Annexure 12:

Engineering Services Report





Engineering Services Report

Gurner TM

69 – 73 Murphy Street

Port Douglas

Job Reference Number – 9283

Date: 19 November 2020

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1 Introduction

1.1. Purpose and Scope

Inertia Engineering has been commissioned by Gurner TM to prepare an Engineering Services Report for the proposed development at 69 – 73 Murphy Street, Port Douglas (the subject site). This report will support the development application submitted for the proposed development. The site layout and elevations are shown on the architectural plans in Appendix A.

This report addresses stormwater management (quality and quantity) during the construction and operational phases of the proposed development. It also demonstrates conceptually how the development can be serviced by water and sewer.

The required detailed design for the service infrastructure will be subject to the conditions (if any) attached to the Development Approval to be provided by Council and any nominated referral agencies.

This report has been prepared in accordance with the *State Planning Policy* (SPP, 2017), *Queensland Urban Drainage Manual Fourth Edition 2016 - Provisional* (QUDM, 2018) and Far North Queensland Regional Organisation of Councils Regional Development Manual (2017).

Throughout this report the developable area is referred to as the 'site' which is lot 516 PTD 2094 and 2 RP 724386.

1.2. Report Limitations

This report has been prepared by Inertia Engineering Pty Ltd for Gurner TM and may only be used and relied on by Gurner TM for the purpose agreed between Inertia Engineering and Gurner TM as detailed within this report.

Inertia Engineering otherwise disclaims responsibility to any person other than Gurner TM arising in connection with this report. Inertia Engineering also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by Inertia Engineering in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. Inertia Engineering has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by Inertia Engineering described in this report. Inertia Engineering disclaims liability arising from any of the assumptions being incorrect.

Inertia Engineering has prepared this report on the basis of information provided by Gurner TM and others who provided information to Inertia Engineering (including Government authorities), which Inertia Engineering has not independently verified or checked beyond the agreed scope of work. Inertia Engineering does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2 Site Characteristics

The land contained within the site is described as follows:

Title Details:	Lot 516 PTD 2094 and 2 RP 724386			
Street Address:	69 – 73 Murphy Street, Port Douglas			
Area:	Total: 2833m ²			

Refer to Appendix B for Survey Plan / DBYD information.

2.1. Location

The subject site is located in Port Douglas, located approximately 53km north-west of Cairns Airport. The site lies within a Tourist Accommodation zone according to the Douglas Shire Planning Scheme 2018. The site is bound by residential dwellings to the South and West, Murphy Street to the North and Four Mile Beach to the East.



Figure 2-1 – Location Plan

2.2. Topography

The site grades away from Murphy Street and towards the southern property boundary. The average grade across the site is 23% with a high point of 21.2m AHD along the northern boundary and a low point of 3.6m AHD along the southern boundary.

2.3. Existing Services

Detailed survey by RPS Australia East, 'Dial Before You Dig' (DBYD) data and as-constructed data covering the existing infrastructure services and utilities for the site and surrounding area has been obtained to determine any infrastructure required for the development. This existing infrastructure is outlined in the following sections.

2.3.1. Stormwater

The existing property has an existing 450mm stormwater drainage pipe running parallel and adjacent to the southern boundary. An existing stormwater manhole is located inside the western boundary of the property. All existing site runoff currently drains as sheet flow across the South-Western boundary into the downstream properties.

2.3.2. Sewer

An existing 150mm AC sewer reticulation main currently traverses the site which connects to a sewer manhole located on-site. Further details of the proposed sewer works will be provided in later sections of this report.

2.3.3. Water

No current water service connection is provided to the subject site, with the closest water reticulation main located within Macrossan Street and Murphy Street. Further details on the proposed water service connection will be provided in later sections of this report.

2.3.4. Electrical/Gas/Telecommunications

Existing telecommunication and electrical infrastructure located along Murphy Street is currently used to service the property.

Gas infrastructure is currently located in the vicinity of the property, however, no service connection is currently located on-site.

Note that the location of infrastructure external to the site has been determined from DBYD data.

3 Proposed Development

The development consists of a mixed use development, consisting of 16 apartments, 18 hotel rooms and a food and drink outlet.

Refer to Appendix A for the proposed site layout and elevations.



Figure 3-1 – Development Layout

4 Flooding

The subject site is not subject to any flooding overlays but is recognised to potentially be affected by Storm Tide flooding due to proximity to the coastline. Figure 4-1 below indicates that the subject site is outside of council's flooding overlays.



Figure 4-1 - Current Flood and Storm Tide Overlay

According to the Cairns Region Storm Tide Inundation Study (2013) the applicable flood level, accounting for a 0.8m Sea Level Rise, for a development that is situated within the wave runup zone in Port Douglas is 3.87m AHD. This information has been extracted from the full report (Table 5-2) and presented in Table 4-1 below for reference.

	Projected 2100 1% AEP Storm Tide	1% AEP Storm Tide including Wave Effects (m AHD)			
Location / AEP	0.8m SLR	1.1m SLR			
Bramston Beach	3.58	3.88			
Cairns North Beach	4.04	4.34			
Trinity Beach	3.86	4.16			
Oak Beach	3.85	4.15			
Port Douglas	3.87	4.17			
Wonga Beach	4.04	4.34			
Thornton Beach	3.74	4.04			

Table 4-1 – Projected 2100 1% AEP Storm Tide Flood Levels

Table 8.2.4.3.a from the DSC Planning Scheme (2018) states that any development situated within the Flood and Strom Tide hazards overlay is required to provide immunity to the defined inundation event plus a free board of 300mm. This requires the proposed development to have a minimum immunity to 2100 1% AEP flood levels.

The existing site is considered to be located within the wave runup zone, which is assumed by council to be all land within 200m of the shoreline. Due to the limited understanding of the impacts of wave effects on these properties, the Cairns Region Storm Tide Inundation Study has proposed a minimum freeboard of 1m above the Storm Tide level identified above.

Council has advised that a new dynamic storm tide flood study has been commissioned and the results are expected to recommend a lesser freeboard.

The development proposes a minimum floor level of RL 4.200m AHD, which is >300mm above the applicable 2100 1% AEP Storm Tide level.

5 Filling and Excavation

5.1. Earthworks

Bulk excavation to a depth of circa. 15 meters is proposed to set the basement level back into the existing slope below Murphy Street.

High level investigation into the construction methodology for proposed basement excavation has been carried out with input from geotechnical, structural and architectural consultants. The preferred design methodology proposed for basement retention involves a combination the following:

- Shotcrete retaining wall with permanent soil anchors (Murphy St boundary)
 - Following Council approval, soil nails are proposed to extend into the Murphy Street Road Reserve
 - It should be noted that the existing slope is exhibiting stability issues and the proposed excavation and retention systems and methodology will both remediate the slope and protect Council's assets on Murphy Street.
- Shotcrete retaining wall with sub vertical micorpiles (Western boundary)
 - o Micropiles will not extend beyond the property boundary
- Traditional retaining wall systems with temporary cut batters up to 1:3 slope
- Localised treatment where required to remediate scour/stability issues.

The proposed open space, landscaping and driveway areas will be shaped to tie in with the surrounding natural ground.

Refer to Appendix C which shows a schematic of the earthworks proposed for the site.

In all situations where earthworks are proposed and any ground is disturbed by construction works, sediment and erosion control measures will be implemented in accordance with the following documents:

- Relevant DSC sediment and erosion control guidelines;
- International Erosion Control Association (IECA) Sediment and Erosion Control Guidelines;
 and
- Australian Standards AS 3798-2007.

Given that the site is below RL 20m AHD, the proposed development is considered to be prospective land for the existence of acid sulphate soils (ASS). Further investigations may be required subject to geotechnical advice.

5.2. Erosion and Sediment Control Measures

5.2.1. Pre-Development

Prior to construction, the following sediment and erosion control measures will be implemented to minimise disturbance and ensure water quality is maintained;

- Set out transport routes to ensure minimal vegetation disturbance;
- Construct entry/exit areas that comprise a designed gravel pad or hardwood logs in accordance with the IECA (2008);
- Install sediment fences around the proposed bulk earthworks site (along toe of batter alignment); and
- Install dust control fences adjacent to the proposed bulk earthworks site.

5.2.2. Bulk Earthworks

- Earthworks areas are to be protected against wind and water erosion;
- Silt fences are to be erected around the base of the earthworks and material stockpiles;
- Stockpiles and construction material are not permitted to be stored within the road reserve; and,
- Diversion drains to be provided at upstream catchments to reduce flows onto earthworks areas.

5.2.3. Construction

The following measures will be undertaken to mitigate water quality impacts during the construction phase:

- Sediment fences to be erected at the base of all batters and stockpiles to prevent sediment transportation off site;
- Grass filter strips to be placed along all road verges;
- All sediment control structures to be maintained in an effective manner and inspected after each storm event. No structure is to accumulate sediment above 40% of its capacity;
- Dust producing areas to be swept to remove silt/dust and wetting of roads is only permitted where sweeping has failed;
- At least one bin or litter trap is to be provided for waste material.

5.2.4. Post-Development-Maintenance Period

Silt fences are to remain in place during the maintenance period until the landscaping has established and accepted "On-Maintenance" by DSC.

5.3. Performance Objectives and Indicators

The DSC Guideline on identifying and applying water quality objectives in the Douglas Shire region should be in accordance with those set out in the *BCC water quality management guidelines (2000)* which states that stormwater runoff during the construction phase must be in accordance within the concentration ranges shown in Table 5.1 below.

Table 5-1 - Construction Phase Pollutant Objectives

Pollutant	Criteria		
Total Suspended Solids	90th %tile < 100mg/L for wet weather periods 15mg/L for combined wet and dry periods		
рН	6.5 – 8.5		
Total Nitrogen (mg/L)	0.65		
Total Phosphorous (mg/L)	0.07		
Dissolved Oxygen	80 to 105 percent saturation		
Oils and Grease	No visible films or odours		
Litter	No anthropogenic material greater than 5mm		

5.4. Monitoring and Maintenance

The following monitoring and maintenance procedures are to be undertaken by the site supervisor during all phases of the development:

- Restrict all work activities to designated construction areas;
- Earthworks and site cleaning are undertaken in accordance with the Erosion and Sediment Control plans;
- Inspections of Stormwater and Sediment and Erosion Controls are to be conducted at the end of each construction day and after each rainfall event (>25mm); and
- Any failure to the stormwater system shall be immediately rectified to prevent uncontrolled discharge from the site.

6 Stormwater Management

6.1. Objectives

The hydrologic objectives have been set in accordance with QUDM (2018) and FNQROC Development Manual (2017), including but not limited to:

- The proposed development shall ensure that all stormwater drainage is directed to a lawful point of discharge in accordance with QUDM Section 3.9 (2018);
- No adverse impact on adjoining or downstream properties; and
- Best practice solution with regards to water quality has been designed and certified by an RPEQ.

6.2. Lawful Point of Discharge

The nominated lawful point of discharge for the site is the existing stormwater gully pit located outside of the south-eastern property boundary. All site runoff will drain through Council's stormwater network and discharge directly into the Pacific Ocean via a headwall located on Four Mile Beach.

6.3. Stormwater Quantity Calculations

The Rational Method was used to estimate the site flow for the developed site and external catchments to assist in assessing the suitability of existing downstream infrastructure to take site flows which do not, under existing conditions, enter the piped drainage network until they reach Macrossan St.

6.3.1. Developed Conditions

Under developed conditions, there are two internal catchments:

- C1 Roof area 2,277 m²
- C2 Remaining ground and landscape 501m²

The total fraction impervious of the developed catchment is 85%. Note that the developed catchment includes the site only and does not include any external areas.

Daramotors	Units	Design Storm Event (yr ARI)						
Parameters		1	2	5	10	20	50	100
Catchment Area ha					0.278			
Time of Concentration	min	5.0						
Runoff Coefficient (Cy)		0.70	0.74	0.853	0.87	0.91	1.00	1.00
Rainfall Intensity (ly)	mm/hr	133.96	170.22	209.54	232.34	164.12	305.93	338.08
Peak Flow	L/s	71.5	96.6	132.8	155.0	185.1	230.2	256.2

Table 6-1 – Developed Site Flows

6.3.2. External Upstream Catchments

The upstream catchment for the site has been taken as one large external catchments as per Figure 6.1 below. Council's Ben Armbrust has advised that an existing diversion drain has been implemented as shown below by the blue line, which diverts all upstream flows towards Owen Street. This information has been relied upon to determine the total external catchment area as described in Table 6.2.



Figure 6-1- External Upstream Catchment

Table 6-2 – Greater Catchn

Darameters	Units	Design Storm Event (yr ARI)						
Parameters		1	2	5	10	20	50	100
Catchment Area ha		1.244						
Time of Concentration	min	8.2						
Runoff Coefficient (Cy)		0.66	0.70	0.78	0.72	0.86	0.94	0.98
Rainfall Intensity (ly)	mm/hr	114.66	145.77	179.67	193.31	226.64	262.72	290.55
Peak Flow	L/s	260.0	351.1	483.7	564.8	574.4	856.2	988.1

6.3.3. Downstream Drainage Capacity

As all of the post-developed roofwater runoff is proposed to drain to the existing field inlet located outside of the south-eastern property boundary, a pipe capacity assessment was undertaken on the existing 450mm pipe immediately downstream.

The existing 450mm pipe, laid at a slope of 1 in 48, has a capacity of 411.5L/s and therefore conveys Q10 flows from the contributing external catchment (under post-development conditions) with an effectiveness of 73%.

Under pre-development conditions, contributing catchment flows are marginally less due to a higher pervious ground area and the existing pipe conveys Q10 flows with 77% effectiveness.

It is observed that the change of catchment conditions is minor as, despite the development presenting an increased impervious surface area, the pre-development catchment slope is significant, leading to a short Time of Concentration for rainfall events.

As surcharge flows will not present a risk to any downstream or nearby properties, it is recommended that the existing downstream stormwater infrastructure is sufficient pending future discussions with Council at the detailed design stage.

7 Operational Stormwater Quality Management

7.1. Introduction

The operational phase of the management plan focuses on appropriate consideration of Stormwater Quality Improvement Devices and Water Sensitive Urban Design (WSUD) principles to be incorporated into the total water cycle management of the developed site.

The State Planning Policy (2017) states for a proposed material change of use that involves a site area greater than 2500m² and will result in an impervious area greater than 25% a Site Based Stormwater Quality Management Plan is required.

7.2. Pollutants

Pollutants typically generated during the operational phase of the development are shown below (BCC, 2015).

Pollutant	Sources
Litter	Construction, construction, food waste materials
Sediment	Exposed soils and stockpiles
Oxygen demanding substances	Organic or chemical matter
Nutrients (N & P)	Nitrogen, phosphorus
Pathogens / Faecal coliforms	Sewerage
Hydrocarbons	Fuel and oil spills
Heavy metals (with fine sediment)	Sediment runoff
Surfactants	Detergents from car washing, cleansing agents
Organochlorines & organophosphates	Pesticides, herbicides
Thermal pollution	Heat (ie runoff from impervious areas)
pH altering substances	Washwaters

Table 7-1 – Pollutants typically generated during the operational phase

7.3. Water Quality Objectives

The FNQROC Development Manual – Stormwater Quality Management (2019) sets out the following water quality objectives for Far North Queensland in order to protect downstream receiving waters:

•	Total Suspended Solids (TSS)	80% reduction
•	Total Phosphorus (TP)	60% reduction
•	Total Nitrogen (TN)	40% reduction
•	Gross Pollutant (>5mm)	90% reduction



The percent reductions listed above are the target reductions for comparing mitigated site annual pollutant loads with unmitigated site annual pollutant loads. The proposed treatment strategy selected for the development will ensure these objectives are met for all pollutants.

7.4. Proposed Treatment Strategy

The proposed treatment strategy that can achieve Councils water quality objective (please refer to Section 7.3 for details) will incorporate the following;

- 2 OceanGuards with 200micron mesh bags (OG-200)
- A 7 x 690mm PSorb cartridge StromFilter system within a precast manhole

Please refer to Appendix C for the conceptual design drawings.

7.5. Water Quality Modelling

The proposed treatment strategy above has been modelled using MUSIC version 6.3.

Rainfall, catchment properties and pollutant characteristics have been sourced from Water By Design's 'MUSIC Modelling Guidelines' (2010).

The rainfall data uses rainfall station 31011 (Cairns), 6 minute time step from 01/01/1975 to 31/12/1984 and all source and treatment nodes parameters have sourced from Water By Design's 'MUSIC Modelling Guidelines' (2010).

The model source node parameter values and pollutant concentration parameters are shown in the tables below.

Table 7-2 - MUS	C Source Node	Parameters
-----------------	---------------	------------

Rainfall Runoff Parameters	Values
Rainfall Threshold (mm/day)	1.00
Soil Storage Capacity (mm)	500
Initial Storage (% of capacity)	10
Field Capacity (mm)	200
Infiltration Capacity Coefficient – a	211
Infiltration Capacity Exponent – b	5
Initial Depth (mm)	50
Daily Recharge rate (%)	28
Daily Baseflow Rate (%)	27
Daily Deep Seepage (%)	0



		T	SS	Т	Р		TN
		Base Flow	Storm Flow	Base Flow	Storm Flow	Base Flow	Storm Flow
Roof	Mean (Log mg/L)	N/A	1.30	N/A	-0.89	N/A	0.26
	Std Dev (Log mg/L)	N/A	0.39	N/A	0.31	N/A	0.23
Ground	Mean (Log mg/L)	1.00	2.18	-0.97	-0.47	0.20	0.26
	Std Dev (Log mg/L)	0.34	0.39	0.31	0.31	0.20	0.23

Table 7-3 - MUSIC Pollutant Concentration Parameters – Urban Residential

The subject site has been split into the following areas for the purposes of the MUSIC modelling;

Table 7-4 - Music Model Areas

Land Type	Area (m²)
Roof (100% Impv)	2,277m ²
Ground (30% Impv)	501m ²

The configuration of the model and results are shown in Figure 7-1 below. This demonstrates that the water quality objectives can be achieved by incorporating the proposed treatment strategy into the development.



Figure 7-1 MUSIC Model Configuration

8 Services, Works and Infrastructure

8.1. Policies

The internal sewerage and water reticulation works proposed within the development will comply with the following documents:

- AS 3500.2 Plumbing and Drainage Sanitary plumbing and drainage
- AS 3500.1 Plumbing and Drainage Water Services.

All privately owned water supply infrastructure will be designed in accordance with the relevant plumbing and drainage standards to ensure adequate connection to the DSC owned water reticulation main. Any live works will comply with the following documents:

- Relevant DSC development guidelines & standard drawings
- SEQ WS&S D&C Code Amendment to Sewerage Code of Australia
- Water Association of Australia (WSAA) Sewerage Code of Australia guidelines and standard drawings

8.2. Sewerage Reticulation

A 150mm sewer connection has been proposed to service the property.

As the existing sewer reticulation on site is higher than the lower floor levels, the current proposal is to remove the existing pipework in favour of a gravity sewer reticulation main extension from the existing pump station located on the Esplanade , subject to DSC approval.

An alternative, pump-out solution can be explored as part of the detailed design phase subject to further discussions with council.

Detailed sewer reticulation drawings will be provided as part of the future Operational Works for civil works application once the development application has been approved by Council. Any relevant 'build over' asset applications will be submitted to council for approval.

Refer to the concept engineering drawings in Appendix C for details.



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8.3. Water Reticulation

An extension to the existing water reticulation main currently located on Macrossan Street is proposed as part of this development including a new service and meter to the subject site.

Note that the suitability of this proposed connection point is subject to discussions with DSC to be undertaken at the Operational Works stage.

Any works connections to the existing water main shall be carried out by DSC at the cost of the applicant unless written permission is granted for connection to be made by a nominated contractor. The contractor shall take all precautions to minimise inconvenience to the residences serviced by the existing water infrastructure.

Detailed water reticulation drawings will be provided as part of a future Operational Works for civil works application once the development application has been approved by Council.

Refer to the concept engineering drawings in Appendix C for details.

8.4. Electricity, Communications and Gas

Electricity, gas and telecommunication infrastructure is available in the near vicinity of the subject site. Although the capacity of these existing services has not been determined, it is anticipated that the availability of these services and the required capacity for the proposed development should not pose an issue to the completion of the project.

The developer or services consultant should contact the NBN during the Operational Works phase to confirm their requirements for the development.

9 Conclusions and Recommendations

This Engineering Services Report has assessed the stormwater management, earthworks and service infrastructure for the proposed development at 69 – 73 Murphy Street, Port Douglas.

Earthworks, erosion and sediment control solutions required on site can be performed using common and accepted methods. It is noted that the proposed earthworks will trigger retaining works which have been investigated at a high level with input from geotechnical and structural engineering consultants.

The subject site is not affected by any flooding overlays but is recognised to potentially be affected by Storm Tide flooding due to proximity to the coastline. The available flooding information is not site-specific and Inertia has been advised that DSC is currently undertaking a review of the study, with updated recommendations and advice expected to be released in late 2020 or early 2021. The development proposes a minimum floor level of RL 4.200m AHD, which provides >300mm freeboard above the applicable 2100 1% AEP Storm Tide level.

The stormwater management strategy has the following components:

- All runoff will discharge to the existing stormwater field inlet located just outside of the south-east property boundary.
- The existing downstream stormwater infrastructure will not require to be upgraded as there will be no further surcharge flows cause by the proposed development.
- Proprietary stormwater quality treatment incorporating 2 OceanGuards and a 7 x 690mm PSorb cartridge StromFilter system within a precast manhole

Service supply points for water and sewer reticulation, electricity, telecommunications and gas are located within close proximity to the proposed development and should not present any major connection issues.

Vehicle access and manoeuvring, as well as pedestrian needs have been considered during architectural design and have been reflected within the development layout safely.

This report has demonstrated that the proposed development proposal provides an acceptable solution for all engineering services and has been designed to comply with *DSC Planning Scheme* (2018).

10 References

AS/NZS (2003) Australian Standards/New Zealand Standards, 'Plumbing and Drainage – Part 1: Water Services', 2003

AS/NZS (2003) Australian Standards/New Zealand Standards, 'Plumbing and Drainage – Part 2: Sanitary Plumbing and Drainage', 2003

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Institute of Public Works Engineering Australasia, Queensland Division (2016), Queensland Urban Drainage Manual Fourth Edition 2016 – Provisional

SEQ WS&S D&C Code (2013), 'South East Queensland Water Supply & Sewer Design & Construction Codes – Amendments to Water & Sewerage Codes of Australia, 2013

RPS Australia East Pty Ltd (2020) Detail Survey of 69-73 Murphy Street, Port Douglas 1-Oct-20

WSAA (2002) Water Services Association of Australia, 'Water Supply Code of Australia – Part 1: Planning and Design', 2002

WSAA (2002) Water Services Association of Australia, 'Sewerage Code of Australia – Part 1: Planning and Design', 2002















GURNER TM

SCALE: AS SHOWN @ A1 PLOT DATE: 18/11/2020 DRAWING NO: RE REV: P1.06









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REV

DESCRIPTIO

CODE	DESCRIPTION
ROOF	
TRS-1	ROOF TILE: TIMBER, CLAY, CONC. OR SIMILAR APPROVED
MR-1	PROFILED METAL ROOF SHEE COLOUR: MID GREY TONE OR SIMILAR APPROVED
WALLS	
REN-1	TEXTURED RENDER FINISH COLOUR: WHITE TONE OR SIMILAR APPROVED
REN-2	SMOOTH RENDER FINISH COLOUR: WHITE TONE OR SIMILAR APPROVED
CON-1	INSITU CONCRETE FINISH COLOUR: NATURAL OR SIMILAR APPROVED
TC-1	TIMBER CLADDING OR FC SHEET, OR SIMILAR APPROVED
ST-1	STACKED STONE WALL / FENCE
GLZ-1 / PC-3	CLEAR GLAZING / LIGHT GREY TONE FRAME OR SIMILAR
GLZ-2 / PC-4	CLEAR GLAZING / DARK GREY TONE FRAME OR SIMILAR
RET-1	RENDERED RETAINING WALLS. LIGHT TO MID TONES OR SIMILAR APPROVED
FLOORS	
PAV-1	GROUND / POOL PAVING COLOUR: LIGHT TONED, LIMESTONE OR SIMILAR
PAV-2	COBBLED PAVING <u>OR</u> STAMPED CONCRETE OR SIMILAR APPROVED
TD-1	TIMBER WHARF BOARD DECKING, OR SIMILAR APPROVED
LWN-1	TRAFFICABLE GRASS LAWN, AS PER LANDSCAPE ARCH.'S DETAILS & SPECIFICATION
CON-1	INSITU CONCRETE FINISH COLOUR: NATURAL OR SIMILAR APPROVED
FIXTURES	
GRC-1	GLASS REINFORCED CONCRETE PLANTER BOX COLOUR: NATURAL CONCRETE FINISH OR WHITE, OR SIMILAR APPROVED
SCR-1	OPEN PERGOLA COLOUR: TIMBER, METAL OR SIMILAR APPROVED
SCR-2	ALUMINIUM SHUTTERS COLOUR: PC-1 (WHITE) OR SIMILAR APPROVED
BAL-1	METAL BALUSTRADE PC-1 WHITE POWDERCOAT
FEN-1	TIMBER PALING FENCE
FEN- 2	PAINTED BATTENED FENCE

μ	А	E	

PROJECT: 69-73 MURPHY STREET, PORT DOUGLAS QLD 4877 DRAWING CREATED: DRAWING TITLE:

GURNER TM

SCALE: AS SHOWN @ A1 PLOT DATE: 18/11/2020 DRAWING NO: **REV**: P2.05

DRIVEWAY ENTRY

SECTION SCALE: 1:100 S.01

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DATE

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S.01 CROSS SECTION

SECTION SCALE: 1:100 **S.02**

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S.02 CROSS SECTION

SECTION SCALE: 1:100 **S.03**

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S.03 CROSS SECTION

SCALE: AS SHOWN @ A1 PLOT DATE: 18/11/2020 DRAWING NO: REV: P3.03

LEGEND

0	Bollard	\boxtimes	Telstra Pit
•	Electrical Pillar	Н	Fire Hydrant
S	Sewer Manhole	X	Stop Valve
++	Change of Grade		Field Inlet Pit
+	Top of Bank	D	Drainage Manhole
++	Toe of Bank	X	Gas Valve
++	Edge of Track	¢	Light Pole
++	Edge of Bitumen	0	Power Pole
	Road Crown	Ŧ	Sign
++	IL of Conc. Lined Drain		Overhead Electricity
++	Back of Kerb	-E	Underground Electricity (from records)
++	Edge of Vegetation	+-T+	Underground Telstra (from records)
++	Edge of Garden	+-w+	Underground Water (from records)
++	Fence	+-s+	Underground Sewer (from records)
+-D+	Underground Drainage	++	Underground Gas (from records)

IMPORTANT NOTE

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- per al solution de verime ou y clinicating against une da scale. 5. The tills boundaries as shown hencen were not marked at the time of survey and have been determined by yalan dimensions only and not by field aurow, if find able to be so located, services have been plotted from the records of relevent authorities where available and have been noded accordingly on this join. Where such records either do not oxist or are inadequate a notation has been made hence. 6. Prior to any demolfation, excavation or construction on the site, the relevent authority should be contacted for possible location of further underground services and detailed locations of all services.

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Detail and Contour Survey Lot 2 on RP724386 and Lot 516 on PTD2094 Cnr Murphy Street and The Esplanade Port Douglas Queensland

SCALE

1:200

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- per of local or 5 where a shown are grant in the direction of survey and have been determined by plan dimensions only and not by field anywey. If not all be to be so located, services have been plotted from the records of relevant authorities where available and have been noted accordingly on this plan. Where such records either do not exist or are inadequate a notation has been made hereon.
 6. Prior to any demolfition, excavation or construction on the site, the relevant authory should be contacted for possible location of further underground services and detailed locations of all services.

Fire Hydrant Stop Valve Field Inlet Pit Drainage Manho Gas Valve Light Pole Power Pole Sign Overhead Electricity Underground Electricity (from records) Underground Telstra (from records) Underground Water (from records) Underground Sewer (from records) Underground Gas (from records)

Telstra Pit

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Detail and Contour Survey Lot 2 on RP724386 and Lot 516 on PTD2094 Cnr Murphy Street and The Esplanade Port Douglas Queensland

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LEGEND

SITE BOUNDARY ExSW -— ExS — - FxW ------____ FxT ____ — ExOH — -----XX.XX------XX.XXXm × XX.XXXm x XX.XXXm ×

EXISTING PROPERTY BOUNDARY EASEMENT BOUNDARY EXISTING CONTOURS (AT 0.50m INTERVALS) EXISTING KERB EXISTING EDGE OF BITUMEN EXISTING ROAD CENTRELINE EXISTING CHANGE OF GRADE EXISTING TOP OF BATTER EXISTING BOTTOM OF BATTER EXISTING CONCRETE DRAIN EXISTING STORMWATER EXISTING SEWERAGE EXISTING WATER EXISTING TELSTRA EXISTING OVERHEAD ELECTRICITY DESIGN CONTOUR (INTERVAL 0.10m) FINISHED SURFACE ELEVATION LABEL EXISTING SURFACE ELEVATION LABEL PROPOSED RETAINING WALL HEIGHT

EARTHWORKS LEVELS 1. PRELIMINARY EARTHWORKS VOLUMES AND LEVELS BASED ON SLAB THICKNESS OF 150mm. REFER STRUCTURAL DESIGN DRAWINGS AT DETAILED DESIGN STAGE FOR FINAL PAD THICKNESS. ALL RETAINING WALL HEIGHTS ARE TO EARTHWORK SURFACE LEVELS AND TO NEAREST 100mm HEIGHT.

EARTHWORKS VOLUMES			
(EXISTING SURFACE TO EARTHWORKS SURFACE)			
TOTAL CUT 14,725m ³			
TOTAL FILL 200m ³			
TOTAL BALANCE (CUT TO SPOIL) 14,525m ³			

CUT & FILL LEGEND				
MINIMUM ELEVATION	MAXIMUM ELEVATION	COLOUR		
-16.000m	-12.000m			
-12.000m	-8.000m			
-8.000m	-4.000m			
-4.000m	0.000m			
0.000m	4.000m			
4.000m	8.000m			

NOTES:

B ISSUED FOR APPROVAL

A ISSUED FOR APPROVAL

REV DESCRIPTION

- NUTES: CUT AND FILL IS PROVIDED FOR GUIDANCE ONLY AND DENOTES LEVEL DIFFERENCE BETWEEN EARTHWORKS SURFACE AND EXISTING SURFACE. AREAS NOT REQUIRING EARTHWORKS ARE TO REMAIN UNDISTURBED. CUT/FILL IS TO ULTIMATE FINISHED INCLUDING TOPSOIL AND ROAD SURFACE AND DOES NOT CONSIDER EXCAVATION NEEDED FOR ROAD PAVEMENTS, TOPSOIL ETC. FINAL EXTENTS OF CUT/FILL ARE TO BE DETERMINED BY THE CONTRACTOR ON SITE IN CONJUNCTION WITH THE EARTHWORKS DESIGN.

LEGEND SITE BOUNDARY EXISTING PROPERTY BOUNDARY EASEMENT BOUNDARY EXISTING CONTOURS (AT 0.50m INTERVALS) TIFFETT EXISTING KERB < 33 < 1 < EXISTING EDGE OF BITUMEN EXISTING ROAD CENTRELINE EXISTING CHANGE OF GRADE De MURPHY STREET EXISTING TOP OF BATTER Ex1 - - 21.00 EXISTING BOTTOM OF BATTER EXISTING CONCRETE DRAIN ExSW -EXISTING STORMWATER FFL20.800m EXISTING SEWERAGE – ExS – EXISTING SEWER RISING MAIN - SRM -------EXISTING WATER FxW -----EXISTING TELSTRA ExT — 24 FFL5.150m FFL5.200m FFL5.200m FFL5.200m-EXISTING OVERHEAD ELECTRICITY — ExOH — — FFL14.900m EXISTING UNDERGROUND ELECTRICITY ALC: N ____ F x F _____ DESIGN CONTOUR (INTERVAL 0.10m) -*-*XX.XX------PROPOSED CHANGE OF GRADE 1 🕅 PROPOSED STORMWATER — SWD — FFL5.200n FFL5.200m FFL5.200m FFL5.200m PROPOSED WATER — w — w — ____ s ___ PROPOSED SEWER CONCRETE PAVEMENT EXTENT FFL5.200m FFL5.200m < FFL5.200m FFL5.200m . .4 PROPOSED CONCRETE FOOTPATH CP × XX.XXXm PROPOSED SURFACE LEVEL SP183017 X.X% PROPOSED SURFACE SLOPE \bigcirc FFL5.200m FFL5.200m FFL5.200m CAUTION: ALL TIMES, ANY DAMAGE TO EXISTING SERVICES TO BE REPAIRED AT CONTRACTORS EXPENSE. FFL5.200m FFL5.200m 动 Ì N ъ ľ ê C. \boxtimes FFL4.200m FFL4.200m FFL4.200m FFI 4 200m ExSW ExSW _FFL4.700m. . 4.50 A.50 RP724386 A RP741102 ExSW EXSW EXSW EXSW EXSU - EXSW - EXSW - ExSW ExSW ExSW EXSW EXSW EXSW - Ex\$W Emt C RP732760 CP 512 BUP103563 BUP70412 BUP106490 PTD2092 (\bigcirc) SCALE BARS Inertia WOLVERIDGE GURNER 4 742 8 12m ARCHITECTS ΤМ B ISSUED FOR APPROVAL Unit 5B/85 Hudson R ABN 82 115 498 023 E-mail: info@inertiaeng.com.au Biologia (1998) 100 Phone: 3857 7866 Fax: 3262 7359 19.11.20 IE SCALE 1:200 @ A1 A ISSUED FOR APPROVAL 29.10.20 IE REV DESCRIPTION DATE

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