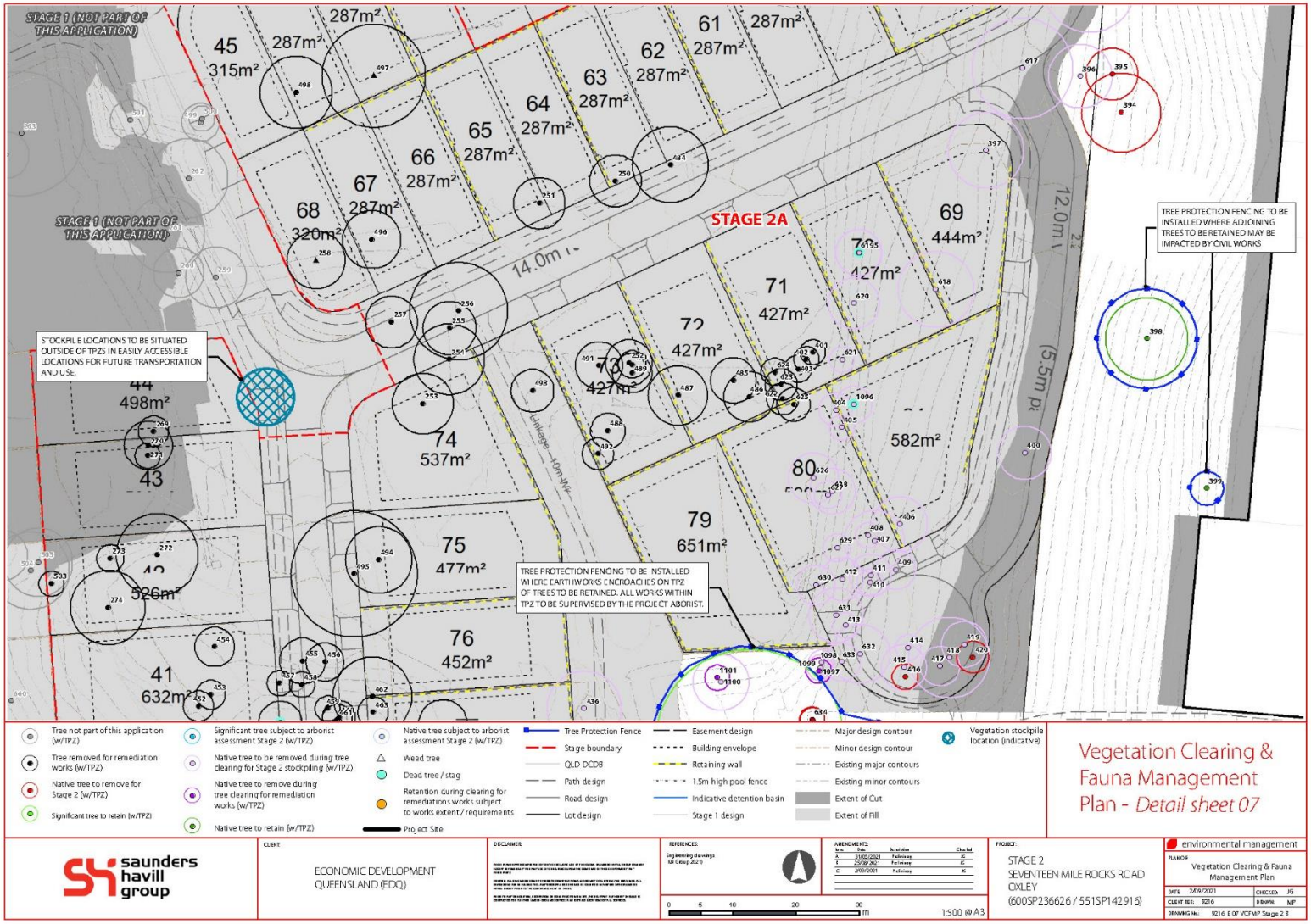
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STAGE 2A
STOCKPILE LOCATIONS TO BE SITUATED OUTSIDE OF TPZS IN EASILY ACCESSIBLE LOCATIONS FOR FUTURE TRANSPORTATION AND USE.
TREE PROTECTION FENCING TO BE INSTALLED WHERE ADJOINING TREES TO BE RETAINED MAY BE IMPACTED BY CIVIL WORKS
TREE PROTECTION FENCING TO BE INSTALLED WHERE EARTHWORKS ENCROACHES ON TPZ OF TREES TO BE RETAINED. ALL WORKS WITHIN TPZ TO BE SUPERVISED BY THE PROJECT ARBORIST.
Tree not part of this application (w/TPZ)
Tree removed for remediation works (w/TPZ)
Native tree to remove for Stage 2 (w/TPZ)
Significant tree to retain (w/TPZ)
Significant tree subject to arborist assessment Stage 2 (w/TPZ)
Native tree to be removed during tree clearing for Stage 2 stockpiling (w/TPZ)
Native tree to remove during tree clearing for remediation works (w/TPZ)
Native tree to retain (w/TPZ)
Native tree subject to arborist assessment Stage 2 (w/TPZ)
Weed tree
Dead tree / stag
Retention during clearing for remediations works subject to works extent / requirements
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Stage boundary
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Path design
Road design
Lot design
Easement design
Building envelope
Retaining wall
1.5m high pool fence
Indicative detention basin
Stage 1 design
Major design contour
Minor design contour
Existing major contours
Existing minor contours
Extent of Cut
Extent of Fill
Vegetation stockpile location (indicative)
Vegetation Clearing & Fauna Management Plan - Detail sheet 07
saunders havill group
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)
STAGE 2
SEVENTEEN MILE ROCKS ROAD
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environmental management
Vegetation Clearing & Fauna Management Plan
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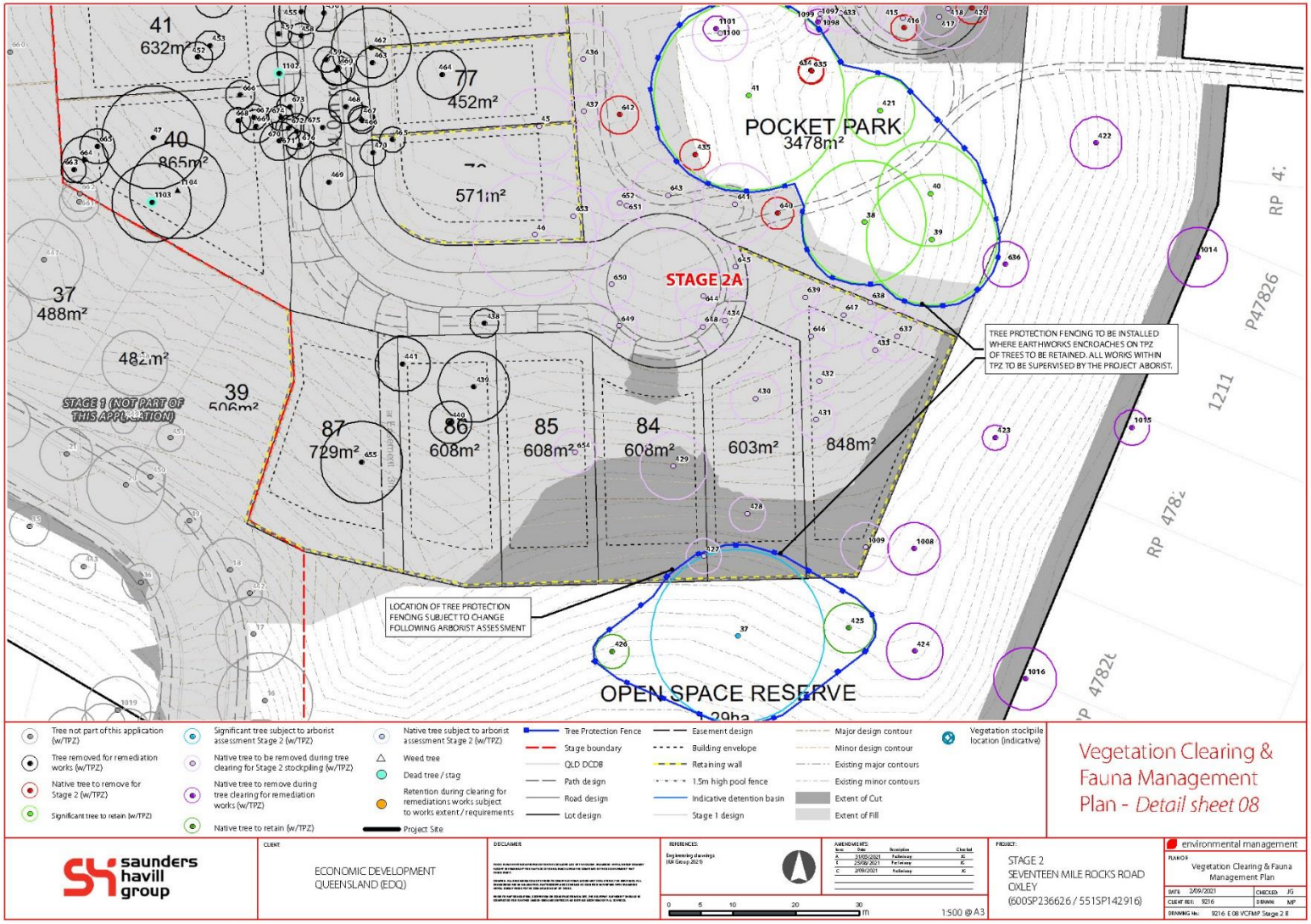
41
632m²
77
452m²
40
865m²
571m²
37
488m²
39
STAGE 1 (NOT PART OF THIS APPLICATION)
87
729m²
86
608m²
85
608m²
84
608m²
603m²
848m²
POCKET PARK
3478m²
STAGE 2A
TREE PROTECTION FENCING TO BE INSTALLED WHERE EARTHWORKS ENCROACHES ON TPZ OF TREES TO BE RETAINED. ALL WORKS WITHIN TPZ TO BE SUPERVISED BY THE PROJECT ARBORIST.
LOCATION OF TREE PROTECTION FENCING SUBJECT TO CHANGE FOLLOWING ARBORIST ASSESSMENT
OPEN SPACE RESERVE
RP 4:
P47826
1211
RP 478
Tree not part of this application (w/TPZ)
Tree removed for remediation works (w/TPZ)
Native tree to remove for Stage 2 (w/TPZ)
Significant tree to retain (w/TPZ)
Significant tree subject to arborist assessment Stage 2 (w/TPZ)
Native tree to be removed during tree clearing for Stage 2 stockpiling (w/TPZ)
Native tree to remove during tree clearing for remediation works (w/TPZ)
Native tree to retain (w/TPZ)
Native tree subject to arborist assessment Stage 2 (w/TPZ)
Weed tree
Dead tree / stag
Retention during clearing for remediations works subject to works extent / requirements
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Stage boundary
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Road design
Lot design
Easement design
Building envelope
Retaining wall
1.5m high pool fence
Indicative detention basin
Stage 1 design
Major design contour
Minor design contour
Existing major contours
Existing minor contours
Extent of Cut
Extent of Fill
Vegetation stockpile location (indicative)
Vegetation Clearing & Fauna Management Plan - Detail sheet 08
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ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)
1:500 @ A3
STAGE 2
SEVENTEEN MILE ROCKS ROAD
OXLEY
(600SP236626 / 551SP142916)
environmental management
Vegetation Clearing & Fauna Management Plan


FAUNA SAFE ZONE
FAUNA SAFE ZONE
FAUNA SAFE ZONE
STAGE 2B
STAGE 2C
STAGE 2D
STAGE 2A
Clearing direction to be determined by Fauna Spotter Catcher
Native tree not part of this application
Exotic tree not part of this application
Native tree removed
Exotic tree removed
Native tree to remove for Stage 2
Significant tree subject to arborist assessment Stage 2
Native tree subject to arborist assessment Stage 2
Native tree to remove during tree clearing for remediation works
Weed tree to remove during tree clearing for remediation works
Native tree to remove during tree clearing for Stage 2 stockpiling
Weed tree to remove during tree clearing for Stage 2 stockpiling
Native tree to retain
Significant tree to be retained
Retention during clearing for remediations works subject to works extent / requirements
Project Site
Tree Protection Fence
Extent of Cut
Extent of Fill
Vegetation stockpile location (indicative)
Vegetation clearing direction
Vegetation Clearing & Fauna Management Plan - Clearing Direction
saunders havill group
CLIENT:
ECONOMIC DEVELOPMENT QUEENSLAND (EDQ)
DISCLAIMER:
REFERENCES:
Engineering drawings (GN Group 2021)
AMENDMENTS:
PROJECT:
STAGE 2
SEVENTEEN MILE ROCKS ROAD
OXLEY
(600SP236626 / 551SP142916)
environmental management
PLAN OF:
Vegetation Clearing & Fauna Management Plan
DATE: 2/09/2021
CHECKED: JG
CLIENT REF.: 9216
DRAWN: MP
DRAWING No.: 9216 E09 VC FMP Stage 2 C
0 25 50 100 150 200 250 300 m
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Site Photos

Tree 41

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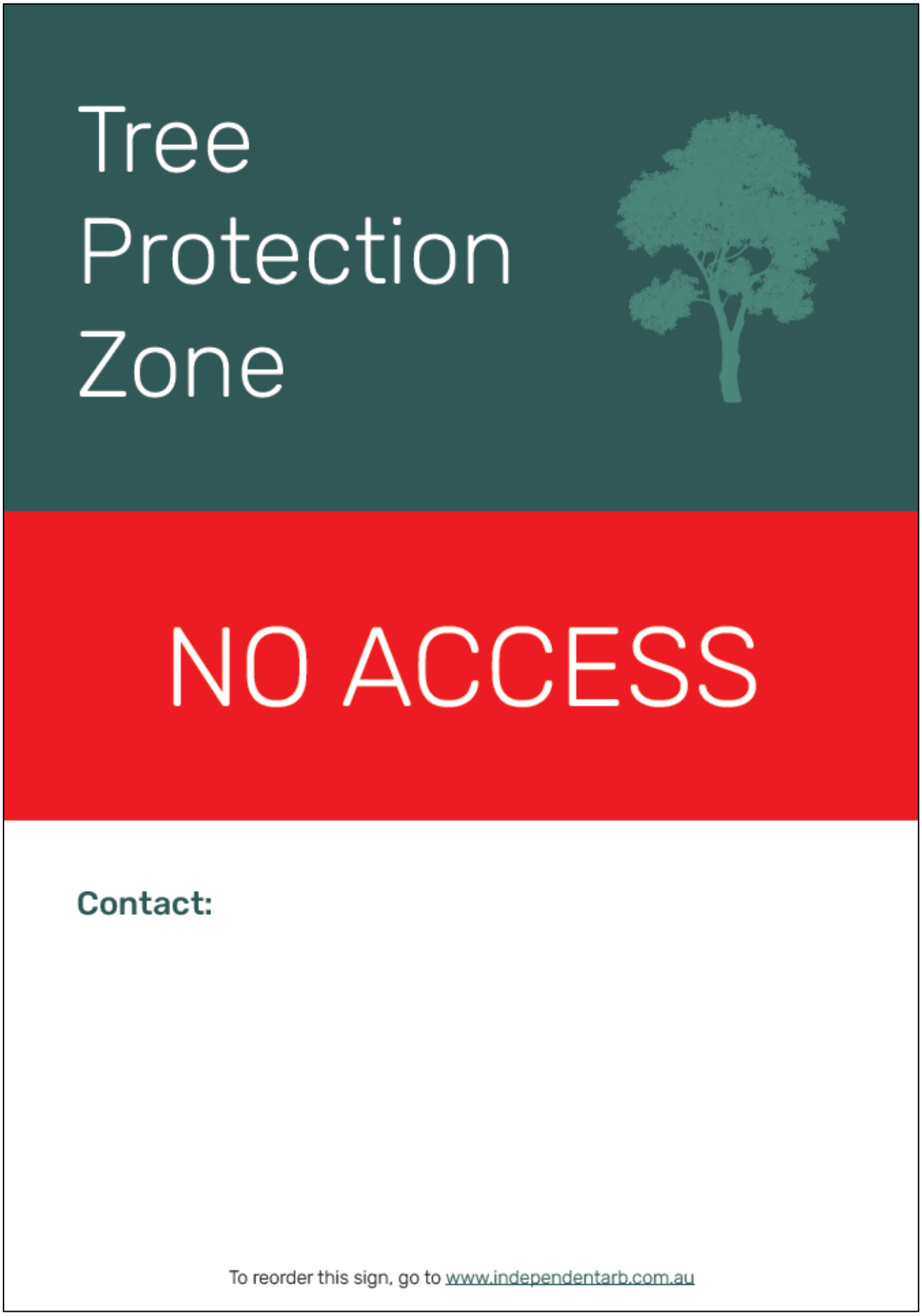
Tree 41

Reference Page

1. Australian Standards 2009, AS 4970-2009 Protection of trees on development sites
2. Australian Standards 2007, AS 4737-2007 Pruning of Amenity Trees
3. Mattheck K, Breloer H. 1994. The body language of trees, a handbook for failure analysis, London, England
4. Shigo, A.L. 1986. A New Tree Biology. Shigo & Trees, Associates, Durham, New Hampshire
5. Shigo, A.L. 1991, Modern Arboriculture. Shigo & Trees, Associates, Durham, New Hampshire
6. Bassuk, Nina, Jason Grabosky, Peter Trowbridge, and James Urban. "Structural Soil." Urban Horticulture Institute. Cornell University, 1996. Web. 26 Apr 2010. <http://www.hort.cornell.edu/uhi/outreach/csc/article.html>
7. Urban, J 2008, Up By Roots, Healthy Soils and Trees in the Built Environment, International Society of Arboriculture
8. Nearmap 2020, www.nearmap.com.au

Appendix 1


Tree
Protection
Zone
NO ACCESS
Contact:
To reorder this sign, go to www.independentarb.com.au

Appendix 3: Explanation of Terminology

Definition	Process Description
Removal	Complete tree removal leaving stump as close as possible to ground level. Recommended process will include chipping of all foliage limbs and timber and reinstatement of work site. Recommendation typically based on tree being assessed as representing a health and safety concern [Dead, dying, structurally unsound, unstable, poor form]
Remove and grind	Complete tree removal to include grinding of stump to a depth of 75 millimetres unless otherwise specified. Recommended process will include chipping of all foliage limbs and timber and reinstatement of work site. Stump site will be cleaned of all grinding debris and sawdust and backfilled with premium topsoil free from weeds.
Crown Clean (Deadwood)	Removal of all major/significant deadwood and dead branches up to [and including] 30 millimetres in diameter in trees overhanging pedestrian or vehicular areas or removal of dead branches > 50mm diameter in canopy of trees located in parkland or similar area unless otherwise specified.
Crown Clean (General pruning)	Recommended pruning process will include removal of broken, crossing, rubbing, diseased, stressed or dying branches or limbs with poor attachment. Additional work process may include pruning to define leaders, balance the crown, reduce weight load, or clear the tree from obstructions. In summary, to rectify, as far as is possible, any structural defects and eliminate undesirable growth or deadwood.
Crown Reduction (Canopy reduction)	Recommended pruning process may include light and general pruning typically to encompass removal of up to 15% but no more than 20% of the leaf-bearing crown. By definition the unique shape and form of the tree will not be altered or compromised by the pruning process. Typically, the consulting arborist will nominate the reduction percentage [%] appropriate to species, condition and assessment.
Crown Raising (Canopy lift)	Pruning processes maybe involve the raising of the tree's lower canopy to a height specified in metres. Typically, the process is performed to provide for pedestrian and or vehicular clearance and unless otherwise specified the default parameters will be to provide 2 metres clearance from ground level or as specified by local or state government regulation. From time to time pruning requirements may be altered to accommodate various site-specific requirements as advised by the consulting arborist accordingly.
Crown Restoration	Pruning process will encompass crown restoration and remedial works where the tree has been previously lopped or otherwise damaged. Not feasible when tree has extensive decay and should only be considered when there is evidence of healthy re- growth. When performed correctly the process of remedial pruning will most likely take several years to complete.
Hanger Limb / Unattached branch	Pruning process may be restricted to the removal of any hanger/s or dangerous/dead/dying limbs and will typically involve the removal of a single limb. In some instances, removal of an individual limb may be necessary to accommodate an obstruction and the consulting arborist will advise accordingly.
Directional Pruning	Pruning process will be restricted to pruning canopy away from buildings/service wires/property boundary and will typically be performed to avoid future growth in these areas. Where appropriate future growth will be directed away from obstruction by selected pruning so as to encourage the development of the growth of new leaders.

Habitat Pruning	When pruning deadwood from trees, simple techniques and methods can be employed to achieve hazard reduction whilst leaving food and habitat for tree dwelling fauna. Long pieces of deadwood can be reduced in length to limit potential hazard but still retain food for the insects and microorganisms. Stubs that have been left by old pruning or previous branch failure can be retained, and with the use of a hole-saw or chainsaw they may also be bored out to create a nesting hollow for native birds or small mammals. Source: Mosman Council
Deadwood	Dead branches within canopy of tree59F. Deadwood is a naturally occurring feature of most tree species and comprises dead or decaying branches within the canopy of a tree. Deadwood may have habitat value and require removal only according to the considered risk of its location, i.e. high use pedestrian area or damage to adjacent infrastructure.
Decay	The process of degradation of woody tissues by micro-organisms61F
Compaction	Results from loads or stress forces applied to the soil as well as shear forces. Both foot traffic and vehicle traffic exert both forces on soils. Vehicle traffic may cause significant compaction at depths of 150–200 mm (the area in which most absorbing roots are located). The degree of compaction will depend on weight of vehicles, number of movements, soil moisture levels and clay content. Soil handling, stockpiling and transporting also tend to lead to the breakdown of soil structure and thus to compaction. Vibration as a result of frequent traffic or adjacent construction activities will also compact soils55F
Codominant Structure:	Stems or trunks of about the same size originating from the same position from the main stem52F. When the stem bark ridge turns upward the union is strong; when the ridge turns inward the union is weak, a likely point of failure in storm or windy weather conditions or where increasing weight causes undue stress on the defective union53F

Source: AS4373-2003 Pruning of Amenity Trees & AS 4970-2009 Protection of Tree on Development Sites & Habitat Creation By Kieran O'Neill, Mosman Council.

Appendix 4: Normal Function of a Tree

Background Note: The following diagrams and explanatory notes are useful to illustrate the structure of a tree in a normal growing environment. This information is taken from AS4970-2009-Protection of trees on development sites which has been released subsequently to AS4373-2007- Pruning of amenity trees.

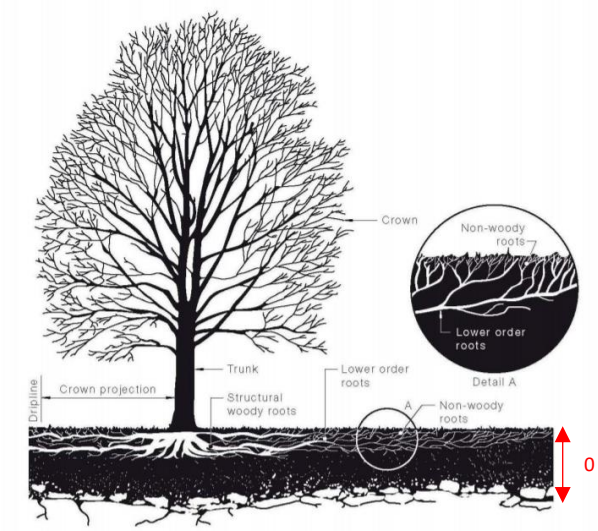


Figure 11: Structure of a tree in a normal growing environment

Leaves
The main function of leaves is photosynthesis, that is, the production of sugars. The sugars produced by the leaves (and any other green tissue) are the source of chemical energy for all living cells in the entire plant and as such are essential for the normal functioning and survival of the tree. Anything that directly or indirectly damages the leaves will interfere with photosynthesis.

Trunks and branches
Branches and trunks are composed of many tissues with specialized functions including the bark (protection), phloem (transport of sugars from the leaves), vascular cambium (growth of new transport tissues), sapwood (transport of water and nutrients from the roots), heartwood (strength and structural support) and rays (internal transport and storage of sugars). Damage to branches or trunks may allow infection by plant pathogens (disease causing organisms), disrupt the movement of vital materials and structurally weaken the tree.

Roots
The main functions of roots include the uptake of water and nutrients, anchorage, storage of sugar reserves and the production of some plant hormones required by the shoots. For roots to function, they must be supplied with oxygen from the soil. The root system of trees consists of several 'types' of roots found in different parts of the soil and is generally much more extensive than commonly thought. The importance of roots is easily overlooked because they are not visible, that is 'out of sight, out of mind'. Damage to the root system is a common cause of tree decline and death and is the most common form of damage associated with development sites.

Root systems consist of three main parts:

1. The structural woody roots (anchorage, storage and transport);
2. Lower order roots (anchorage, storage and transport); and
3. Non-woody roots (absorption of water and nutrients, extension, synthesis of amino acids and growth regulators) (see Figure).

In addition to lateral root spread being underestimated, root depth in trees has also been grossly exaggerated. Deep root systems or taproots are the exception rather than the rule. Most roots of most trees are found in the very top of the soil. The vast majority of these roots are small non-woody absorbing roots which grow upward into the very surface layers of the soil and leaf litter. This delicate, non-woody system, because of its proximity to the surface, is very vulnerable to injury."

Explanatory Note: The importance of gas exchange in soils

The fact that tree roots require oxygen to function is often misunderstood. Accessibility to available oxygen and water within the soil structure is dependent on the integrity of soil structure within their surrounds; when soils are compacted there is little space between soil aggregates with soil volume and total pore space, especially macropore space diminished. In turn, good soil oxygenation and gas exchange (Lonsdale) levels allow for successful function of tree roots. Oxygen levels in soils will typically decrease as soil depth increases and /or soils are heavily compacted.

Macropore is the term used to describe the relatively large space between soil particles that is usually air filled and allows for water movement and root penetration. Micropore is the term used to describe the space between soil particles that is relatively small and likely to be water filled.

Compaction results from loads or stress forces applied to the soil as well as shear forces. When soil within the root zone of a plant, including a tree, is compacted through either pedestrian or vehicular traffic, or by the heavy weight of stored materials or machinery, the ability of water and oxygen to penetrate the soil around the roots of living plants is compromised. Whilst tree roots are typically found in the top 600mm of the soil horizon, vehicle traffic, in particular may cause significant compaction at depths of 150–200 mm (the area in which most absorbing roots are located). (Refer Tree Function Note above).

The degree of soil compaction will depend on weight of vehicles, number of movements, soil moisture levels and clay content. Soil handling, stockpiling and transporting also tend to lead to the breakdown of soil structure and thus to soil compaction. Vibration, as a result of frequent traffic or adjacent construction activities, will also cause compaction of soil.

Contrary to the commonly held myth that all trees have tap roots, tree roots are typically located within the top 600mm of soil. Just as leaves perform the vital function of photosynthesis, tree roots are vital for the primary functions of anchorage, storage, absorption and conduction. Larger tree roots fulfil the main functions of anchorage, storage and conduction and smaller more fibrous tree roots, which grow primarily at the end of the main woody roots, fulfil a vital role in absorbing oxygen, essential mineral elements and moisture from the soil, often through a symbiotic relationship with soil borne fungi referred to as Mycorrhizae; the extent of root loss has the potential to jeopardise any or all of these main functions and most importantly may compromise the structural integrity of an established tree and its associated potential OH&S risk of failure occurring; any OH&S risk of potential failure in a high use area such as public roads, is noteworthy for all the wrong reasons and should be of major concern and avoided at all times. (Refer Appendix 2, Tree Function Note).

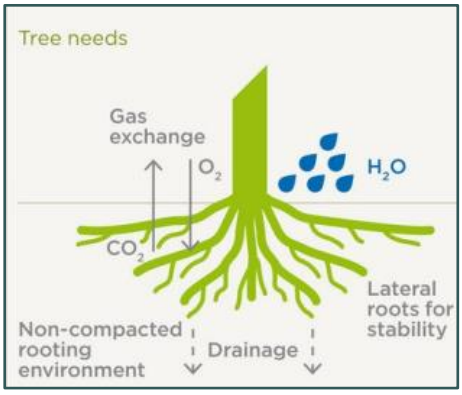


Figure 12: Gas exchange in woody tissues: the diffusion of gases into and out of a particular region (Jaluzot)

Reference Page

1. Australian Standards 2009, AS 4970-2009 Protection of trees on development sites.
2. Australian Standards 2007, AS 4737-2007 Pruning of Amenity Trees.
3. Mattheck K, Breloer H. 1994. The body language of trees, a handbook for failure analysis, London, England.
4. Shigo, A.L. 1986. A New Tree Biology. Shigo & Trees, Associates, Durham, New Hampshire.
5. Shigo, A.L. 1991, Modern Arboriculture. Shigo & Trees, Associates, Durham, New Hampshire.
6. Bassuk, Nina, Jason Grabosky, Peter Trowbridge, and James Urban. "Structural Soil." Urban Horticulture Institute. Cornell University, 1996. Web. 26 Apr 2010. <http://www.hort.cornell.edu/uhi/outreach/csc/article.html>.
7. Urban, J 2008, Up by Roots, Healthy Soils and Trees in the Built Environment, International Society of Arboriculture
8. Shigo, A.L. 1991, Modern Arboriculture. Shigo & Trees, Associates, Durham, New Hampshire.
9. Londsdale, David, Principles of Tree Hazard Assessment and Management Tree Hazard Assessment & Management TSO (The Stationery Shop, PO Box 29, Norwich, NR3 IGN)
10. Nearmap. (www.nearmap.com.au); accessed 21st March 2021.

Company Details

Independent Arboricultural Services

Independent Arboricultural Services, incorporated in May 2007, offers a completely independent arborist consulting and reporting service. Its directors and associated consultants bring extensive arboricultural knowledge gained over many years to this company. All consulting staff hold AQF Level 5 (Diploma of Arboriculture). Specialised advice when required, such as provision of survey mapping or engineering advice and certification is sourced from reputable professional providers according to site requirements as per Australian Standard 4970-2009.

Statement of Goal

To deliver continual improvement through the use of world's best arboricultural practices, supported by ongoing education and exposure to leading industry experts and research throughout the world.

Mission Statement

To provide timely, relevant and actionable consulting advice and practice based on the latest available and best scientific arboricultural knowledge.

Environmental Statement

Independent Arboricultural Services supports long term environmental sustainability sustainable sourced paper and ensuring all inks cartridges are recycled where possible.

Independent Arboricultural Services actively seeks to maintain a positive carbon footprint status and to that end is committed to protecting and preserving the environment, continuing to carry out tree planting, transplanting and replacement planting where practical, having planted in excess of 4000 trees in the first 2 years after its inception in May 2007 alone. Arboricultural recommendations involving the removal of tree/s will include replanting at a minimum ratio of 2 trees for any tree removed where possible. All arboricultural recommendations are made in accordance with world's best arboricultural practice and within the Australian Standards AS 4373-2007 Pruning of amenity trees and AS 4970-2009 – Protection of trees on development sites so as to ensure optimal outcomes for all living trees.

Independent Arboricultural Services acknowledges the benefits of healthy trees with good vigour and vitality and actively promotes better understanding in the general community of the contribution that trees make to reducing greenhouse gasses, the contribution of trees to better water retention and the prevention of soil erosion, the ability of trees to provide protection to infrastructure by diffusing strong winds in weather events and the contribution of trees to general liveability within the urban environment.

It is an acknowledged fact that air temperature beneath a tree canopy can be in excess of 5° Celsius lower than the surrounding ambient air temperature thereby reducing reliance on greenhouse gas producing air conditioners and coal fired power sources.