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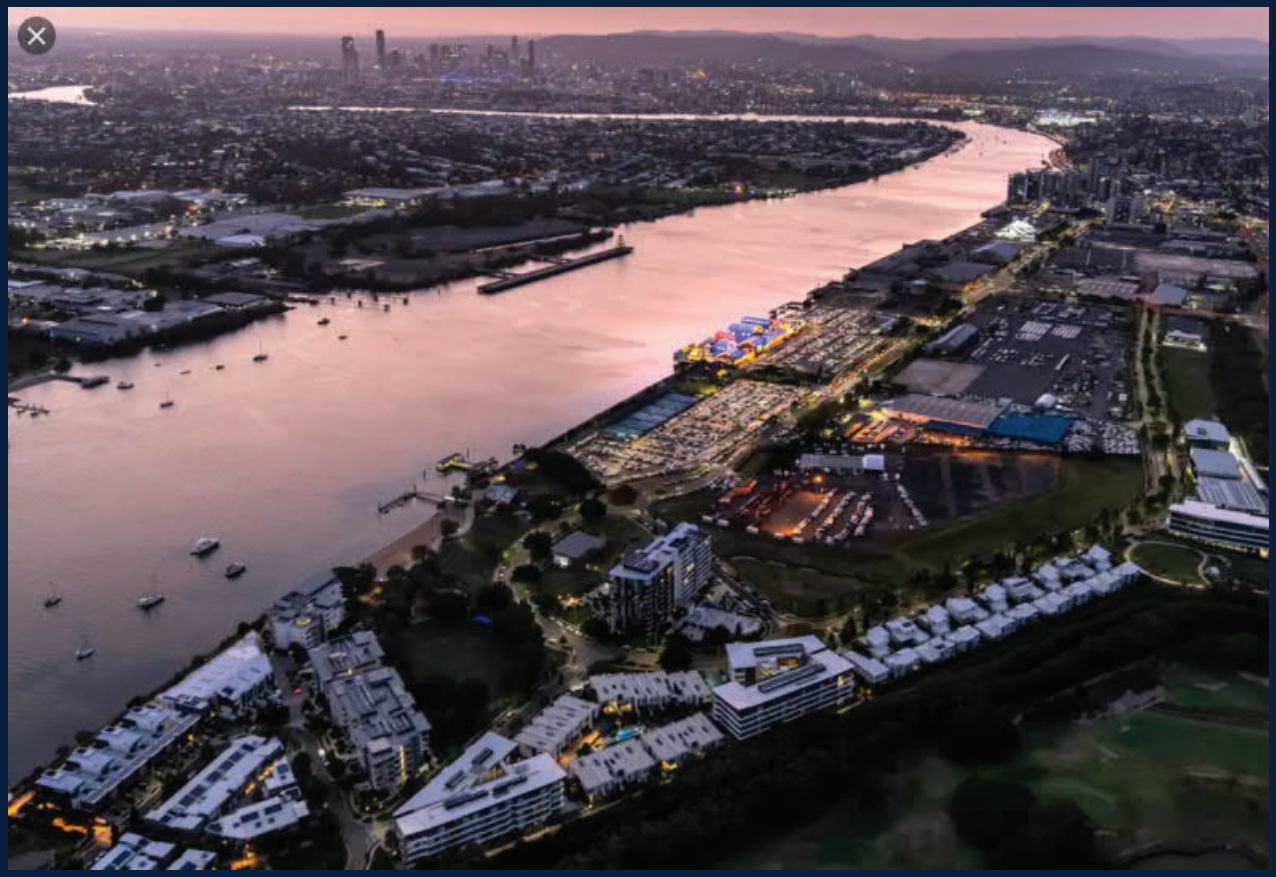

Northshore Hamilton

Engineering Services Report

Reference No. 30032521-R003

Prepared for Economic Development Queensland

24 August 2021

SMEC INTERNAL REF. 30032521-R003

PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

Approval no: DEV2021/1217

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Queensland Government

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Signature			

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Contents

Appendices

List of Figures

1 Introduction

SMEC have been engaged by Economic Development Queensland to provide investigation into the serviceability of the proposed lot reconfiguration at 240 and 280 Macarthur Avenue, Hamilton (Lot 13 on SP214221, Lot 14 on SP195300 and Lots 1 and 2 on SP273089).

The above-mentioned lots are proposed to be reconfigured as part of the Northshore Hamilton Development Scheme, which aims to produce a variety of land use opportunities to become a central hub in one of the most significant waterfront development opportunities in Brisbane. Upgrade of the section of MacArthur Ave south of the subject lots is also included as part of the scope of works.

The aim of this report is to outline the proposed servicing strategy to allow this site to develop in accordance with EDQs Infrastructure Strategy. This report will begin by outlining the current site conditions and existing services and will then transition into detailing the infrastructure required to fully service the site.

2 Existing Site Conditions and Servicing

2.1 Site Layout and Characteristics

The site of works is located within Northshore Hamilton PDA, which is located close by to some of Brisbane's most important economic drivers, including Brisbane Airport and Australia TradeCoast. The site location can be seen in Figure 1: Location of proposed development. Source: Brisbane City Council City Plan 2014: v21 (17/06/2021) below.

Key Features in and around the Northshore Hamilton PDA include:

- Bretts Wharf
- The Brisbane River
- Royal Queensland Golf Club
- Portside Wharf Complex
- Kingsford Smith Drive and the Gateway Motorway

Figure 1: Location of proposed development. Source: Brisbane City Council City Plan 2014: v21 (17/06/2021)

The total site area is 9.3ha, with the proposed ultimate development consisting of a reconfiguration from four lots into five lots, through which three new roadways are proposed and upgrade of the section of MacArthur Ave. In the Stage 1 of the development, only four lots will be created with a section of one of the new roadways not being constructed at this stage (three lots plus a balance lot). Both existing lots contain existing light industrial building and car parking space with little greenspace incorporated.

The development is currently accessible via two roads of varying categories under the Brisbane City Council (BCC) Planning Scheme, they are as follows:

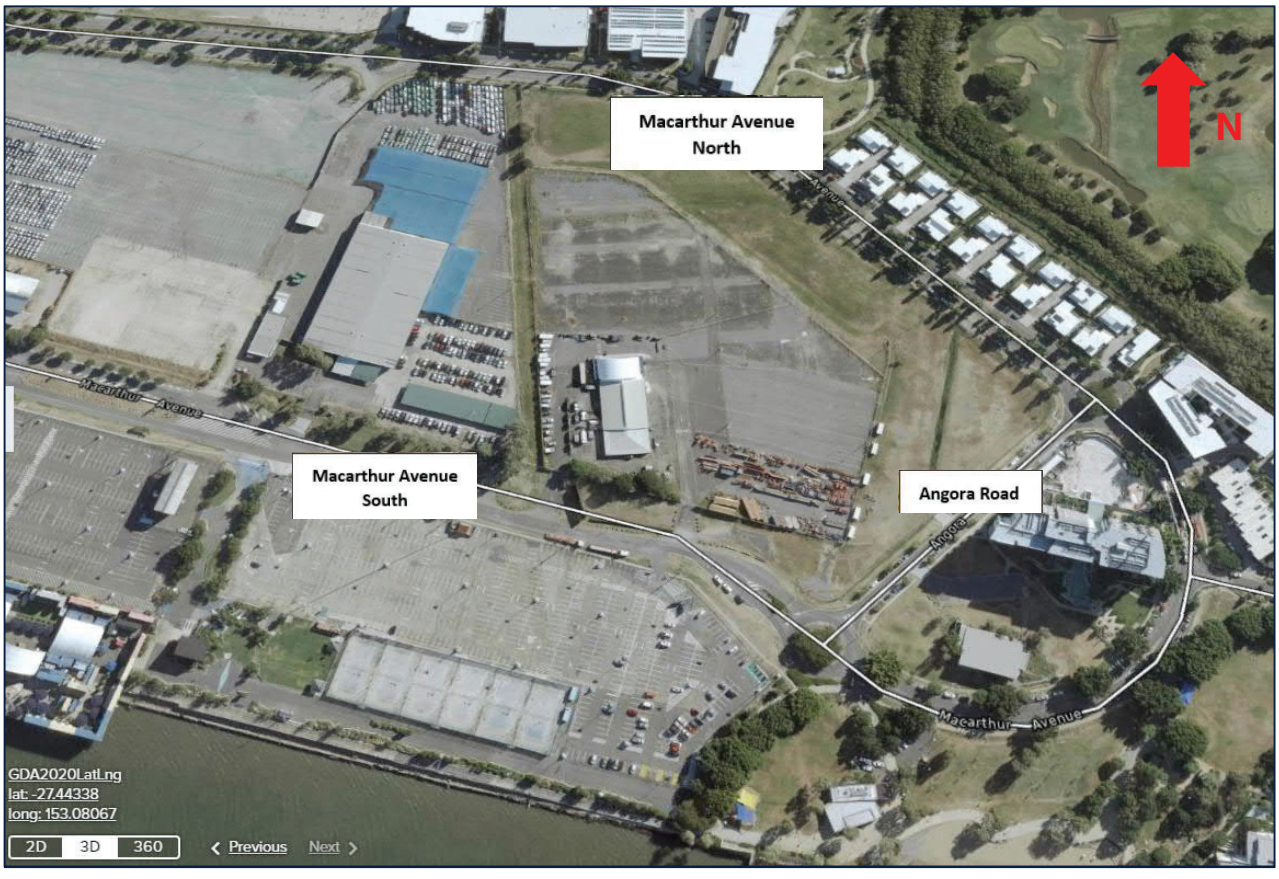
- Macarthur Avenue- South and North of the development (loop)
- Angora Road- East of the development

From a topographical perspective, the site is relatively low lying due to its proximity to the Brisbane River. The high point of the site stretches across the Northern section of the development at an RL of 5m AHD. At this location, a small portion of the existing surface levels fall towards Macarthur Avenue to the north into the existing drainage infrastructure whilst the other then grades south towards to the Brisbane River to a low point of RL 4.5m at approx. 0.15% over its entirety.

A biodiversity area of "High Ecological Significance" is located to the North East of the development. This development will not have any impact on this corridor as works are to be contained within the ROL previously described. The contractor assigned to the project will ensure to capture this State Environmental Area in their Construction Management Plan and ensure that no construction activities impact this area in any form.

As shown on the BCC Mapping Scheme, there is the potential for acid sulphate soils on site. The contractor awarded to the project will need to manage this risk on site and will provide a full geotechnical report prior to works commencement. If acid sulphate soils are discovered on site, a detailed management plan and strategy will need to be created to manage accordingly and in line with the relevant guidelines.

Figure 2: The proposed site and its surrounds. Source: Queensland Globe (Queensland Government) (17/06/2021)



2.2 Existing Road Network

The site is accessible via Macarthur Avenue which runs both north and south of the proposed development. This road provides direct access to the Major District Kingsford Smith Drive. This District Road provides a link with the airport to the north east and Brisbane City to the south west. As part of the development works, it was determined that Macarthur avenue required an upgrade to keep consistent with future land use, its extent to the west and to provide long term access to future builds in the vicinity.

Angora Road closes the loop around the development via connection of Macarthur Avenue from the north to the south. This road was built as part of the residential building construction works, located within lot 114 on SP287516. Angora Road was built as local access street under the BCC Planning Scheme Policy and is located to the east of the development.

Prior to any tie in works as part of this development, the contractor is to provide information on the existing condition of the roads at these connection points. It will also be suggested that the contractor carries out detailed dilapidation across the extent to avoid any future issues with the existing pavements.

2.3 Existing Stormwater Infrastructure

Detailed Survey was undertaken to identify the existing infrastructure servicing the site. It was found that there was little in the way of underground infrastructure, the only direct pipeline being a 475mm diameter which is located within Macarthur Avenue to the South West. Macarthur Avenue to the north consists only of some minor drainage networks which were constructed as part of the development to the north. These drainage lines mainly run through the central swale and are connected to the existing infrastructure to the west of the site.

There is also an existing stormwater network to the east of the development which caters for the entirety of the previously developed residential building adjacent the Royal Queensland Golf Course.

As part of the strategic overland flow strategy of the PDA area, a number of overland flow corridors were created to divert flows from residential and commercial lots, draining directly to the Brisbane River to the south east of the site. The BCC mapping scheme shows an overland flow path extending through the site to the north as shown in Figure 3: BCC Mapping Existing Overland Flow Paths. As part of the proposed design, this overland flow path will be fully addressed to ensure it is captured within appropriately sized stormwater pipe infrastructure as detailed in the latter part of this report.

A stormwater and flooding master plan "***Hamilton Northshore Trunk Infrastructure***" dated Sept 2019 was previously prepared by BMT, addressing the conditions of the existing drainage network and required upgrades to provide adequate level of service to the development. The report noted that the existing drainage infrastructure does not have the capacity to adequately service the development for the 10% Annual Exceedance Probability (AEP) event for minor flows and 2% AEP event for major flows.

The models generated by BMT show that significant flooding occurs across the PDA catchment area for this flood event, refer to Figure 4: 50-year ARI Event (Phase 2) – . To the northern and south along Macarthur avenue, it is evident that flooding is still occurring with the minor augmentation works having occurred (model based on existing RLs without earthworking proposed as part of this project). The report by BMT continues to state that considerable ponding of water and flooding occurs during a number of rainfall events in all area across the PDA. These are compounded by tidal events which greatly affect the excavated channels which encompass the site. Over time, the tidal flooding has caused sediment build up in these channels when receding which has resulted in further issues from a flooding perspective with several blockages now observed as being present. Upstream of Kingsford Smith Drive, flooding is exacerbated by an undersized drainage system and the lack of dedicated overland flow paths.

It is important to note that the flooding to the industrial building that is to be kept in place for an interim duration at 240 Macarthur Avenue is alleviated due to the phase 2 works having been completed. One of the critical

components of the proposed infrastructure is to ensure that this is protected in the interim by the introduction of long-term design solutions, of which will be detailed in this report.

Figure 3: BCC Mapping Existing Overland Flow Paths. Source: Brisbane City Council City Plan 2014: v21 (17/06/2021)

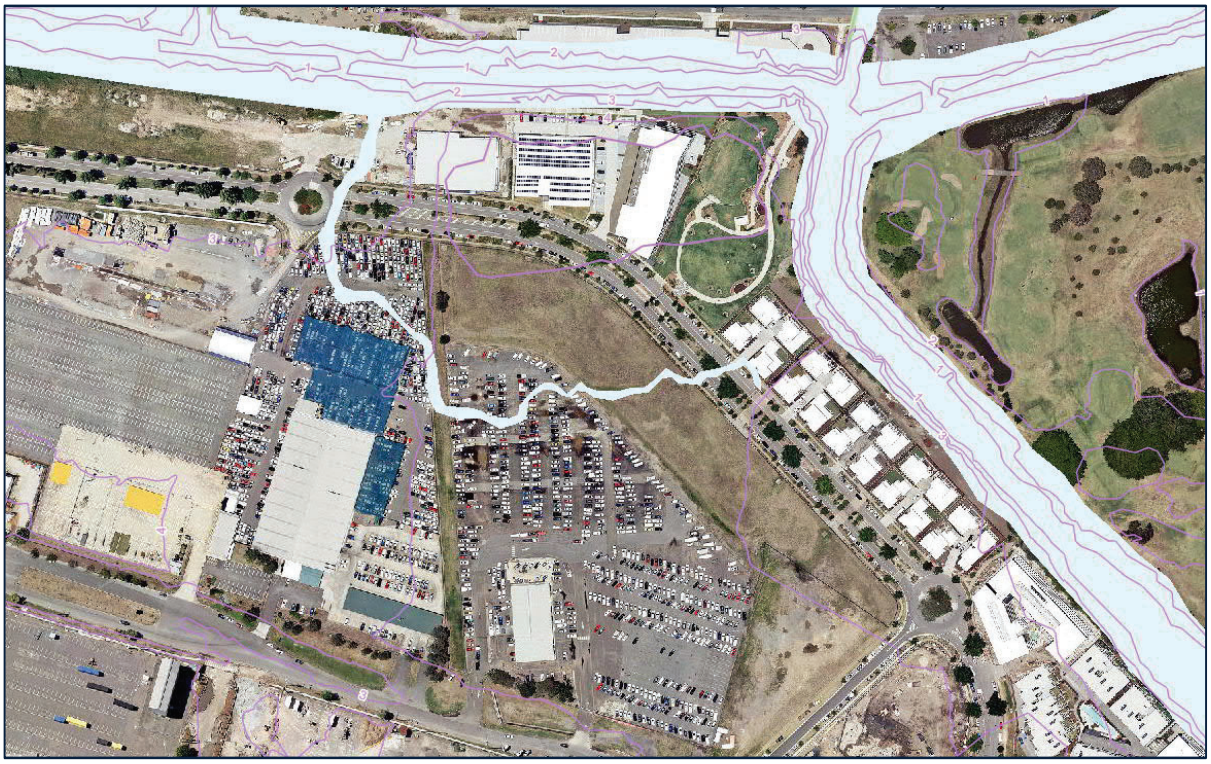
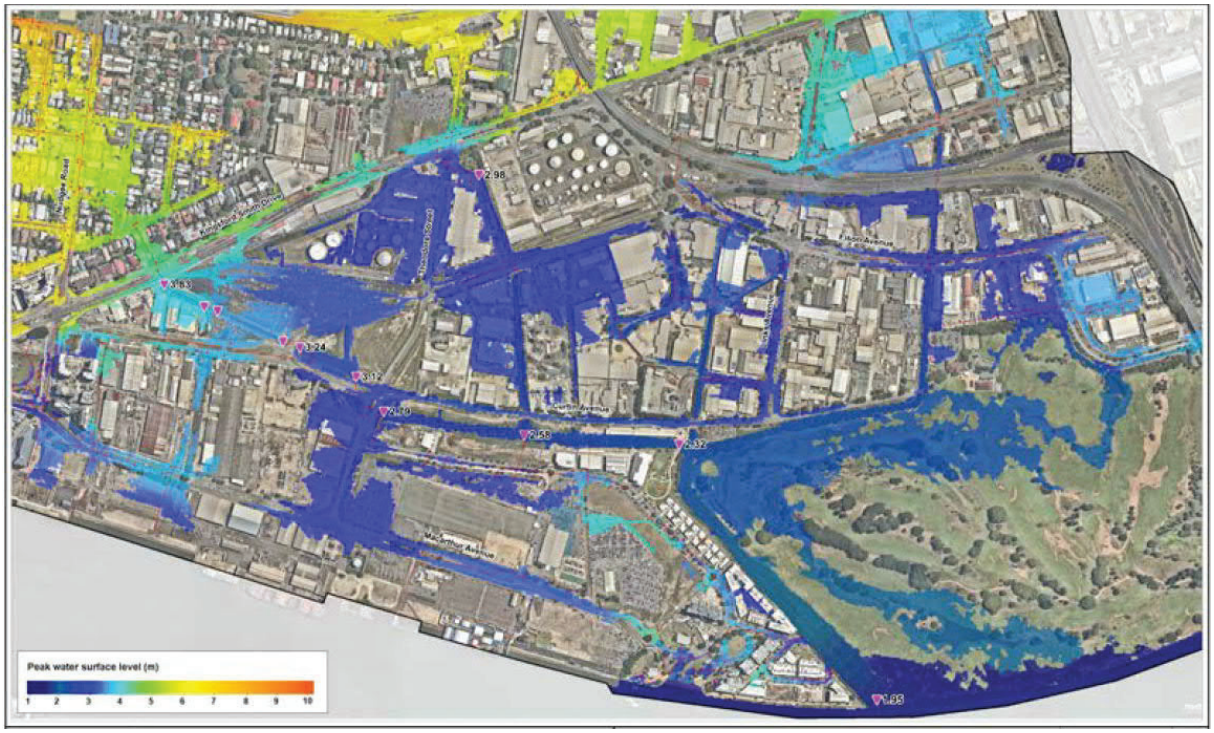


Figure 4: 50-year ARI Event (Phase 2) – Source: Hamilton Northshore Trunk Drainage Assessment Report undertaken by BMT

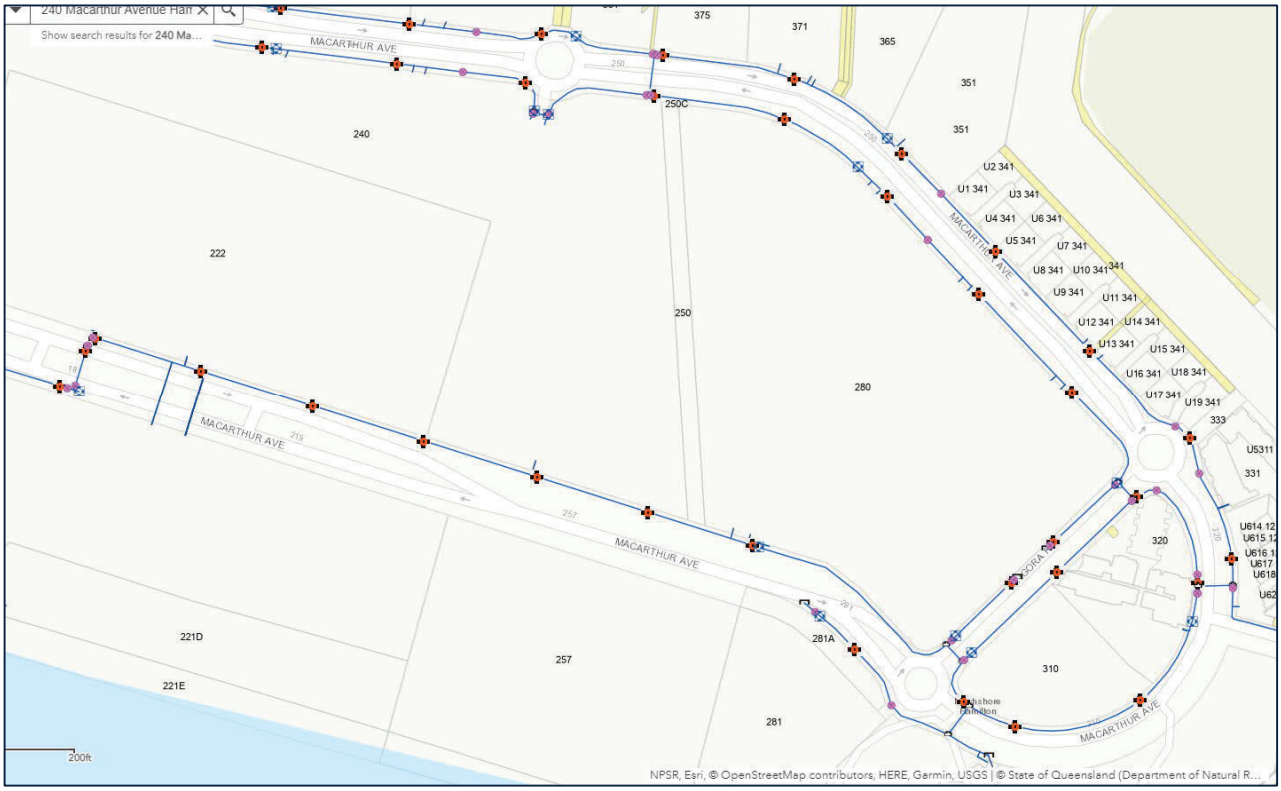


2.4 Existing Water Infrastructure

As Constructed Documentation and the Urban Utilities infrastructure mapping shows that there is extensive infrastructure in the vicinity of the site area as shown in Figure 5: Urban Utilities GIS mapping- Existing Water Infrastructure below. This includes the following:

- 150mm UPVC dual main which runs to the north of the proposed development in Macarthur Avenue.
- 180mm PE main to the east of the development on Angora Road.
- 150mm UPVC main to the south which wraps back around Macarthur Avenue to the south to complete the loop.
- Several property connections of varying sizing.

Figure 5: Urban Utilities GIS mapping- Existing Water Infrastructure



2.5 Existing Sewer Infrastructure

To fully understand the extent of the sewer infrastructure within the development, a review of the survey supplied As Construction documentation combined with the Urban Utilities GIS mapping system was undertaken, the findings are per the below:

- 275mm Glass Reinforced Pipe to the North which runs along Macarthur Avenue.
- 225mm Concrete Non- Reinforced Pipe to the south which transitions to a;
- 150mm Concrete Non- Reinforced Pipe to the south.

Figure 6: UU GIS mapping- Existing Sewer Infrastructure

2.6 Existing Electrical, Communications and Gas

There are existing services relating to electricity, communications and gas throughout the development. Energex, Telstra and NBN infrastructure run the extents of Macarthur Avenue and Angora Road.

Relocations will need to occur to align with the standard council service corridors for the new upgrade. Works can only be undertaken once approval from the relevant service providers has been received.

All services have been located via as constructed plans for adjacent developments and through Dial Before You Dig reports. The proposed electrical, communications and gas drawings have been included in Appendix C for viewing.

3 Proposed Servicing Strategy

3.1 Overall Summary of Works

This civils works scope is divided into two separate packages as follows:

- Package 1- New road (Cedar Road) to be constructed between Macarthur Avenue north and south within Lot 13 on SP214221 and upgrade of Macarthur Avenue to the south.
- Package 2- New roads (Barcham Road and Karakul Road) to be constructed to connect Macarthur avenue from the north to south with a connection provided to the east to Angora Road. The Stage 1 allows only for earthworks to be provided for a stub road connection between Barcham Road and Cedar Road. This will occur as part of the future Stage 2 works of the development.

Based on reports carried out by others with further review and analysis by SMEC, a new stormwater strategy throughout the entirety of the development has been designed to mitigate the flooding observed in the existing scenario. This new stormwater infrastructure caters for the 2% AEP rainfall events, providing large scale improvement of the ponding and overland flow paths previously described across the catchment. The stormwater is to initially be treated with BCC approved Biopods (consistent with other development in the area) within road verge, which then progresses through the networks to outlet into the Brisbane River to the south of the development.

To meet the requirements set out in the Trunk Drainage Assessment report by BMT, extensive earthworks in the form of import fill is required to meet minimum levels to cater for a number of flood events and potential tidal impacts across the development. Earthworking to the lots is not scheduled as part of these package of works as it is envisaged the lots will be further excavated during its development to make room for basements. The design achieves its intent for catering for these internal lots through connections to existing infrastructure and the introduction of field inlets within the development. Until such time the lots are developed, they will be fenced to prevent egress of public and managed by EDQ.

Both the sewer and water infrastructure has been designed to meet the criteria set out in the NSH Water and Sewer Assessment report by Cardno. This includes new infrastructure throughout the development to meet the built-out form servicing requirements. An in-depth analysis was undertaken to assess the capacity of the existing infrastructure and on review of the reporting documentation provided SMEC have allowed for various live connections throughout the site.

3.2 Earthworks

Extensive fill material is proposed to be imported and placed under Level 1 supervision to allow for the construction of the proposed new and upgraded roads across the site. This fill material is to be in accordance with the specification outlined in the Brisbane City Planning Scheme Policy and in accordance with the Contract specifications for the works.

In reference to the geotechnical report carried out by Butlers Partners on the 30 April 2020, it was found that the existing subsurface material consisted of a variable fill layer from 1.0m to 2.5m depth approx., which was sitting on layers of soft to very stiff clays and loose to medium dense sands to the depths investigated within the boreholes carried out across the development. It was found that the groundwater level was sitting at varying depths from 0.6m- 2.2m in depth.

Both of the above-mentioned present challenges with respect to solid foundations for road construction and services laying. SMEC had advised that pre- loading the areas proposed for future road pavement works would help to alleviate potential issues of settlement due to the nature of the material. Alternatively, other measures such as plates can be installed to monitor potential future settlement to identify additional fill to be injected over the years.

Minor cut works are required, these are mostly located at the tie in areas to the existing roads located to both the north and the south of the development. Below is a summary of the earthwork's strategy:

Package 1 Earthworks Volumes:

- Total Cut Volumes= 131.176m3
- Total Fill Volumes= 24,299.905m3
- Total Balance (imported fill) = 24,174.729m3

Package 2 Earthworks Volumes:

- Total Cut Volumes= 88.825m3
- Total Fill Volumes= 13,700.673m3
- Total Balance (imported fill) = 13,611.821m3

Please refer to Figure 7, Figure 8 and Figure 9 for the proposed earthworks strategy.

Figure 7: Package 1- Earthworks Cedar Road

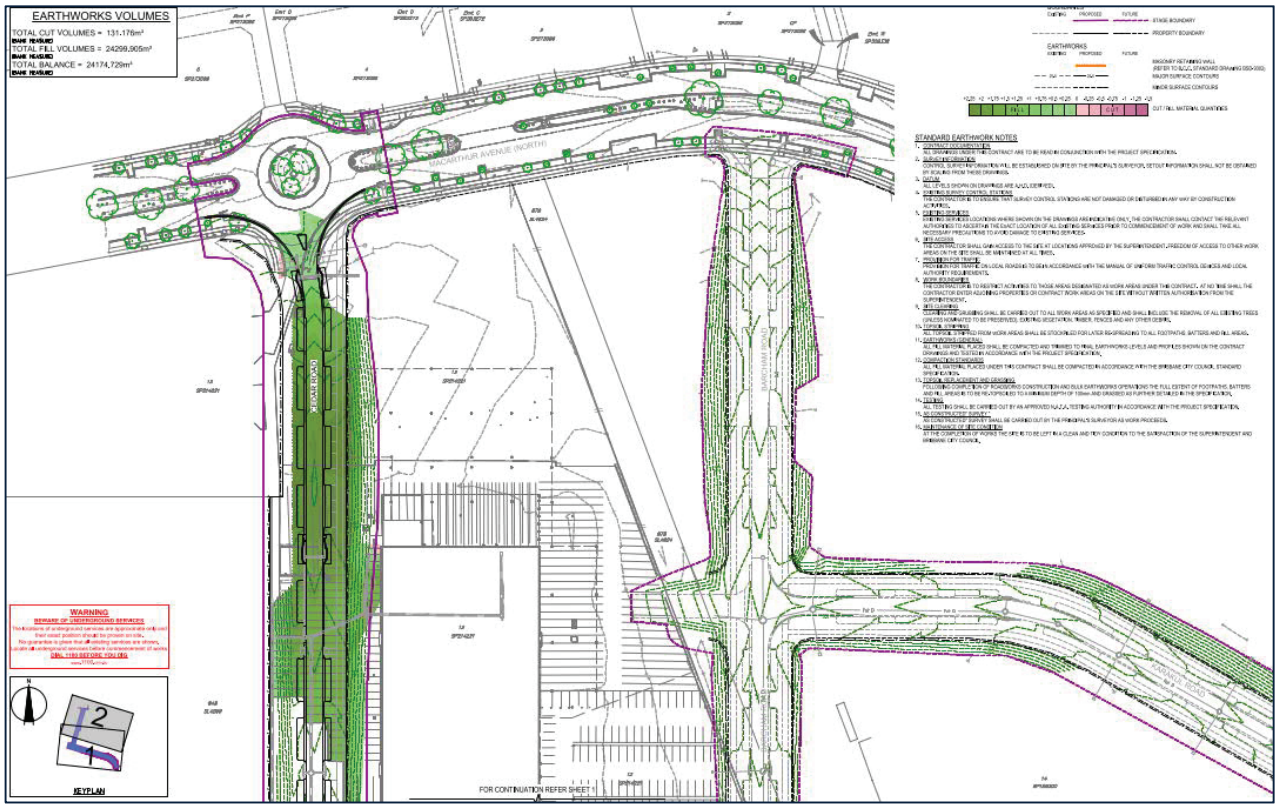


Figure 8: Package 1- Earthworks Macarthur Upgrade

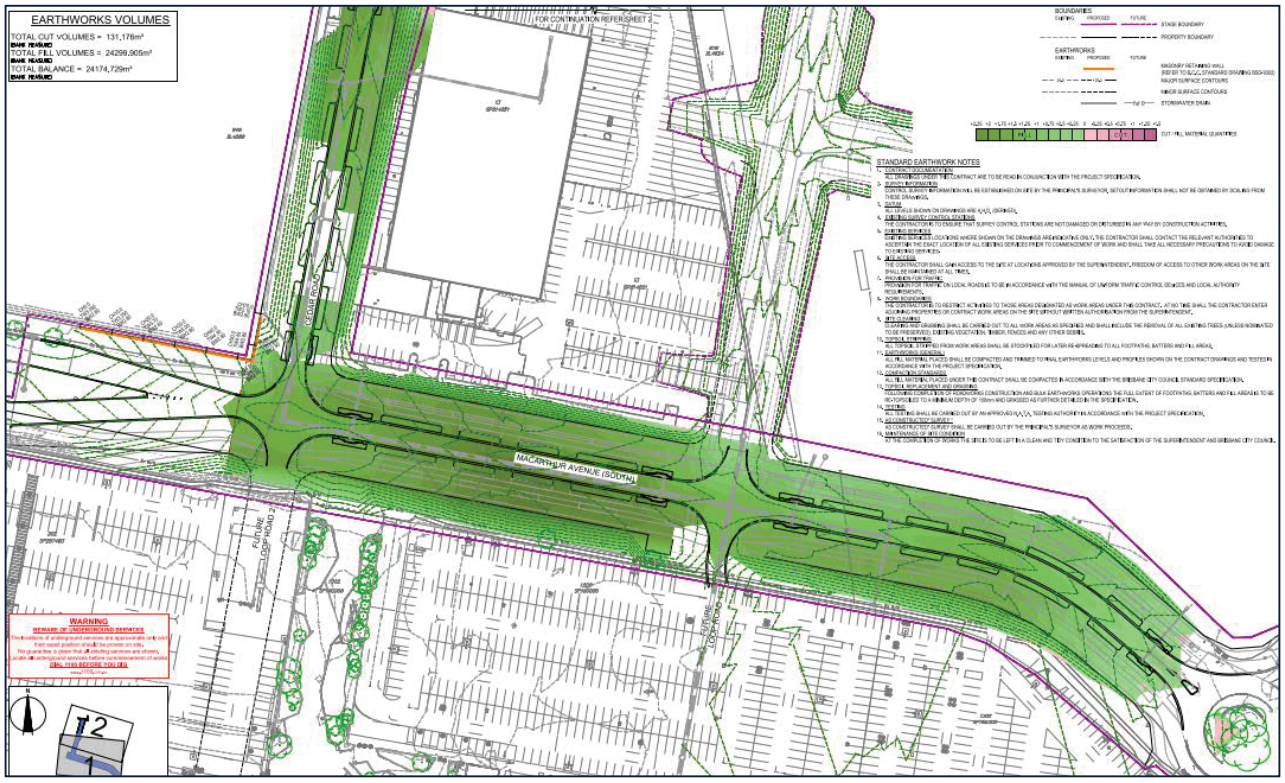
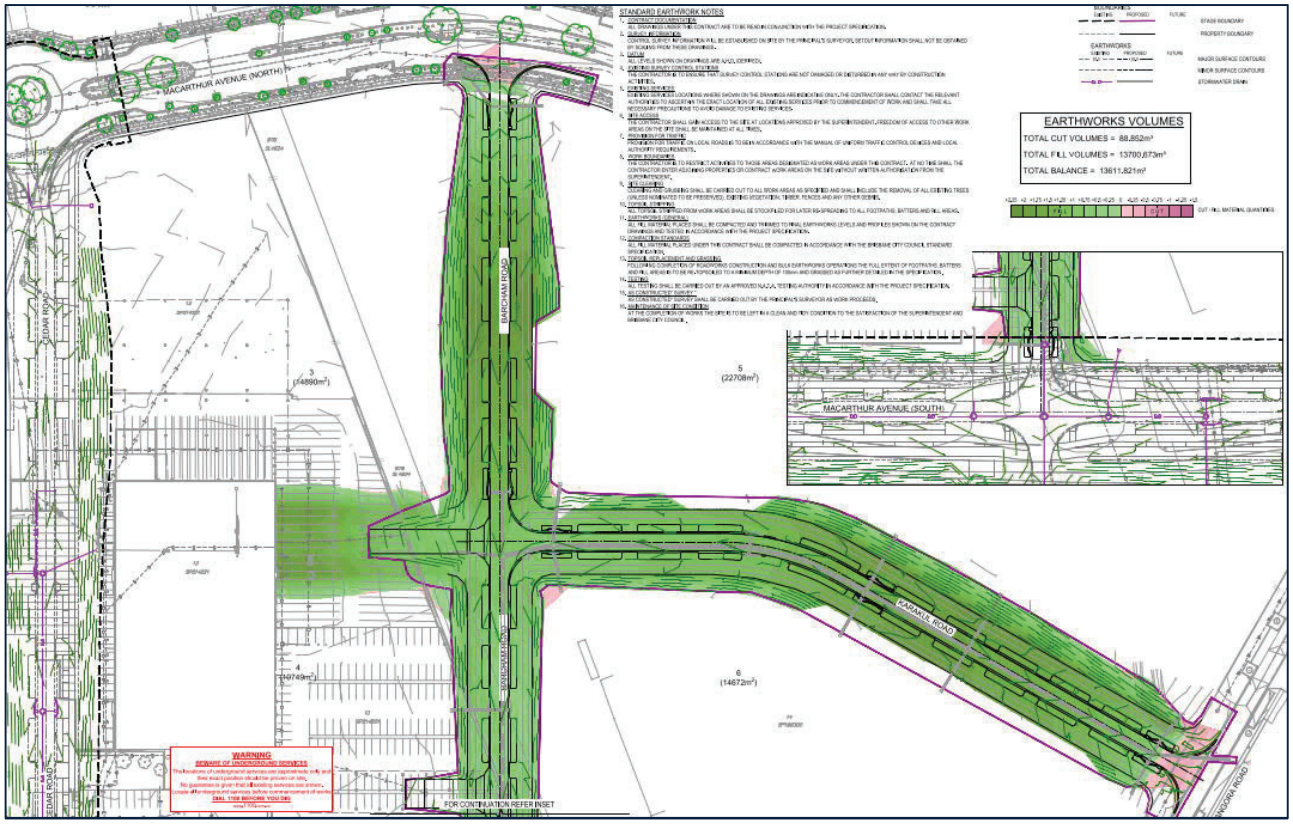


Figure 9: Package 2- Earthworks to Barcham Road and Karakul Road



3.3 Road Infrastructure

The works proposed as part of this development include the following:

- Creation of Cedar Road;
- Upgrade of Macarthur Avenue south;
- Creation of Barcham Road;
- Creation of Karakul Road.

Each of the roads designed to maximise ease of access for the future mixed-use lots and to ensure that minimum grades were employed throughout to meet stormwater objectives. BCC were and are continuing to be consulted through both the design and construction phases and have approved the proposed roads configuration. Parking bays have been incorporated throughout the proposed design for future access to the residential and commercial built out form. Biopods were incorporated into the design throughout which have been created to filter the stormwater prior to entering the network. Their location and contents of filter media and planting have been specifically designed to best practise approach to ensure well treated stormwater is flowing from the proposed roadways into the Brisbane river. The road infrastructure design is available for viewing in Appendix A, where the Road Layout drawings have been provided.

The proposed road network was graded to ultimately freely drain towards the Brisbane River (except for standard local sag pits at intersections). The road levels were set by adopting a minimum level of 3.1m AHD at the lowest point within the proposed road network, in accordance with the recommendations of the Trunk Drainage Assessment report. This lowest point is to be located adjacent to the Brisbane River, in a future road to be constructed as part of the future works (outside this scope of works). Minimum grade was adopted to set the levels for the remainder of the road network, achieving RL greater than 4.0m AHD at most locations of the subject works.

Since the area of the subject works does not receive stormwater runoff from any external catchment, raising the roads will not cause any obstruction to external overland flows. The proposed grading therefore achieves the following results:

- Minimum road level of 3.1m AHD as recommended in the Trunk Drainage Assessment Report.
- Ultimate on-grade unobstructed overland flow path through the road network to the Brisbane River (via Phase 3, as per Trunk Drainage Assessment Report).
- Non-obstruction of any external flows.
- Compliance with minimum road grading requirements.
- Eliminates the need of sags that may result in undesired flooding hazards.

The works exclude filling of the new lots created as part of the overarching development strategy, resulting in their surface level to be below the proposed roads. These lots will be owned and maintained by EDQ and adequately fenced to prevent access to the lots. It is understood that those lots will be sold to private developers to be further developed as high density mixed-use. As part of these works, the access to the future developments will be made at the road level, with the area below used as car parking basement. Thus, the proposal to temporarily maintain lots at their existing surface level (below road level) will prevent the extra costs of import fill material that will be eventually excavated and removed from site to give way to the future buildings and basements.

3.4 Stormwater Network Upgrade

As previously outlined, in its existing scenario the development is subject to extensive flooding and ponding, particularly at MacArthur Ave. To address this issue, BMT developed a stormwater strategy to mitigate this flooding for both what is described as the “Interim” and “Ultimate” Solution. This was further reviewed by SMEC

with changes made to the proposed infrastructure to maximise efficiency through the network, please refer to letter labelled 30032521-R002, dated 5 May 2021 for further details.

The BMT's Trunk Drainage Assessment identifies 3 phases of the development:

- Phase 1 (Development to 2020)- mostly already completed, located on the western and eastern edges of the PDA.
- Phase 2 (Development by 2031)- composed of the subject works (to the east of the PDA) and additional works further away to the west of the development.
- Phase 3 (Development beyond 2031)- remainder of the PDA.

The SMEC adopted drainage solution (refer to 30032521-R002) is proposed for the works, which addresses all the requirements of the Trunk Drainage Assessment Report with some additional improvements as noted below:

- Minimum road level of 3.1m AHD due to Brisbane River storm tide.
- Roads on-grade, eliminating the need of local sags and undesirable flooding hazards/risks.
- New drainage system provides 10% AEP drainage capacity for Phase 2 without the need to wait for Phase 3 upgrades.
- Reduction of existing flooding within Phase 3 (MacArthur Ave) due to current limited drainage system capacity by diverting more flows away from Phase 3.
- Reduction of flows to future Phase 3 drainage system, potentially reducing the costs to upgrade Phase 3 system.

It is therefore concluded that the proposed drainage solution adequately addresses the drainage and flooding requirements of Phase 2, in accordance with the Trunk Drainage Assessment Report prepared for Northshore Hamilton PDA, with some additional improvements.

The Interim design for the Phase 2 works also allows for the drainage system to cater for the industrial building located at 240 Macarthur Avenue. Measures have been put in place to ensure no flooding or ponding occurs in this are during the interim solution up until the ultimate. This includes the use of proposed internal drainage as well as connections to the infrastructure under roadways which will outlet to the Brisbane River.

Figure 10: Phase 2 Ultimate Design- 50-year ARI

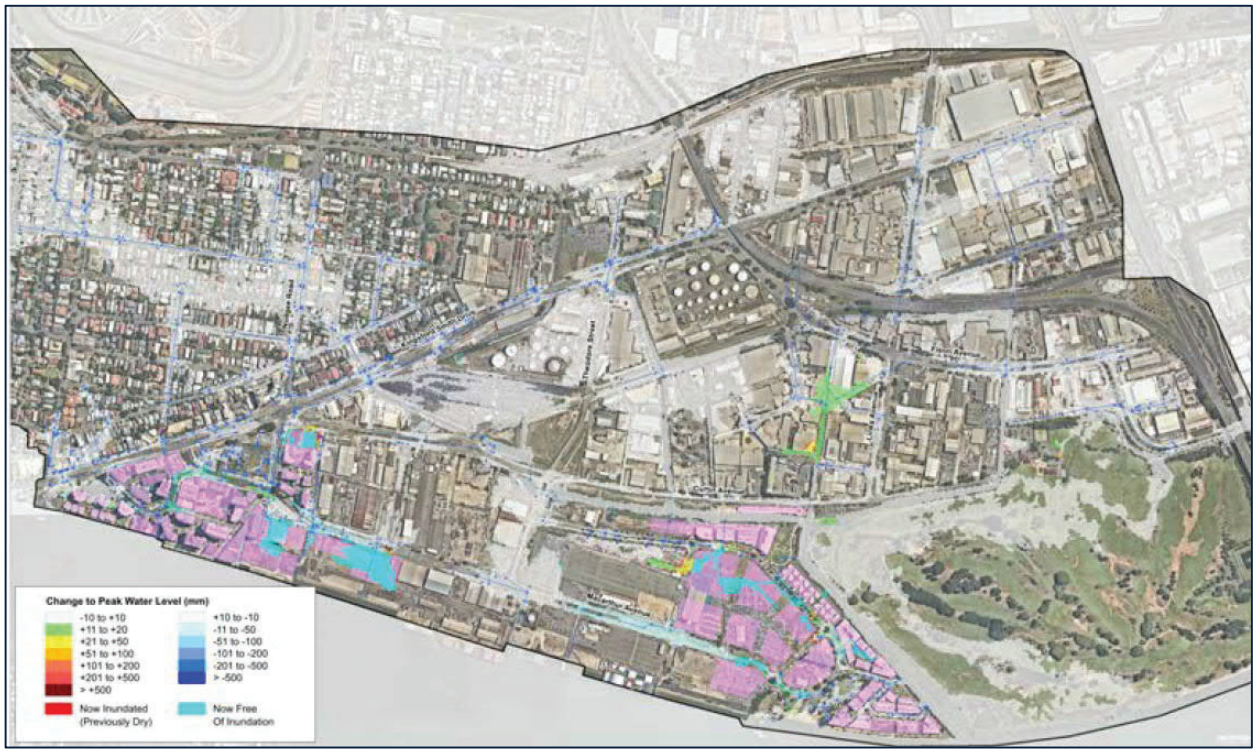
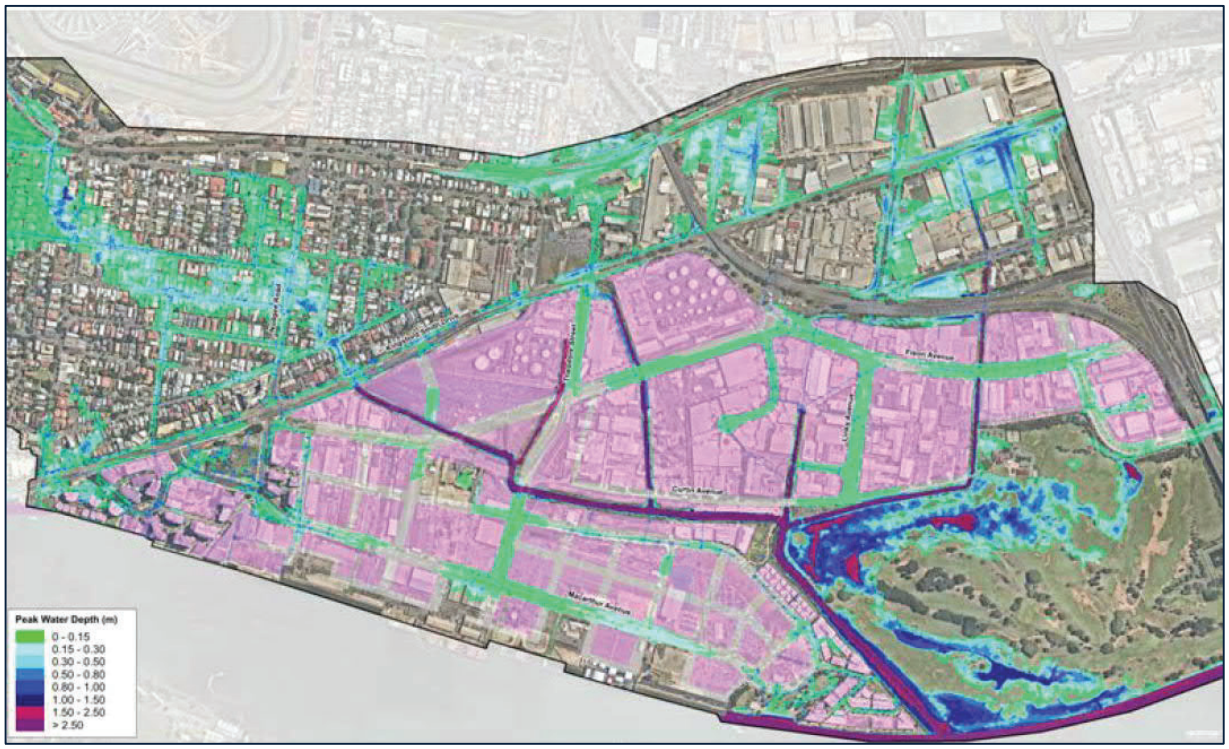


Figure 11: Phase 3 Ultimate Design- 50-year ARI



3.5 Sewer and Water Infrastructure

SMECs design for the development was prepared in accordance the water and sewer strategy stated in the master plan report ***"Northshore Hamilton PDA – Water Supply and Sewer Preliminary Analysis",*** prepared by Cardno, dated 4th November 2020. SMEC drawings are available for viewing in the Appendix A: Road, Stormwater, Sewer and Water Layouts**Error! Reference source not found.** of this document. Cardno's summary of the proposed network is shown below:

3.5.1 Water Infrastructure:

- Proposed growth within the PDA represents increase in load to 30,225EP from Urban Utilities' previous forecast of 22,173EP, representing a 36% increase.
- The proposed network within the PDA is adequate to supply peak hour and fire flow requirements within the PDA.
- Deficiencies are observed outside of the PDA in Urban Utilities' planning model under both Peak Hour and fire-flow scenarios. It is not expected that external network augmentations will affect the network performance within the PDA.
- Subsequent network planning and design stages shall consider the location of valves to optimise network conditions during planned or unplanned events to minimise disruption.
- Detailed geotechnical investigations shall be undertaken to minimise construction risks.
- Sizing of the water mains within the development were set in the Cardno's report and approved by Urban Utilities.

3.5.2 Sewer Infrastructure:

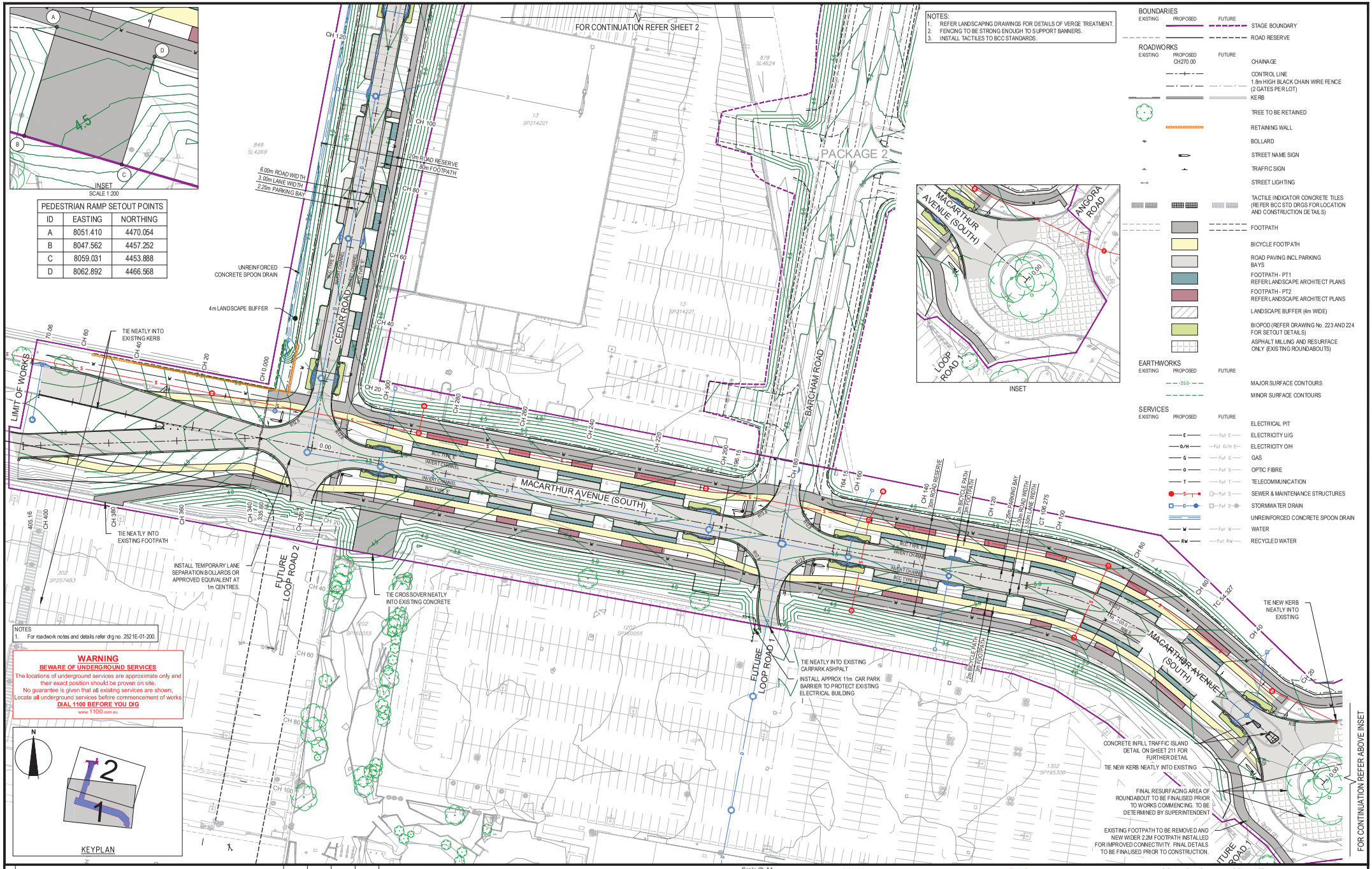
- Proposed growth within the PDA represents increase in load to 30,225EP from Urban Utilities' previous forecast of 22,174EP, representing a 36% increase.
- With reference to the report created by Cardno, SMEC have created a design strategy to best service the future lots in the form of a combined micro tunnelling and trenching solution. The proposed trunk main has been sized by Cardno and approved by Urban Utilities to cater for the Equivalent Persons calculation derived from future use figures. For the purposes of this project, the trunk sewer will be connected to the existing 500m VC main located at the intersection of Theodore Street and Macarthur Avenue.

One of the key objectives of the sewer design was to mitigate as much as possible any constructability and future maintenance issues associated with the observed subsurface soil conditions. As previously outlined, the existing conditions consist of interconnected layers of loose sand and stiff clay which results in low skin friction for the bored encasement.

To avoid this to a large extent, a micro tunnelling solution was developed for the majority of the trunk infrastructure in accordance with the SEQ Codes. This design has been specifically chosen to avoid potential future settling of the line and to limit the number of access chambers across the development which will be at or below groundwater levels and susceptible to infiltration. Microtunelling is a more advanced technique of trenchless line construction and can be laid to a very accurate construction tolerance whilst maintaining its integrity when tunnelling.

The sewer to the east of Macarthur Avenue will be excavated and laid in accordance to the Urban Utilities specifications and SEQ Codes for trunk infrastructure.

Appendix A **Road, Stormwater, Sewer and Water Layouts**



REVISION	DATE	DES/DFT	WAR	APP'D
C Re issue for construction	25/08/21	AY/AY	0023	GP
B Cedar Road Swale Drainage Updated	7/07/21	AC/KM	0011	GP
A Issue for Construction	11/06/21	DR/KM	008	GP

Gustavo Pereira
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Principal
Economic Development Queensland
1 William Street
Brisbane, 4000

All setting out should be carried out in accordance with GAA/Council's standard drawings or as nominated on hard copy plans provided by SMEC. Any digital information supplied by this office is for information only. Any discrepancies should be discussed with the superintendent.

Project Leader G. Pereira
Designed D. Rapson
Drawn K. McCoy
Checked D. Rapson
Authorised G. Pereira
Date May-2021

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Scale 1:500

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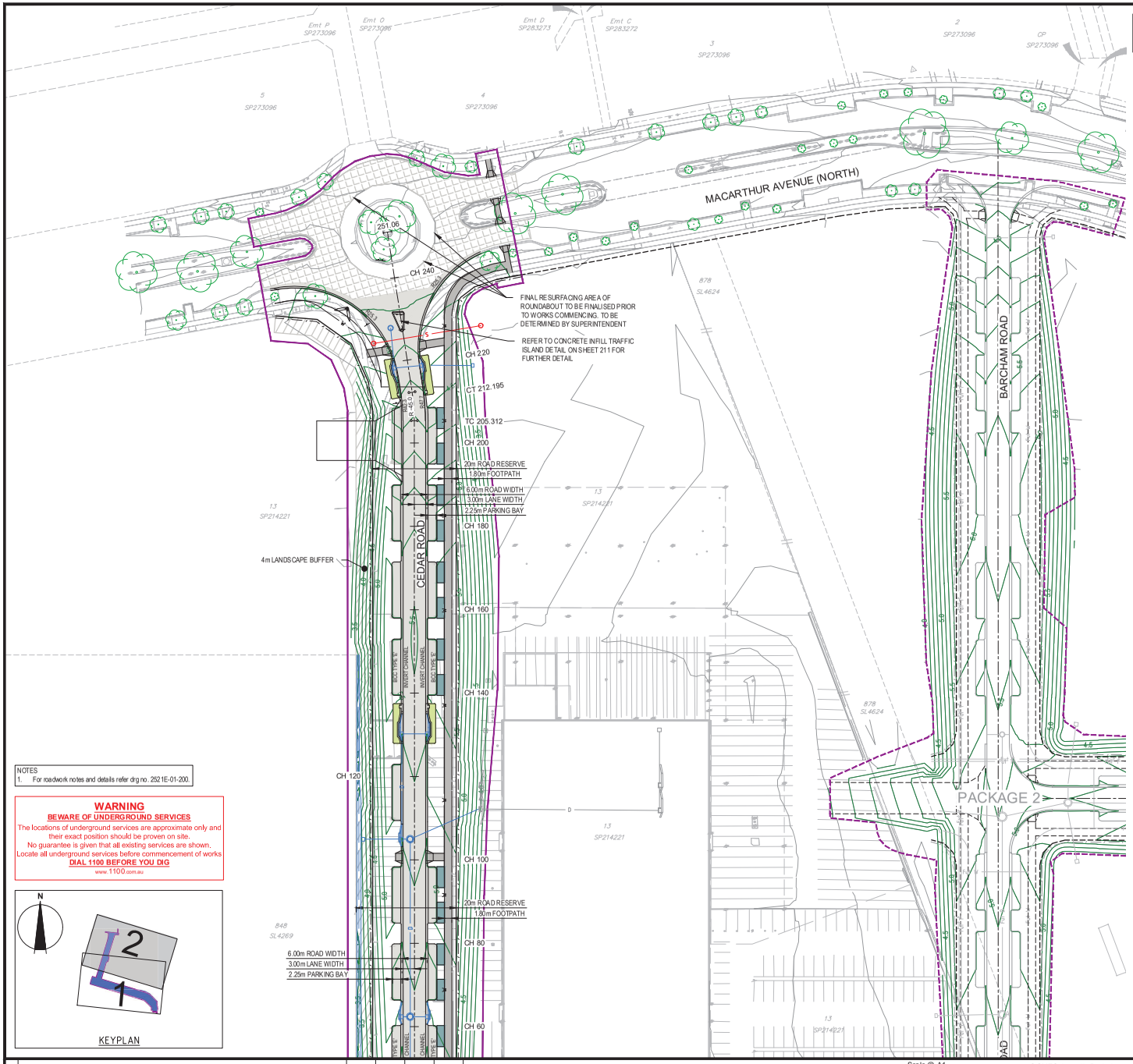
Northshore, Hamilton
Package 01
Economic Development Queensland
Roadworks
Roadworks Layout Plan

Drawing No. 2521E-01-211 **Rev** C
Dev. App. No.
Sheet No. 1 of 2

Issue for Construction



NOTES:
1. REFER LANDSCAPING DRAWINGS FOR DETAILS OF VERGE TREATMENT.
2. FENCING TO BE STRONG ENOUGH TO SUPPORT BANNERS.
3. INSTALL TACTILES TO BCC STANDARDS.

BOUNDARIES
EXISTING / PROPOSED / FUTURE
- STAGE BOUNDARY
- ROAD RESERVE

ROADWORKS
EXISTING / PROPOSED CH270.00 / FUTURE
- CHAINAGE
- CONTROL LINE
- 1.8m HIGH BLACK CHAIN WIRE FENCE (2 GATES PER LOT)
- KERB
- TREE TO BE RETAINED
- BOLLARD
- STREET NAME SIGN
- TRAFFIC SIGN
- STREET LIGHTING
- TACTILE INDICATOR CONCRETE TILES (REFER BCC STD DRGS FOR LOCATION AND CONSTRUCTION DETAILS)
- FOOTPATH
- BICYCLE FOOTPATH
- ROAD PAVING INCL PARKING BAYS
- FOOTPATH - PT1 REFER LANDSCAPE ARCHITECT PLANS
- FOOTPATH - PT2 REFER LANDSCAPE ARCHITECT PLANS
- LANDSCAPE BUFFER (4m WIDE)
- BIOPOD (REFER DRAWING No. 223 AND 224 FOR SETOUT DETAILS)
- ASPHALT MILLING AND RESURFACE ONLY (EXISTING ROUNDABOUTS)

EARTHWORKS
EXISTING / PROPOSED / FUTURE
- MAJOR SURFACE CONTOURS
- MINOR SURFACE CONTOURS

SERVICES
EXISTING / PROPOSED / FUTURE
- ELECTRICAL PIT
- ELECTRICITY U/G
- ELECTRICITY O/H
- GAS
- OPTIC FIBRE
- TELECOMMUNICATION
- SEWER & MAINTENANCE STRUCTURES
- STORMWATER DRAIN
- UNREINFORCED CONCRETE SPOON DRAIN
- WATER
- RECYCLED WATER

NOTES
1. For roadwork notes and details refer drg no. 2521E-01-200.

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KEYPLAN

REVISION		DATE	DES/DFT	WAR	APP'D
B	Re Issue for Construction	20/08/21	AY/EG	0019	GP
A	Issue for Construction	11/06/21	DR/KM	008	GP

Gustavo Pereira
RPEQ# 17514

.....
Principal
Economic Development Queensland
1 William Street
Brisbane, 4000

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Project Leader G. Pereira
Designed D. Rapson
Drawn K. McCoy
Checked D. Rapson
Authorised G. Pereira
Date May-2021

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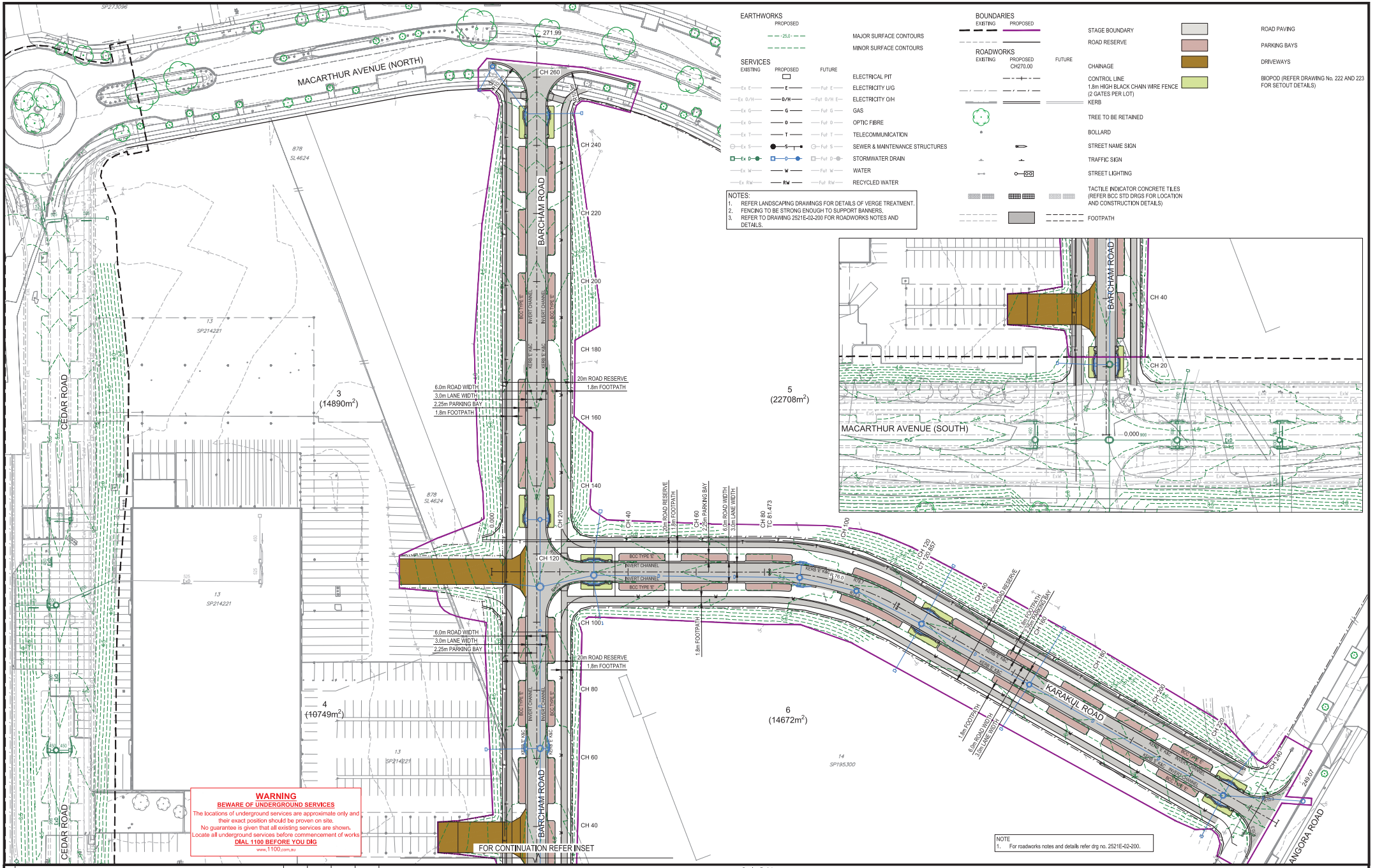
Northshore, Hamilton
Package 01
Economic Development Queensland
Roadworks
Roadworks Layout Plan

Drawing No. 2521E-01-212 **Rev** B
Dev. App. No.
Sheet No. 2 of 2

Issue for Construction



EARTHWORKS

PROPOSED

MAJOR SURFACE CONTOURS

MINOR SURFACE CONTOURS

SERVICES

EXISTING	PROPOSED	FUTURE	
			ELECTRICAL PIT
Ex E	E	Fut E	ELECTRICITY U/G
Ex O/H	O/H	Fut O/H	ELECTRICITY O/H
Ex G	G	Fut G	GAS
Ex O	O	Fut O	OPTIC FIBRE
Ex T	T	Fut T	TELECOMMUNICATION
Ex S	S	Fut S	SEWER & MAINTENANCE STRUCTURES
Ex D	D	Fut D	STORMWATER DRAIN
Ex W	W	Fut W	WATER
Ex RW	RW	Fut RW	RECYCLED WATER

NOTES:
1. REFER LANDSCAPING DRAWINGS FOR DETAILS OF VERGE TREATMENT.
2. FENCING TO BE STRONG ENOUGH TO SUPPORT BANNERS.
3. REFER TO DRAWING 2521E-02-200 FOR ROADWORKS NOTES AND DETAILS.

BOUNDARIES

EXISTING PROPOSED

STAGE BOUNDARY

ROAD RESERVE

CHAINAGE

CONTROL LINE

1.8m HIGH BLACK CHAIN WIRE FENCE (2 GATES PER LOT)

ROADWORKS

EXISTING PROPOSED FUTURE

CH270.00

KERB

TREE TO BE RETAINED

BOLLARD

STREET NAME SIGN

TRAFFIC SIGN

STREET LIGHTING

TACTILE INDICATOR CONCRETE TILES (REFER BCC STD DRGS FOR LOCATION AND CONSTRUCTION DETAILS)

FOOTPATH

ROAD PAVING

PARKING BAYS

DRIVEWAYS

BIOPOD (REFER DRAWING No. 222 AND 223 FOR SETOUT DETAILS)

NOTE
1. For roadworks notes and details refer drg no. 2521E-02-200.

REVISION	DATE	DES/DFT	WVR	APP'D
A Issue for Construction	11/06/21	DR/KM	008	GP

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Project Leader G.Pereira
Designed D.Rapson
Drawn K.McCoy
Checked D.Rapson
Authorised G.Pereira
Date Dec-2020

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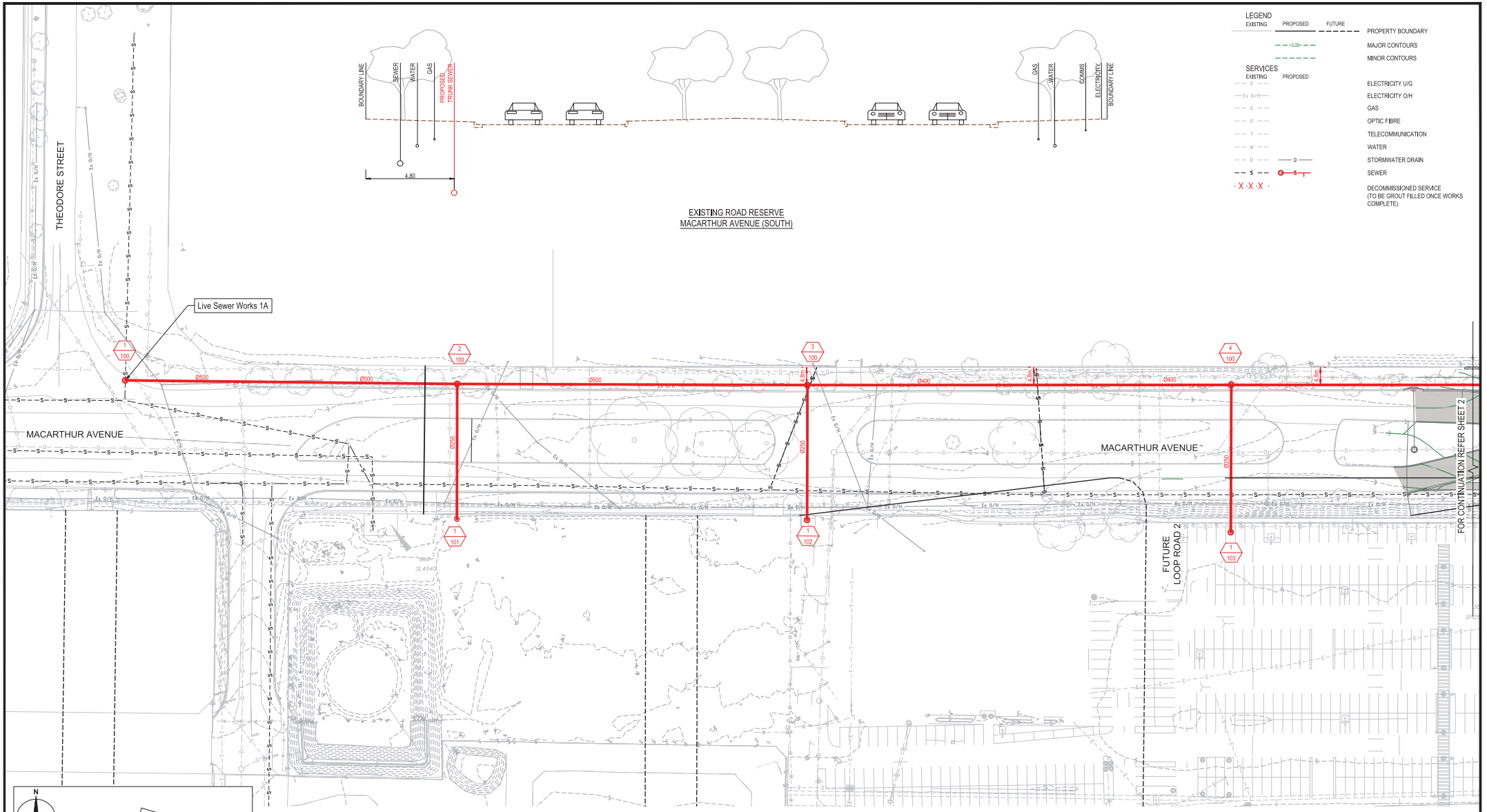
Northshore, Hamilton
Package 02
Economic Development Queensland
Roadworks
Roadworks Layout Plan

Drawing No. 2521E-02-211 **Rev** A
Dev. App. No.
Sheet No. 1 of 1

Issue for Construction



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NOTES
1. For sewer notes and details refer drg no. 2521E-01-400.
2. For sewer longitudinal sections refer drg no. 2521E-01-411 & 412.
3. For tunnel bored details refer drg no. 2521E-01-421.

REVISION	DATE	DES/DFT	W/R	APP'D
A Issue for Construction	11/06/21	DR/KM	008	GP

Gustavo Pereira
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Project Leader
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Designed
D. Rapson
Drawn
K. McCoy
Checked
D. Rapson
Authorised
G. Pereira
Date
May-2021

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Scale 1:500

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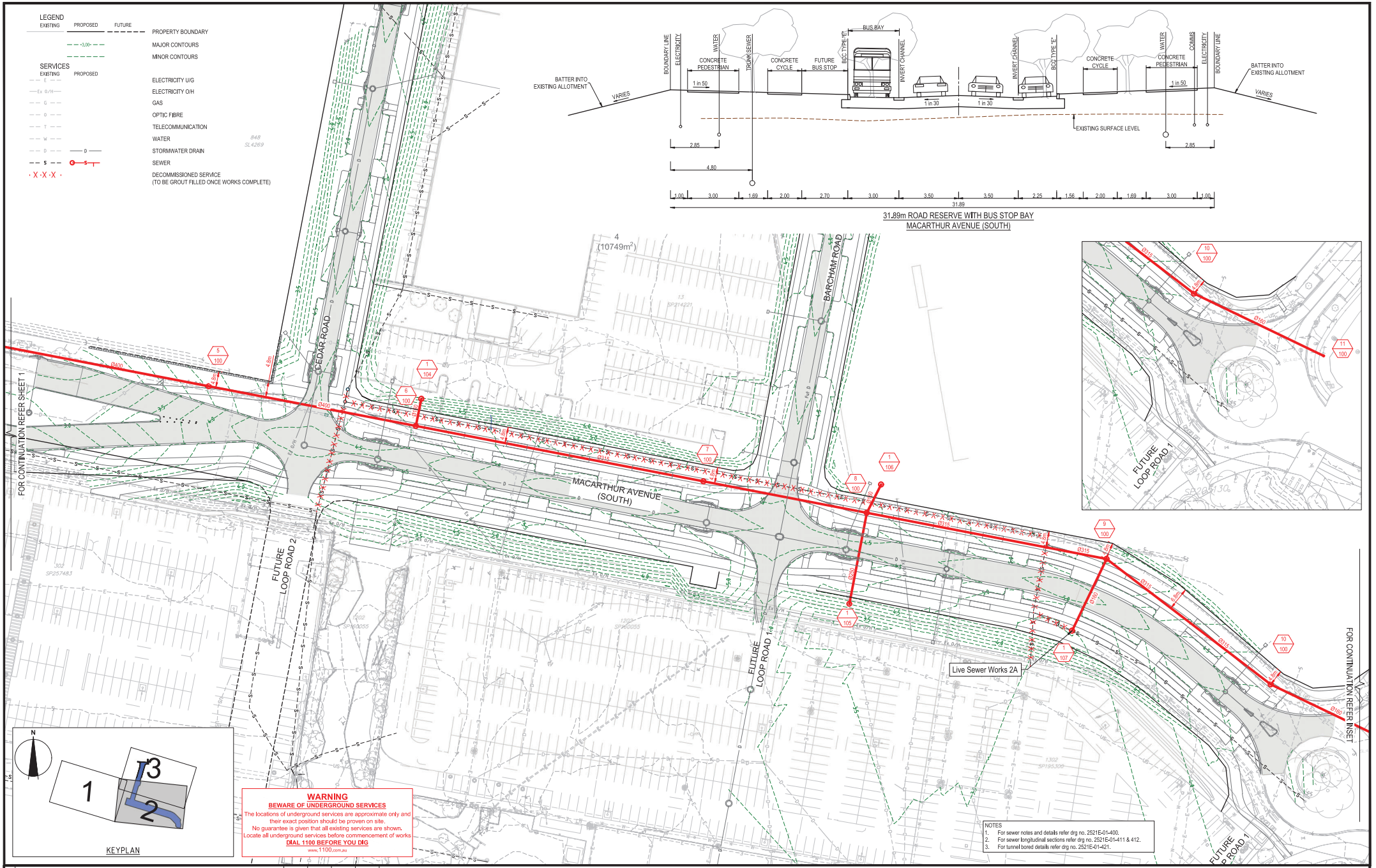
Northshore, Hamilton

Package 01 & 02
Economic Development Queensland
Sewer
Sewer Layout Plan

Drawing No. 2521E-01-401 **Rev** A
Dev. App. No.
Sheet No. 1 of 3

Issue for Construction



REVISION	DATE	DES/DFT	W/R	APP'D
A Issue for Construction	11/06/21	DR/KM	008	GP

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Project Leader G. Pereira
Designed D. Rapson
Drawn K. McCoy
Checked D. Rapson
Authorised G. Pereira
Date May-2021

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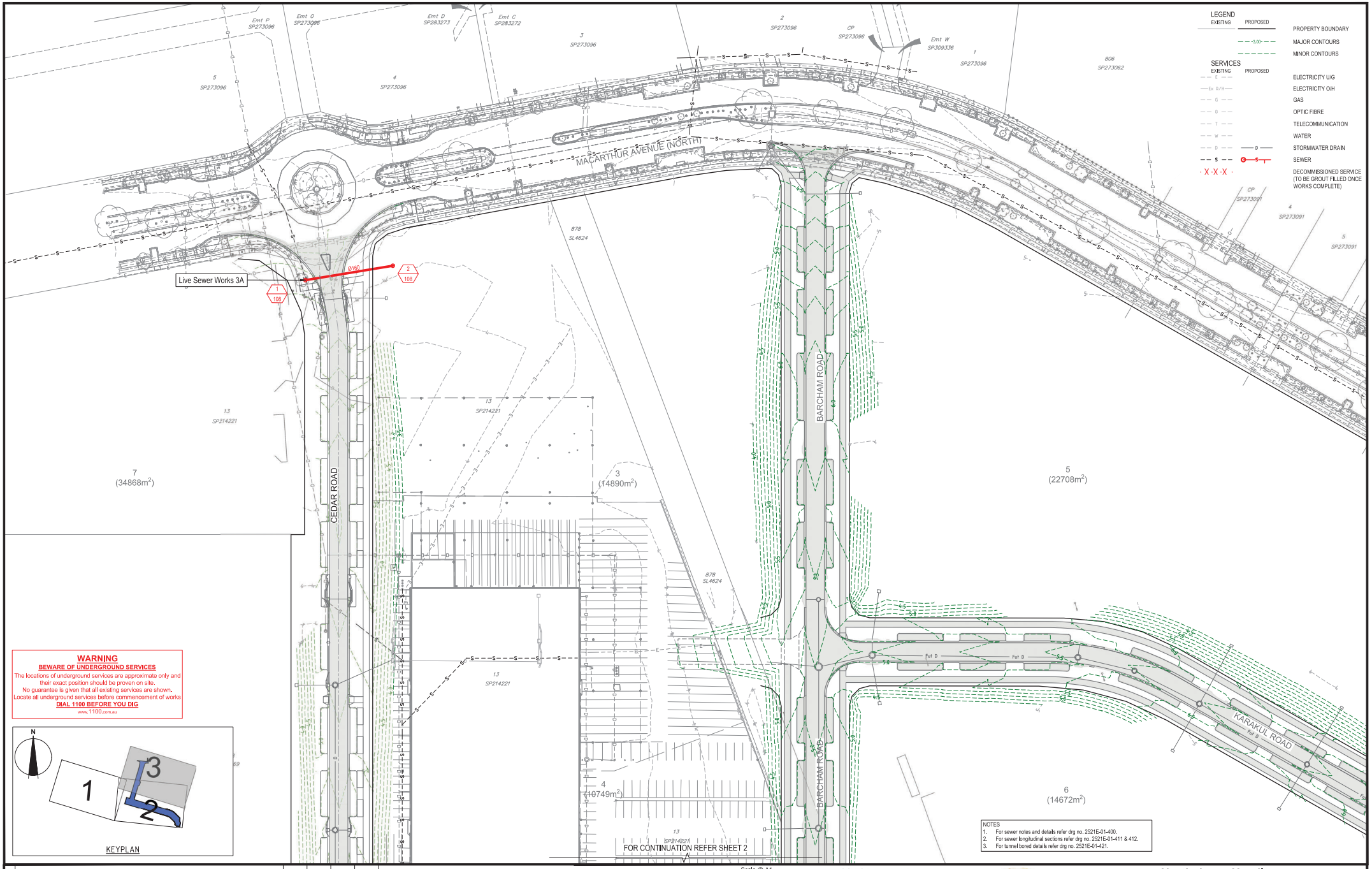
Northshore, Hamilton

Package 01 & 02
Economic Development Queensland
Sewer
Sewer Layout Plan

Drawing No. 2521E-01-402 **Rev** A
Dev. App. No.
Sheet No. 2 of 3

Issue for Construction



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KEYPLAN

REVISION	DATE	DES/DFT	W/R	APP'D
A Issue for Construction	11/06/21	DR/KM	008	GP

Gustavo Pereira
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Project Leader G. Pereira
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Drawn K. McCoy
Checked D. Rapson
Authorised G. Pereira
Date May-2021

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Scale 1:500

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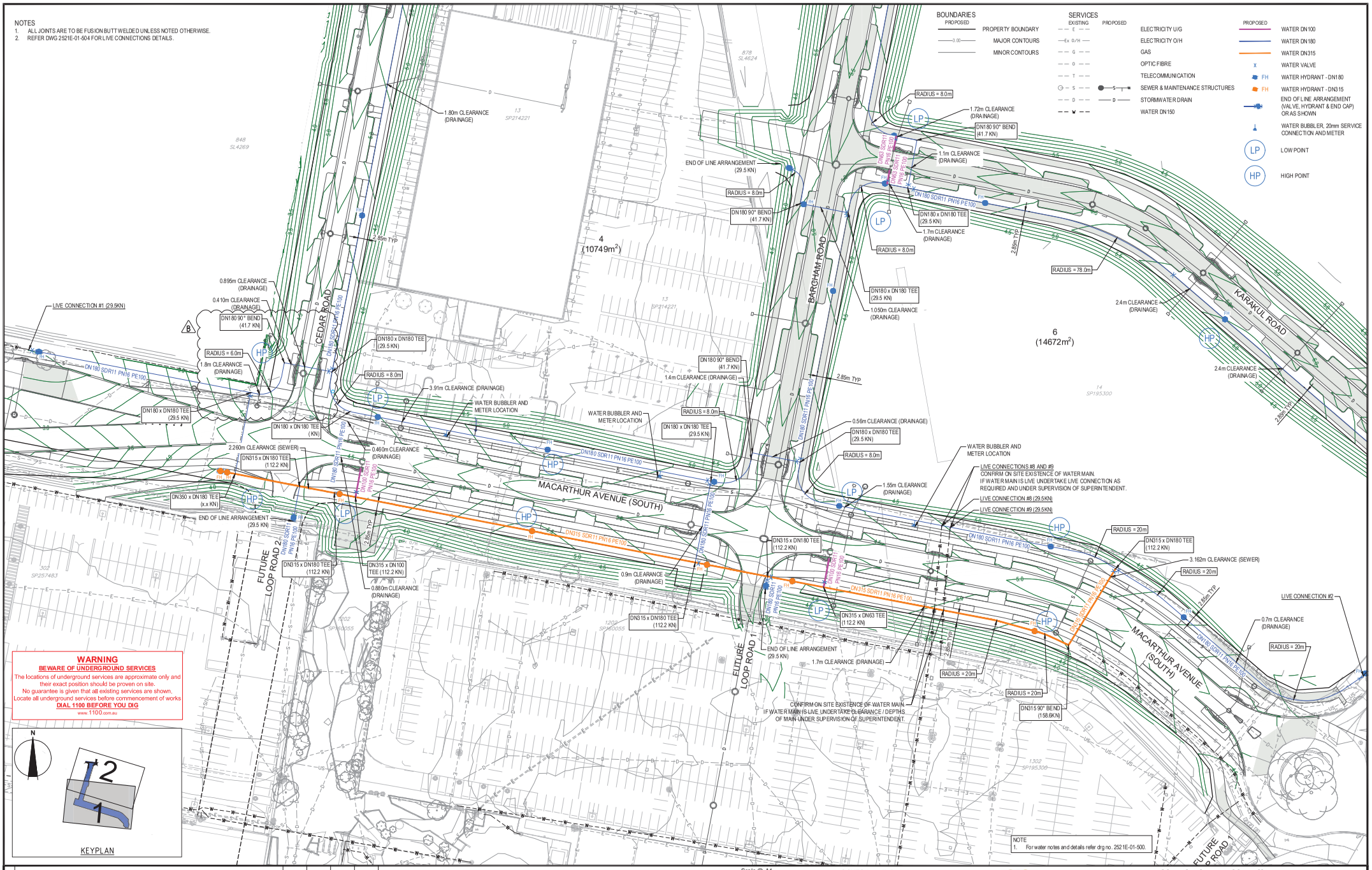
Northshore, Hamilton
Package 01 & 02
Economic Development Queensland
Sewer
Sewer Layout Plan

Drawing No. 2521E-01-403 **Rev** A
Dev. App. No.
Sheet No. 3 of 3

Issue for Construction



REVISION	DATE	DES/DFT	WR	APP'D
C Re-issue for Construction, water amended	25/08/21	EW/EG	0023	GP
B Cedar Road Swale Drainage Updated	7/07/21	AC/KM	0011	GP
A Issue for Construction	11/06/21	DR/KM	008	GP

Gustavo Pereira
RPEQ# 17514

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Brisbane, 4000

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Project Leader G. Pereira
Designed D. Rapson
Drawn K. McCoy
Checked D. Rapson
Authorised G. Pereira
Date May-2021

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Scale 1:500

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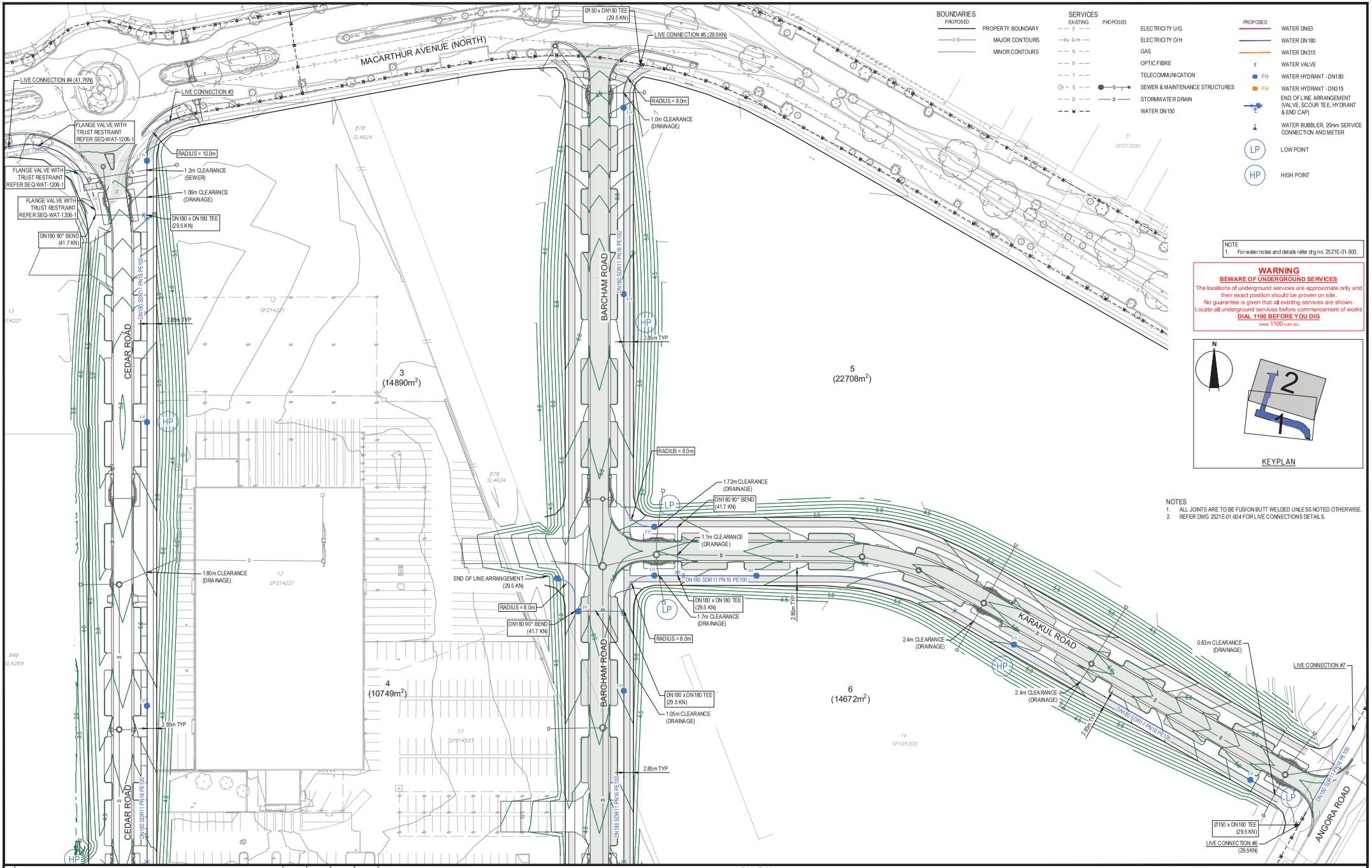
Northshore, Hamilton
Package 01 & 02
Economic Development Queensland
Water
Water Layout Plan

Drawing No. 2521E-01-502 **Rev** C
Dev. App. No.
Sheet No. 1 of 2

Issue for Construction



BOUNDARIES
PROPOSED
PROPERTY BOUNDARY
MAJOR CONTOURS
MINOR CONTOURS

SERVICES
EXISTING / PROPOSED
ELECTRICITY U/G
ELECTRICITY O/H
GAS
OPTIC FIBRE
TELECOMMUNICATION
SEWER & MAINTENANCE STRUCTURES
STORMWATER DRAIN
WATER DN150

PROPOSED
WATER DN63
WATER DN180
WATER DN315
WATER VALVE
WATER HYDRANT - DN180
WATER HYDRANT - DN315
END OF LINE ARRANGEMENT (VALVE, SCOUR TEE, HYDRANT & END CAP)
WATER BUBBLER, 20mm SERVICE CONNECTION AND METER
LOW POINT
HIGH POINT

NOTE
1. For water notes and details refer drg no. 2521E-01-500.

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KEYPLAN

NOTES
1. ALL JOINTS ARE TO BE FUSION BUTT WELDED UNLESS NOTED OTHERWISE.
2. REFER DWG 2521E-01-504 FOR LIVE CONNECTIONS DETAILS.

REVISION		DATE	DES/DFT	WR	APP'D
B	Re-issue for Construction, water amended	25/08/21	EW/EG	0023	GP
A	Issue for Construction	11/06/21	DR/KM	008	GP

Gustavo Pereira
RPEQ# 17514

.....
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Brisbane, 4000

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Project Leader G. Pereira
Designed D. Rapson
Drawn K. McCoy
Checked D. Rapson
Authorised G. Pereira
Date May-2021

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Scale 1:500

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Northshore, Hamilton
Package 01 & 02
Economic Development Queensland
Water
Water Layout Plan

Drawing No. 2521E-01-503 **Rev** B
Dev. App. No.
Sheet No. 2 of 2

Issue for Construction

Appendix B **SMEC Proposed Drainage Infrastructure Letter- 30032521-R002**

Member of the Surbana Jurong Group

30032521-R002

5 May 2021

Department of State Development, Tourism and Innovation
Level 14
1 Willian Street
Brisbane QLD 4000

Dear Aaron Grant,

RE: Proposed Drainage Infrastructure - MacArthur Ave and Cedar Road Works, Northshore Hamilton PDA

This letter is to address the stormwater drainage solution proposed for the works included in the MacArthur Ave and Cedar Road package works, and its compliance with the drainage requirements identified in the drainage and flooding assessment prepared for the Northshore Hamilton. The assessment of the drainage infrastructure for Northshore Hamilton and the impacts for the proposed development were addressed in the report "*Hamilton Northshore Trunk Drainage Assessment*", Reference No R.B22076.002.03.PDA, prepared by BMT and dated September 2019 (hereby referred as Trunk Drainage Assessment or Report). This letter must be read in conjunction with the Trunk Drainage Assessment Report.

1. Trunk Drainage Assessment

The Trunk Drainage Assessment identifies 3 phases of the development:

- Phase 1, mostly already completed, located on the western and eastern edges of the PDA.
- Phase 2, composed of the subject works (to the east of the PDA) and additional works further away to the west of the development.
- Phase 3, remainder of the PDA.

As part of each of the Phases abovementioned, stormwater drainage infrastructure upgrades are identified as required to improve the current drainage conditions to adequately service the proposed development. As part of Phases 1 and 2, only local augmentation of existing drainage infrastructure is required to address their respective catchments. Phase 3, however, requires significant trunk infrastructure to be constructed as part of the works to service its local catchment, the runoff from the major upstream catchment to the North of the PDA and any excess runoff from Phases 1 and 2 catchments that may discharge into Phase 3 catchment area.

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1.1 Road Levels and Flooding

As noted in the Trunk Drainage Assessment, the minimum development level for the roads is based on the Brisbane River storm tide level identified to be 3.1m AHD. As such, for the hydraulic modelling assessment undertaken by BMT the minimum level of 3.1m AHD was adopted for the roads. The report also is very clear to state that as a consequence of raising road reserves, as required for the development, the notional flood level within the roads will also increase. Therefore, as stated in the report, the flood levels should be viewed in context, i.e. whilst the notional flood level will increase, the actual depth of inundation will not significantly change and will likely being reduced at certain locations.

The BMT's statement about the relationship between road levels and flood levels is further supported by the flood maps provided within the report that indicates that any flooding within the PDA is caused by overland runoff, and not dictated by the Brisbane River flooding (when the roads are above 3.1m AHD).

1.2 Phase 2 Drainage

As previously mentioned, the Trunk Drainage Assessment indicates that only some minor upgrades to the existing networks within Phase 2 catchment is required as part of Phase 2 works (refer Figure 3-4 in the Report). This is to exclusively convey flows from Phase 2 catchment to its ultimate discharge point, the Brisbane River. No works outside Phase 2 catchment or provision for external catchments are required as part of Phase 2 works.

Upgrading of the existing drainage system at MacArthur Avenue, west of the proposed Cedar Road is also proposed as part of Phase 3 works (Figure 3-11 of the Trunk Drainage Assessment). This section of the drainage networks is to convey flows from Phase 2 catchment. It is currently under capacity, however not required to be upgraded during Phase 2 works.

1.3 Overland Flows

The overland flow regime intended for the works is illustrated in a number of Figures within the Trunk Drainage Assessment report. Figures 3-5 and 3-7 indicates that the overland flow from Phase 2 (relative to the scope of these works) are to be directed to 2 discharge points:

- Brisbane River through Phase 1 (to the East of the works, small portion of Phase 2 catchment).
- Brisbane River through Phase 3 Theodore Street (to the West, majority of Phase 2 catchment).

1.4 Summary of Findings

In summary, the Trunk Drainage Assessment report identified the following drainage and flooding controls for Phase 2 (subject works only):

- Only minor augmentation to existing drainage system within Phase 2 catchment is required.
- Phase 2 catchment is to discharge into Brisbane River via combination of underground drainage system and overland flow:
  - through Phase 1 for a small section of MacArthur Avenue.
  - through Theodore Street (Phase 3).
- No catchment external discharges into Phase 2 catchment.
- Drainage system within MacArthur Ave (Phase 3) is to be upgraded to convey flows form Phase 2 catchment, during Phase 3 stage of works only.
- Minimum road levels to be set at 3.1m ADH.

2. Proposed Drainage Works

As part of the civil package of the works prepared for the subject works (identified as the eastern side of Phase 2), a new road and drainage network is proposed, which includes the construction of 3 new roads, as well as realignment of the local section of the MacArthur Avenue. All proposed new roads will be constructed in approximately 1.5m to 2m fill over existing surface levels.

The proposed stormwater drainage infrastructure partially differs to the works indicated in the Trunk Drainage Assessment Report. The alternative design proposed, however, fully complies with the intended outcome of the Trunk Drainage Assessment, also providing further improvements to the overall PDA. A brief assessment of the impact of the works is discussed below.

2.1 Road Levels and Road Grading

The proposed road network was graded to ultimately freely drain towards the Brisbane River (except for standard local sag pits at intersections). The road levels were set by adopting a minimum level of 3.1m AHD at the lowest point within the proposed road network, in accordance with the recommendations of the Trunk Drainage Assessment report. This lowest point is to be located adjacent to the Brisbane River, in a future road to be constructed as part of the Phase 2 works (outside this scope of works). Minimum grade was adopted to set the levels for the remainder of the road network, achieving RL greater than 4.0m AHD at most locations of the subject works.

Since the area of the subject works does not receive stormwater runoff from any external catchment, raising the roads will not cause any obstruction to external overland flows. The proposed grading therefore achieves the following results:

- Minimum road level of 3.1m AHD as recommended in the Trunk Drainage Assessment Report.
- Ultimate on-grade unobstructed overland flow path through the road network to the Brisbane River (via Phase 3, as per Trunk Drainage Assessment Report).
- Non-obstruction of any external flows.
- Compliance with minimum road grading requirements.
- Eliminates the need of sags that may result in undesired flooding hazards.

The works exclude filling of the new lots created as part of the works, resulting in their surface level to be below the proposed roads. These lots will be owned and maintained by EDQ and adequately fenced to prevent access to the lots. It is understood that those lots will be sold to private developers to be further developed as high density mixed-use. As part of these works, the access to the future developments will be made at the road level, with the area below used as car parking basement. Thus, the proposal to temporarily maintain lots at their existing surface level (below road level) will prevent the extra costs of import fill material that will be eventually excavated and removed from site to give way to the future buildings and basements.

2.2 Drainage Strategy

2.2.1 Underground Drainage Network

Whilst the Trunk Drainage Assessment Report indicates that only minor upgrades to the local drainage networks is required for Phase 2, the current civil package of works proposes a new drainage network servicing Phase 2 only and discharging into the Brisbane River through a new outlet. This will provide the following drainage improvements over and above the recommended in the Trunk Drainage Assessment Report:

- Proposed system will have capacity to cater for 10% AEP storm events for Phase 2 works at the completion of Phase 2, without the need of any future additional works as part of Phase 3 works. The proposed solution in the Trunk Assessment Report would only fully achieve 10% AEP capacity for Phase 2 at the completion of Phase 3 works.

- Addition of new headwall to Brisbane River and diversion of Phase 2 catchment away from Phase 3 drainage network. The Trunk Drainage Assessment Report identifies Phase 3 as requiring a number of large new drainage trunk infrastructure to be constructed due to the large catchment contributing to its system, including Phase 2 catchment. By diverting Phase 2 (or part of) away from that system, it reduces the flows entering Phase 3 system.
- Phase 3 existing drainage network is currently under capacity. The solution presented in the Report would not improve the flooding occurring at MacArthur Ave until Phase 3 is completed. The now proposed solution reliefs the existing Phase 3 system by taking flows away from the system, and therefore reducing the flooding issues in MacArthur Ave.

2.2.2 Overland Flow

The overland flows will be managed in accordance with the Trunk Drainage Assessment Report, with most surface runoff flowing towards Phase 3, as the current scenario. As mentioned in section 2.2.1, the proposed solution will however improve the capacity of the underground drainage network in Phase 2 and consequently reduce the volume of water and flow concentration discharging into Phase 3 MacArthur Ave.

3. Summary & Conclusion

The Trunk Drainage Assessment Report identified the following main aspects of the drainage design for Phase 2 (area of the proposed works):

- Minimum road level of 3.1m AHD due to Brisbane River storm tide.
- Flooding occurring due to limited capacity of the existing underground drainage, resulted from surface runoff from the local catchment only.
- Phase 2 does not receive flows from any external catchment.
- Only minor drainage upgrades required as part of Phase 2 works, with additional works proposed as part of Phase 3 only (MacArthur Ave).

An alternative drainage solution is proposed for the works, which addresses all the requirements of the Trunk Drainage Assessment Report with some additional improvements:

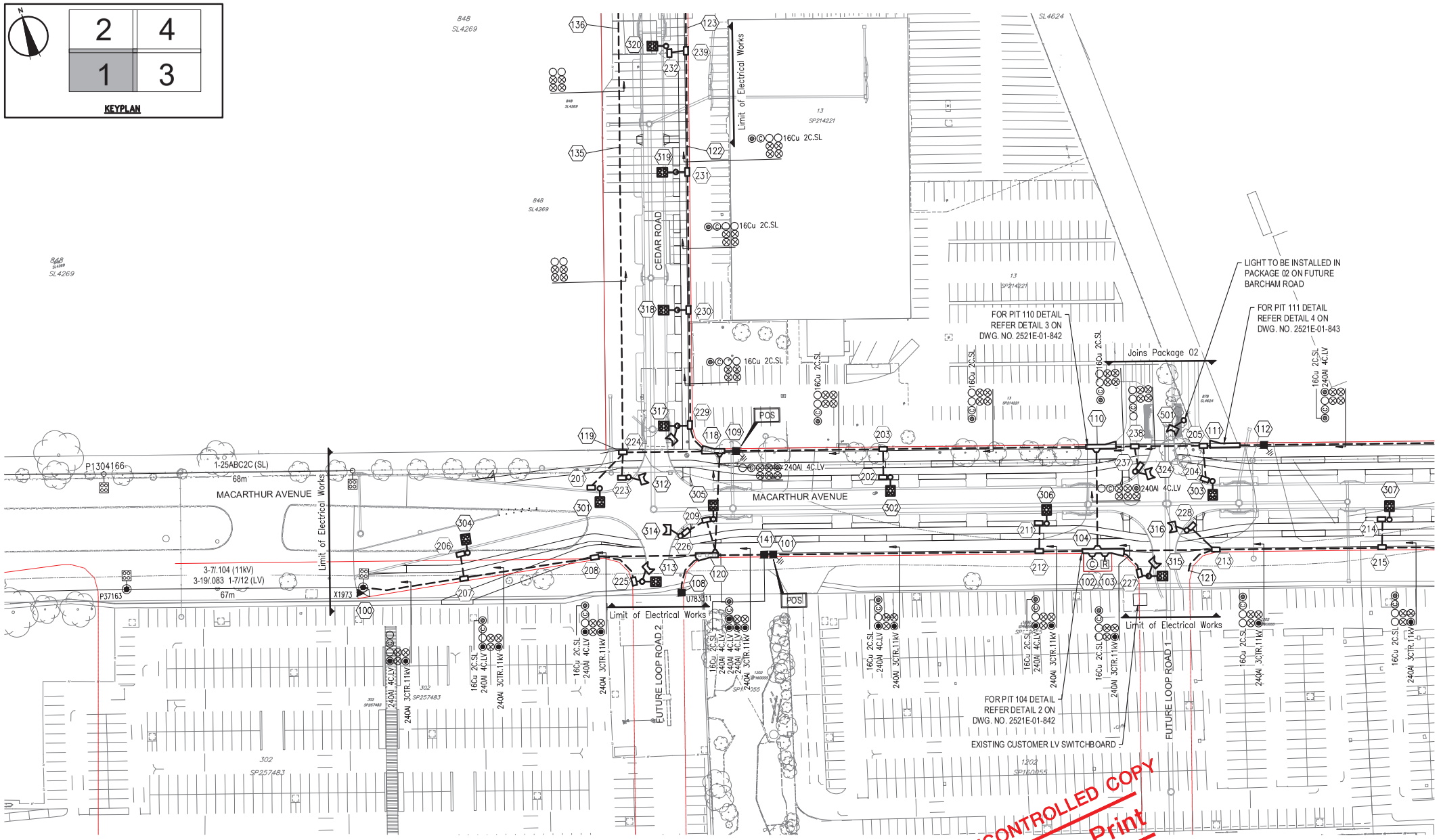
- Minimum road level of 3.1m AHD due to Brisbane River storm tide.
- Roads on-grade, eliminating the need of local sags and undesirable flooding hazards/risks.
- New drainage system provides 10% AEP drainage capacity for Phase 2 without the need to wait for Phase 3 upgrades.
- Reduction of existing flooding within Phase 3 (MacArthur Ave) due to current limited drainage system capacity by diverting more flows away from Phase 3.
- Reduction of flows to future Phase 3 drainage system, potentially reducing the costs to upgrade Phase 3 system.

It is therefore concluded that the proposed drainage solution adequately addresses the drainage and flooding requirements of Phase 2, in accordance with the Trunk Drainage Assessment Report prepared for Northshore Hamilton PDA, with some additional improvements.

Yours sincerely,

Gustavo Pereira
URBAN MANAGER - RPEQ 17514

Appendix C **Electrical, Communications and Gas Plans**



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SITE CONTACT DETAILS		ALIGNMENTS		STORMWATER	LOCATE	LOTS	–
NAME		ENERGEX OH	3.0m	SEWERAGE	LOCATE	CANCELLING LOTS	–
–		ENERGEX UG	0 – 900mm	OTHER	LOCATE		
COMPANY		TELSTRA	LOCATE			LOCAL AUTHORITY	BCC
–		GAS	LOCATE	WORKS CO-ORDINATOR	–	UBD REF:	–
PHONE	–	H.P.GAS	LOCATE	CONST. PROJECT NO.	–	PEGGED?	ON REQUEST
MOBILE	–	WATER	LOCATE	WORK REQUEST NO.	–		

ENERGEX PROJECT No: S3500136
PROJECT SUBURB: HAMILTON
SHEET 2 OF 27
DESIGNER DETAILS
STEVE GIBSON: (07) 3324 7826

REVISION IN PROGRESS

REVISION		DATE	DES'D BY	DWN	APP'D
3	Issue for Energex Approval				
2	Issue for Tender				
1	Draft 50% Detailed Design				

CHECK PRINT	PRELIM INITIAL	FINAL DATE
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DRAFTING CHECK COMPLETED		
ENGINEERING SIGN OFF		

Neal Digby
RPEQ 16172

Principal
Economic Development Queensland
William Street
Brisbane, 4000

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Project Leader: G. Pereira
Designed: S. Gibson
Drawn: R.Chiruta
Checked: N. Digby
Authorised: G. Pereira
Date: Dec-2020

Scale @ A1
1:500
0 5 10 20
Scale 1:500

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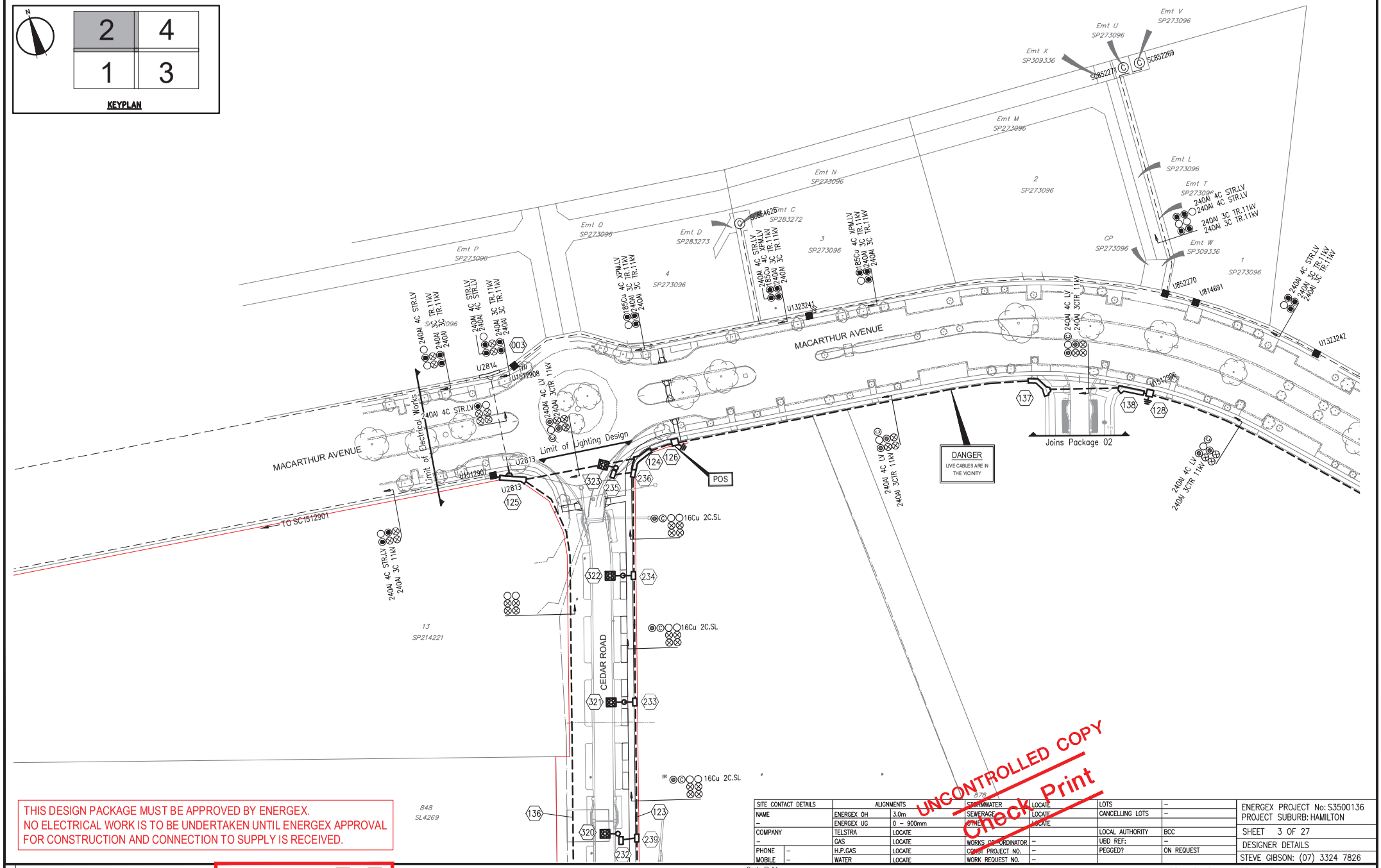
Northshore, Hamilton
Package 01
Economic Development Queensland
Electrical Reticulation & NPL2 Road Lighting
Layout Plan

Drawing No. 2521E-01-811 **Rev** 3
Dev. App. No.
Sheet No. 2 of 27

Issue for Approval



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SITE CONTACT DETAILS		ALIGNMENTS		STORMWATER	LOCATE	LOTS	–
NAME		ENERGEX OH	3.0m	SEWERAGE	LOCATE	CANCELLING LOTS	–
–		ENERGEX UG	0 – 900mm	OTHER	LOCATE		
COMPANY		TELSTRA	LOCATE			LOCAL AUTHORITY	BCC
–		GAS	LOCATE	WORKS CO-ORDINATOR	–	UBD REF:	–
PHONE	–	H.P.GAS	LOCATE	CONST. PROJECT NO.	–	PEGGED?	ON REQUEST
MOBILE	–	WATER	LOCATE	WORK REQUEST NO.	–		

ENERGEX PROJECT No: S3500136
PROJECT SUBURB: HAMILTON
SHEET 3 OF 27
DESIGNER DETAILS
STEVE GIBSON: (07) 3324 7826

REVISION IN PROGRESS

REVISION		DATE	DES'GN'T	W'KR	APP'D
3	Issue for Energex Approval				
2	Issue for Tender				
1	Draft 50% Detailed Design				

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DRAFTING CHECK COMPLETED		
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Neal Digby
RPEQ 16172

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Economic Development Queensland
William Street
Brisbane, 4000

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Project Leader G. Pereira
Designed S. Gibson
Drawn R.Chiruta
Checked N. Digby
Authorised G. Pereira
Date Dec-2020

Scale @ A1
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Scale 1:500

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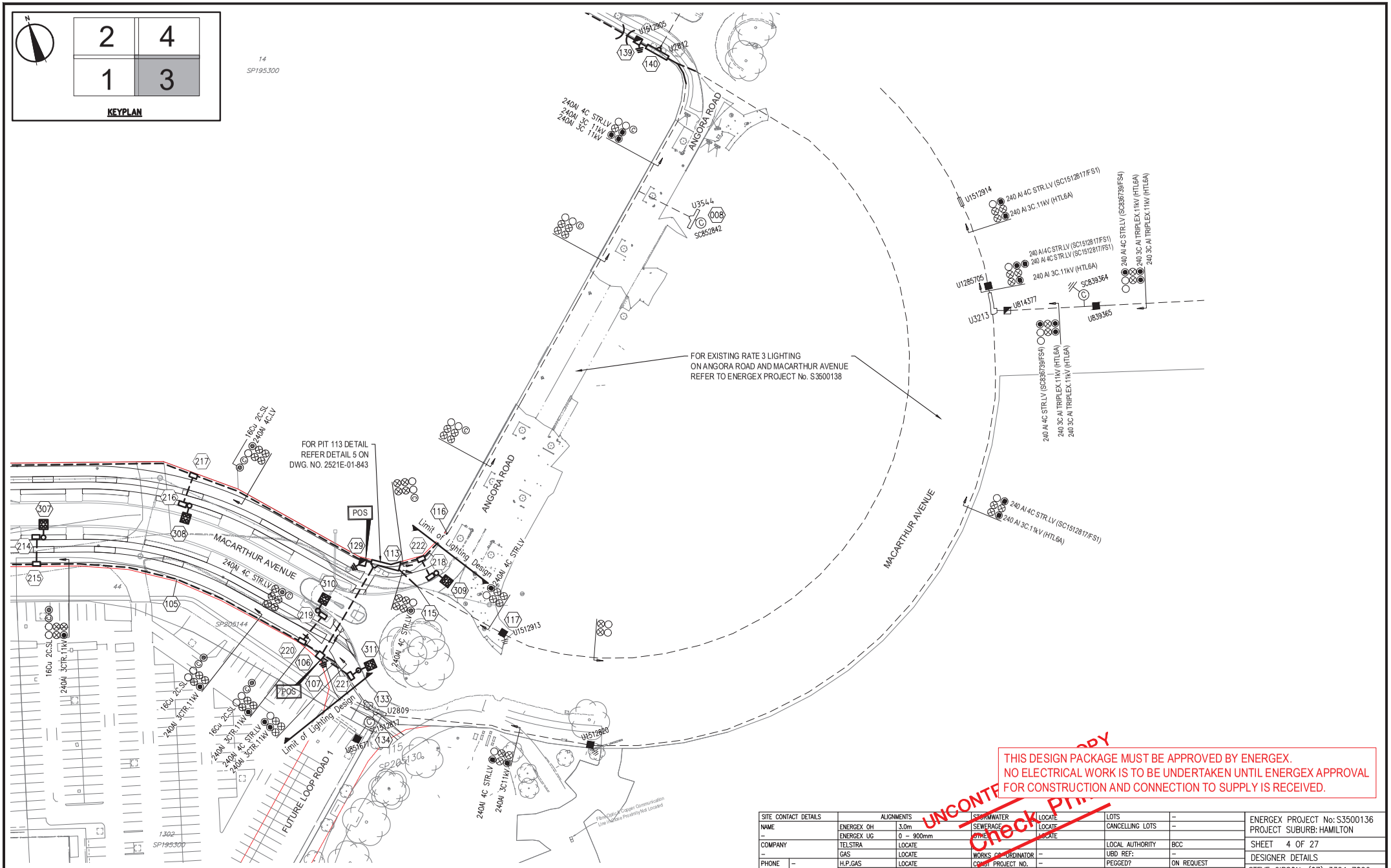
Northshore, Hamilton
Package 01
Economic Development Queensland
Electrical Reticulation & NPL2 Road Lighting
Layout Plan

Drawing No. 2521E-01-812 **Rev** 3
Dev. App. No.
Sheet No. 3 of 27

Issue for Approval



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SITE CONTACT DETAILS		ALIGNMENTS						
NAME	–	ENERGEX OH	3.0m	STORMWATER	LOCATE	LOTS	–	ENERGEX PROJECT No: S3500136
–		ENERGEX UG	0 – 900mm	SEWERAGE	LOCATE	CANCELLING LOTS	–	PROJECT SUBURB: HAMILTON
COMPANY		TELSTRA	LOCATE	OTHER	LOCATE			SHEET 4 OF 27
–		GAS	LOCATE	WORKS CO-ORDINATOR	–	LOCAL AUTHORITY	BCC	DESIGNER DETAILS
PHONE	–	H.P.GAS	LOCATE	CONST. PROJECT NO.	–	UBD REF:	–	STEVE GIBSON: (07) 3324 7826
MOBILE	–	WATER	LOCATE	WORK REQUEST NO.	–	PEGGED?	ON REQUEST	

REVISION IN PROGRESS

REVISION		DATE	DES'GN'T	W'KR	APP'D
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2	Issue for Tender				
1	Draft 50% Detailed Design				

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William Street
Brisbane, 4000

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Project Leader G. Pereira
Designed S. Gibson
Drawn R.Chiruta
Checked N. Digby
Authorised G. Pereira
Date Dec-2020

Scale @ A1
1:500
0 5 10 20
Scale 1:500

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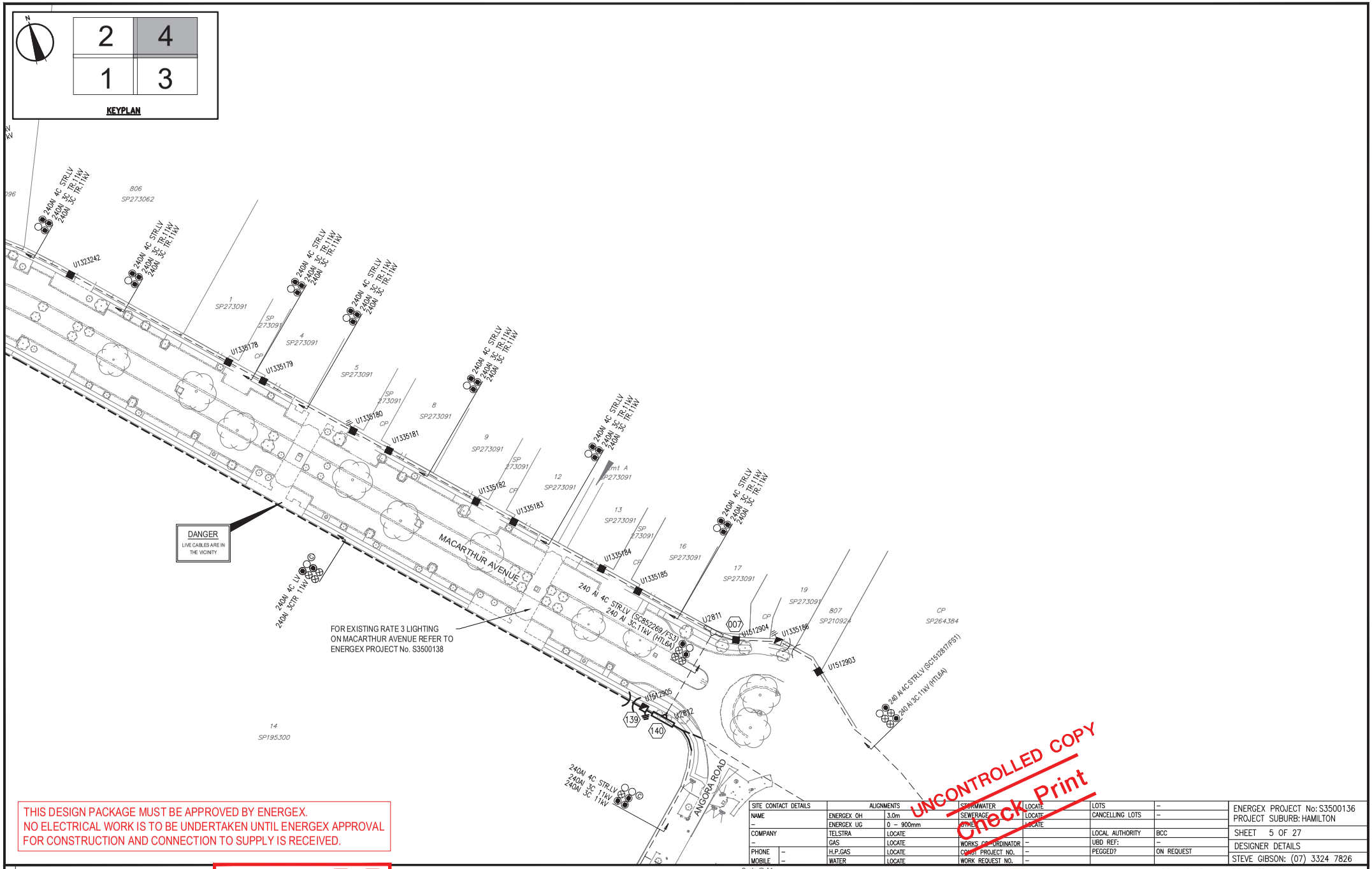
Northshore, Hamilton
Package 01
Economic Development Queensland
Electrical Reticulation & NPL2 Road Lighting
Layout Plan

Drawing No. 2521E-01-813 **Rev** 3
Dev. App. No.
Sheet No. 4 of 27

Issue for Approval



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SITE CONTACT DETAILS		ALIGNMENTS		STORMWATER	LOCATE	LOTS	–
NAME	–	ENERGEX OH	3.0m	SEWERAGE	LOCATE	CANCELLING LOTS	–
	–	ENERGEX UG	0 – 900mm	OTHER	LOCATE		
COMPANY	–	TELSTRA	LOCATE			LOCAL AUTHORITY	BCC
	–	GAS	LOCATE	WORKS CO-ORDINATOR	–	UBD REF:	–
PHONE	–	H.P.GAS	LOCATE	CONST. PROJECT NO.	–	PEGGED?	ON REQUEST
MOBILE	–	WATER	LOCATE	WORK REQUEST NO.	–		

ENERGEX PROJECT No: S3500136
PROJECT SUBURB: HAMILTON
SHEET 5 OF 27
DESIGNER DETAILS
STEVE GIBSON: (07) 3324 7826

REVISION		DATE	DESIGN	WVR	APP'D
3	Issue for Energex Approval				
2	Issue for Tender				
1	Draft 50% Detailed Design				

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Neal Digby
RPEQ 16172
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Principal
Economic Development Queensland
William Street
Brisbane, 4000

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Project Leader G. Pereira
Designed S. Gibson
Drawn R.Chiruta
Checked N. Digby
Authorised G. Pereira
Date Dec-2020

Scale @ A1
1:500
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Scale 1:500

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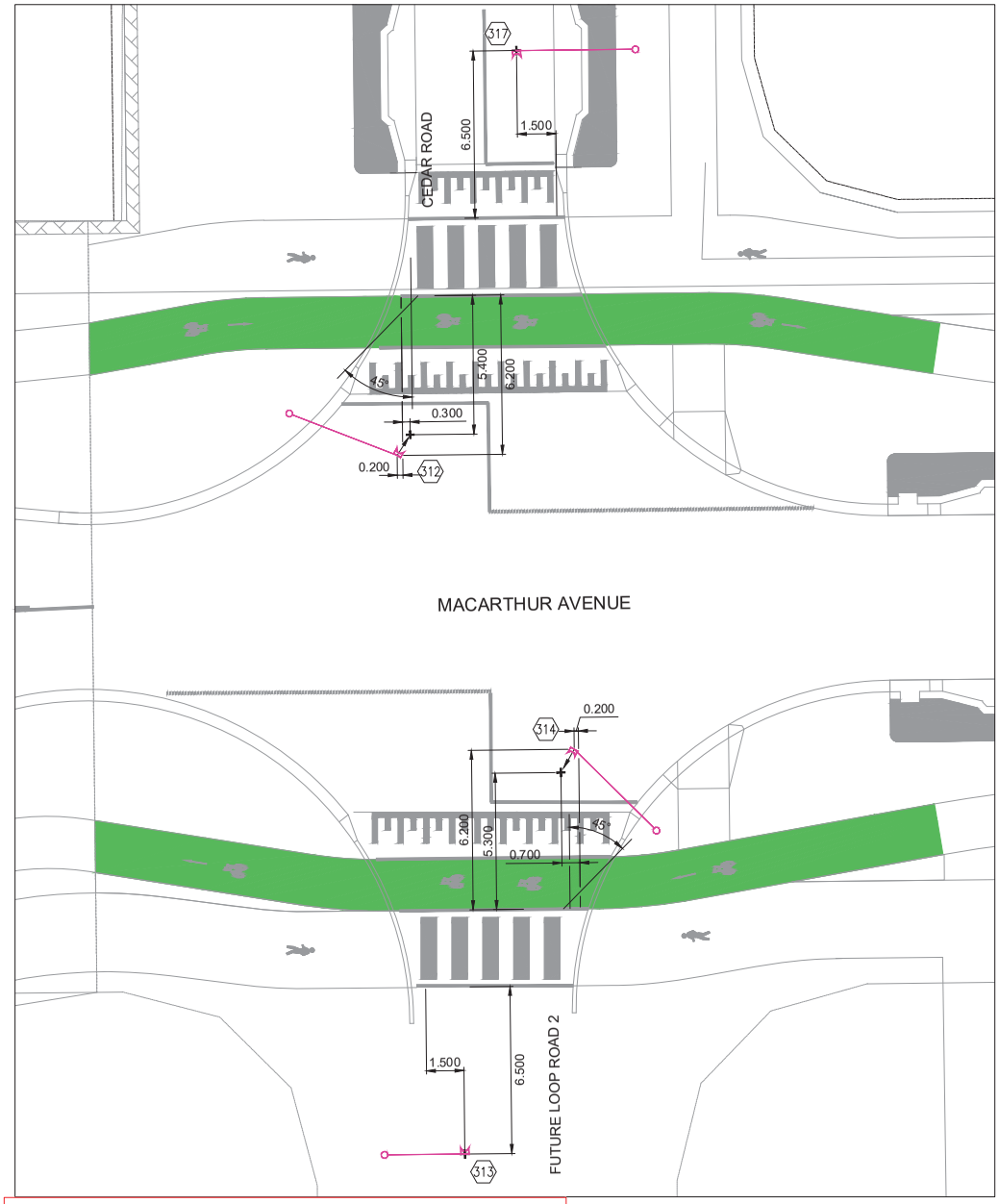
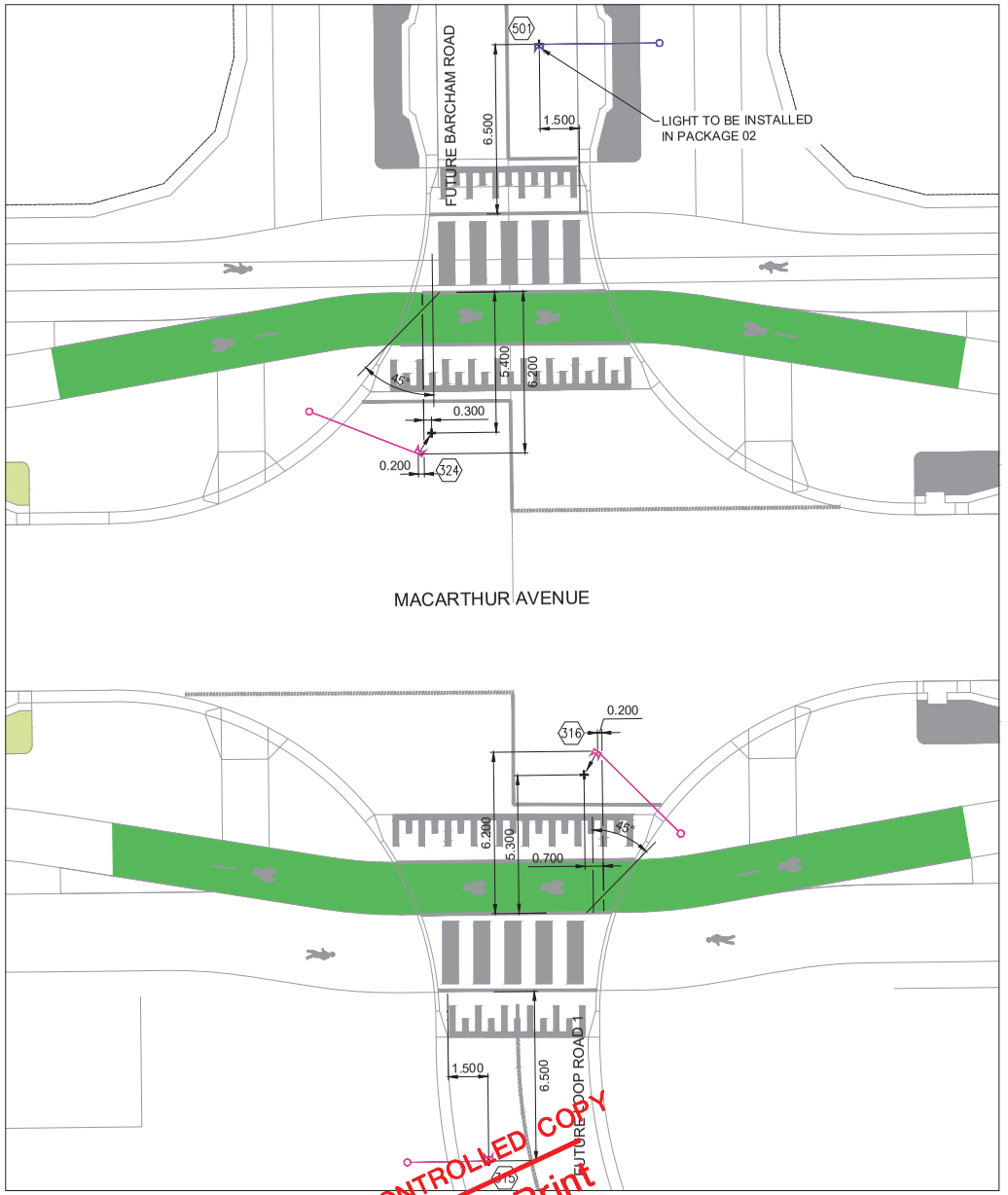
Northshore, Hamilton
Package 01
Economic Development Queensland
Electrical Reticulation & NPL2 Road Lighting
Layout Plan

Drawing No. 2521E-01-814 **Rev** 3
Dev. App. No.
Sheet No. 5 of 27

Issue for Approval





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SITE CONTACT DETAILS		ALIGNMENTS		STORMWATER	LOCATE	LOTS	–
NAME		ENERGEX OH	3.0m	SEWERAGE	LOCATE	CANCELLING LOTS	–
–		ENERGEX UG	0 – 900mm	OTHER	LOCATE		
COMPANY		TELSTRA	LOCATE			LOCAL AUTHORITY	BCC
–		GAS	LOCATE	WORKS CO-ORDINATOR	–	UBD REF:	–
PHONE	–	H.P.GAS	LOCATE	CONST. PROJECT NO.	–	PEGGED?	ON REQUEST
MOBILE	–	WATER	LOCATE	WORK REQUEST NO.	–		

ENERGEX PROJECT No: S3500136
PROJECT SUBURB: HAMILTON
SHEET 6 OF 27
DESIGNER DETAILS
STEVE GIBSON: (07) 3324 7826

REVISION IN PROGRESS

REVISION		DATE	DES'GN'T	W'KR	APP'D
3	Issue for Energex Approval				
2	Issue for Tender				
1	Draft 50% Detailed Design				

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Principal
Economic Development Queensland
William Street
Brisbane, 4000

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Project Leader
G. Pereira
Designed
S. Gibson
Drawn
R.Chiruta
Checked
N. Digby
Authorised
G. Pereira
Date
Dec-2020

Scale @ A1
1:500
0 1 2 4
Scale 1:100

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Package 01
Economic Development Queensland
Electrical Reticulation & NPL2 Road Lighting
Floodlight Aiming Diagram

Drawing No. 2521E-01-815 **Rev** 3
Dev. App. No.
Sheet No. 6 of 27

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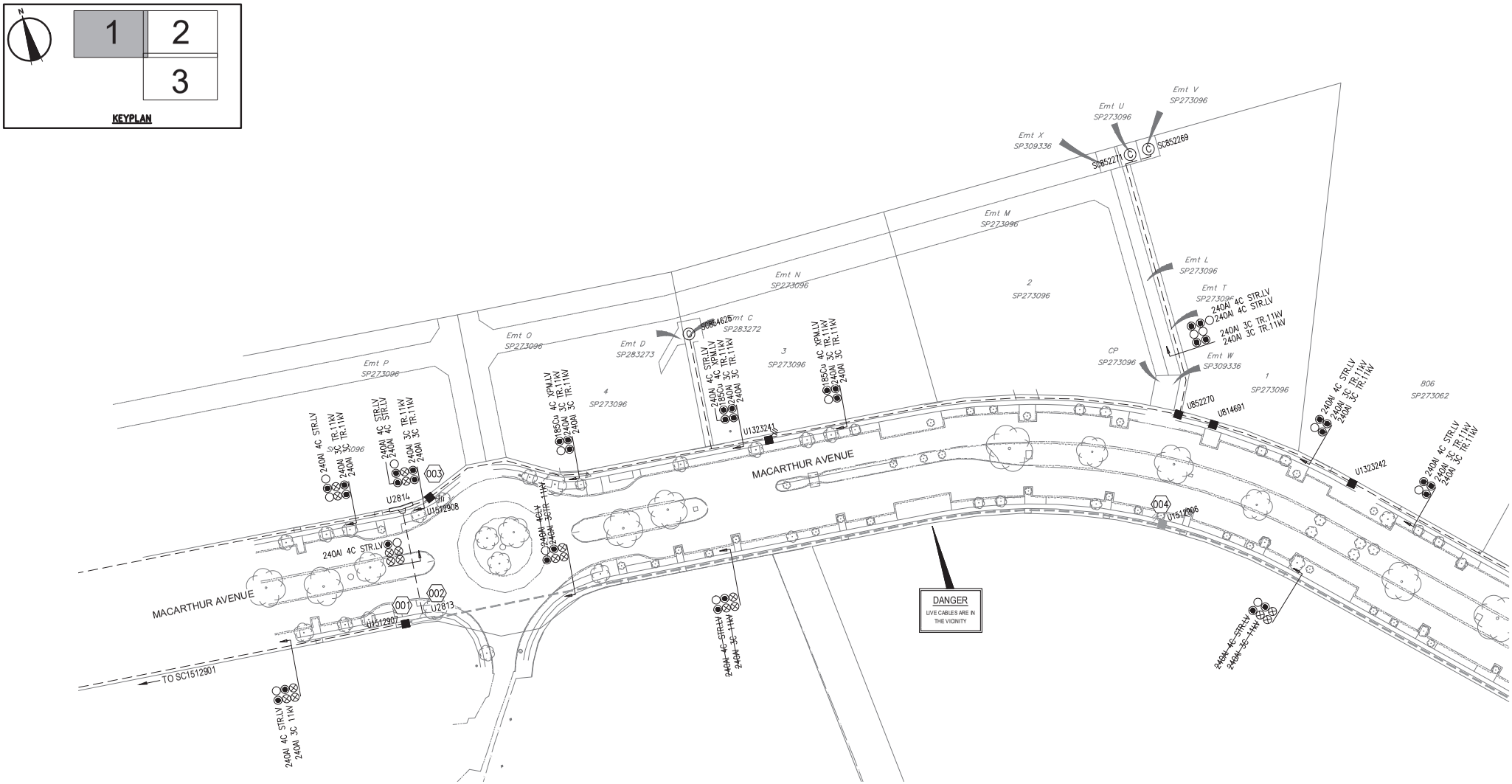

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NAME		ENERGEX OH	3.0m	SEWERAGE	LOCATE	CANCELLING LOTS	–
–		ENERGEX UG	0 – 900mm	OTHER	LOCATE		
COMPANY		TELSTRA	LOCATE			LOCAL AUTHORITY	BCC
–		GAS	LOCATE	WORKS CO-ORDINATOR	–	UBD REF:	–
PHONE	–	H.P.GAS	LOCATE	CONST. PROJECT NO.	–	PEGGED?	ON REQUEST
MOBILE	–	WATER	LOCATE	WORK REQUEST NO.	–		

ENERGEX PROJECT No: S3500136
PROJECT SUBURB: HAMILTON
SHEET 7 OF 27
DESIGNER DETAILS
STEVE GIBSON: (07) 3324 7826

REVISION IN PROGRESS

REVISION		DATE	DESIGN	DWN	APP'D
1	Issue for Energex Approval				

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Neal Digby
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Principal
Economic Development Queensland
William Street
Brisbane, 4000

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Project Leader G. Pereira
Designed S. Gibson
Drawn R.Chiruta
Checked N. Digby
Authorised G. Pereira
Date Dec-2020

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Scale 1:500

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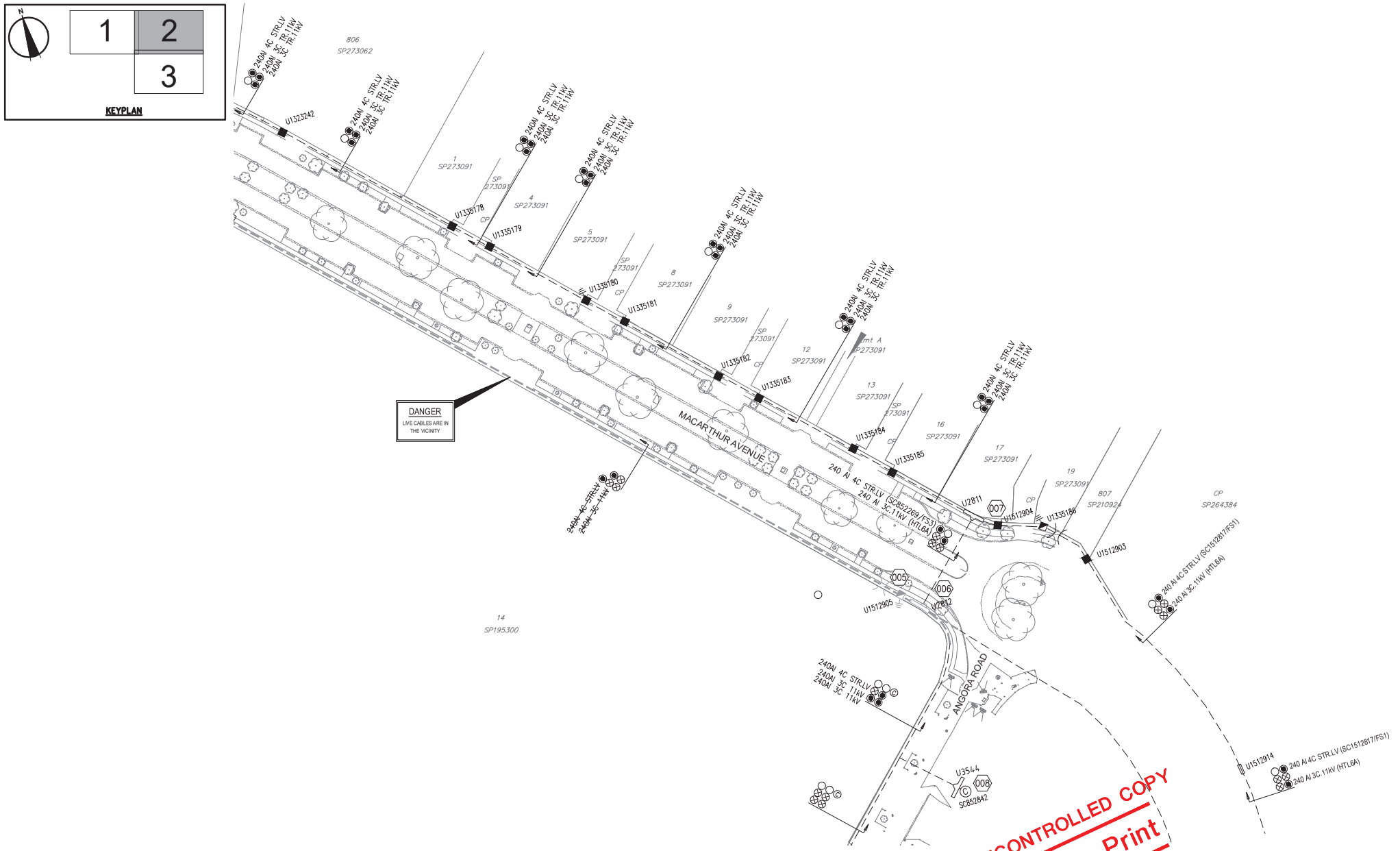
Northshore, Hamilton
Package 01
Economic Development Queensland
Electrical Reticulation Recovery
Layout Plan

Drawing No. 2521E-01-816 **Rev** 1
Dev. App. No.
Sheet No. 7 of 27

Issue for Approval



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SITE CONTACT DETAILS		ALIGNMENTS		STORMWATER	LOCATE	LOTS	–	ENERGEX PROJECT No: S3500136
NAME		ENERGEX OH	3.0m	SEWERAGE	LOCATE	CANCELLING LOTS	–	PROJECT SUBURB: HAMILTON
–		ENERGEX UG	0 – 900mm	OTHER	LOCATE			
COMPANY		TELSTRA	LOCATE			LOCAL AUTHORITY	BCC	SHEET 8 OF 27
–		GAS	LOCATE	WORKS CO-ORDINATOR	–	UBD REF:	–	DESIGNER DETAILS
PHONE	–	H.P.GAS	LOCATE	CONST. PROJECT NO.	–	PEGGED?	ON REQUEST	STEVE GIBSON: (07) 3324 7826
MOBILE	–	WATER	LOCATE	WORK REQUEST NO.	–			

REVISION IN PROGRESS

REVISION		DATE	DESIGN	DWN	APPD
1	Issue for Energex Approval				

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Neal Digby
RPEQ 16172

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Principal
Economic Development Queensland
William Street
Brisbane, 4000

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Project Leader G. Pereira
Designed S. Gibson
Drawn R.Chiruta
Checked N. Digby
Authorised G. Pereira
Date Dec-2020

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Scale 1:500

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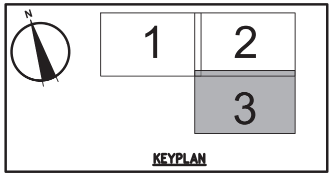
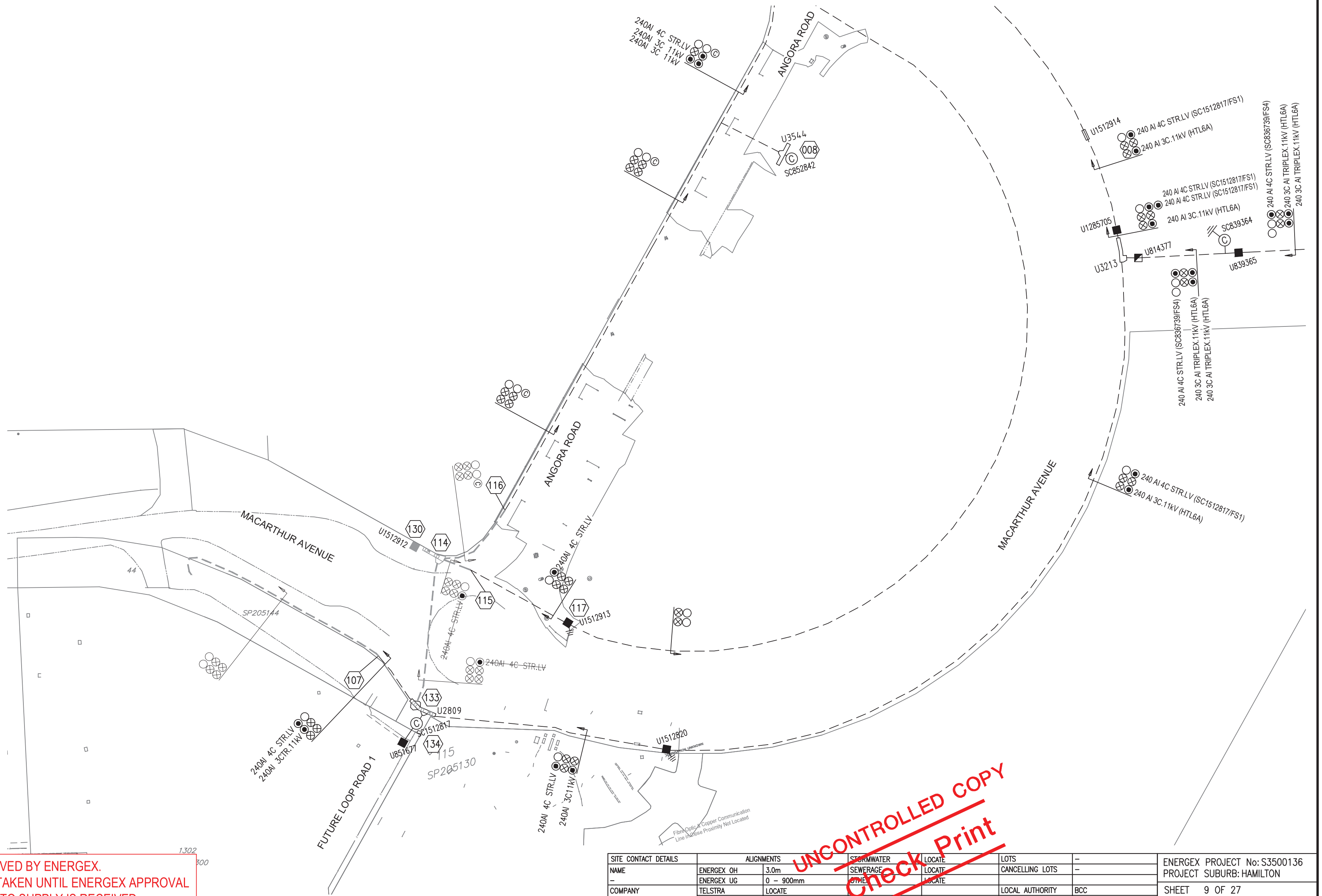
Northshore, Hamilton
Package 01
Economic Development Queensland
Electrical Reticulation Recovery
Layout Plan

Drawing No. 2521E-01-817 **Rev** 1
Dev. App. No.
Sheet No. 8 of 27

Issue for Approval





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SITE CONTACT DETAILS		ALIGNMENTS			LOCATE	LOTS	–
NAME		ENERGEX OH	3.0m	SEWERAGE	LOCATE	CANCELLING LOTS	–
–		ENERGEX UG	0 – 900mm	OTHER	LOCATE		
COMPANY		TELSTRA	LOCATE			LOCAL AUTHORITY	BCC
–		GAS	LOCATE	WORKS CO-ORDINATOR	–	UBD REF:	–
PHONE	–	H.P.GAS	LOCATE	CONST PROJECT NO.	–	PEGGED?	ON REQUEST
MOBILE	–	WATER	LOCATE	WORK REQUEST NO.	–		

ENERGEX PROJECT No: S3500136
PROJECT SUBURB: HAMILTON
SHEET 9 OF 27
DESIGNER DETAILS
STEVE GIBSON: (07) 3324 7826

REVISION IN PROGRESS

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DRAFTING CHECK COMPLETED		
ENGINEERING SIGN OFF		

1 Issue for Energex Approval

REVISION DATE DES/DFT WVR APP'D

Neal Digby
RPEQ 16172

Principal
Economic Development Queensland
William Street
Brisbane, 4000

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Project Leader G. Pereira
Designed S. Gibson
Drawn R.Chiruta
Checked N. Digby
Authorised G. Pereira
Date Dec-2020

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Scale 1:500

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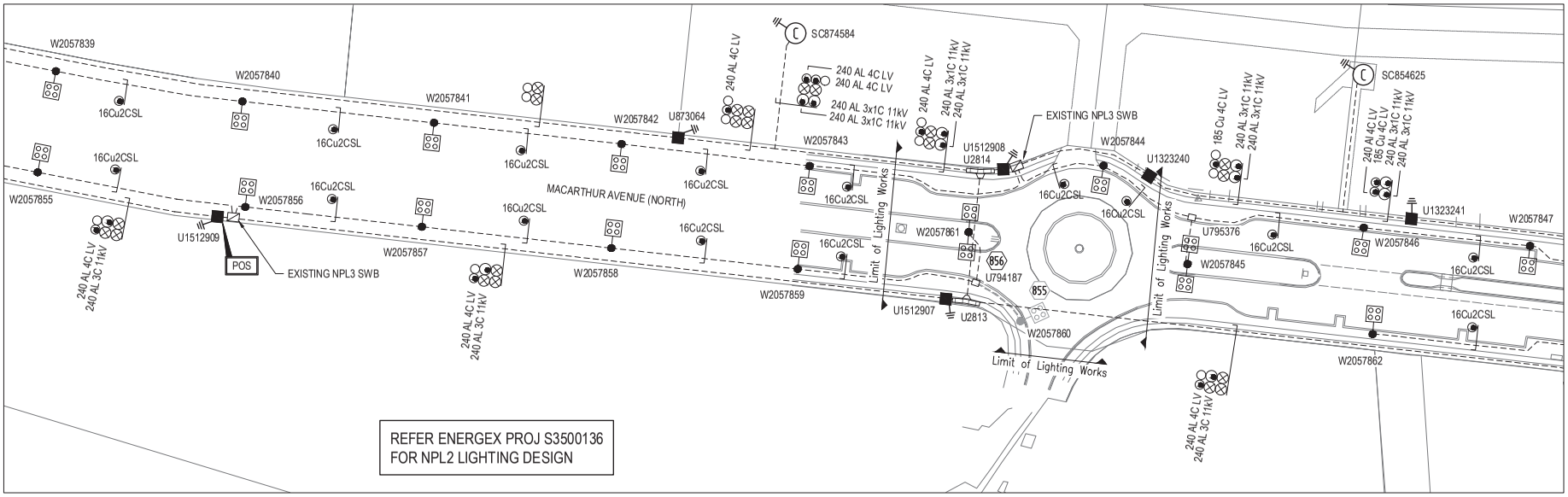
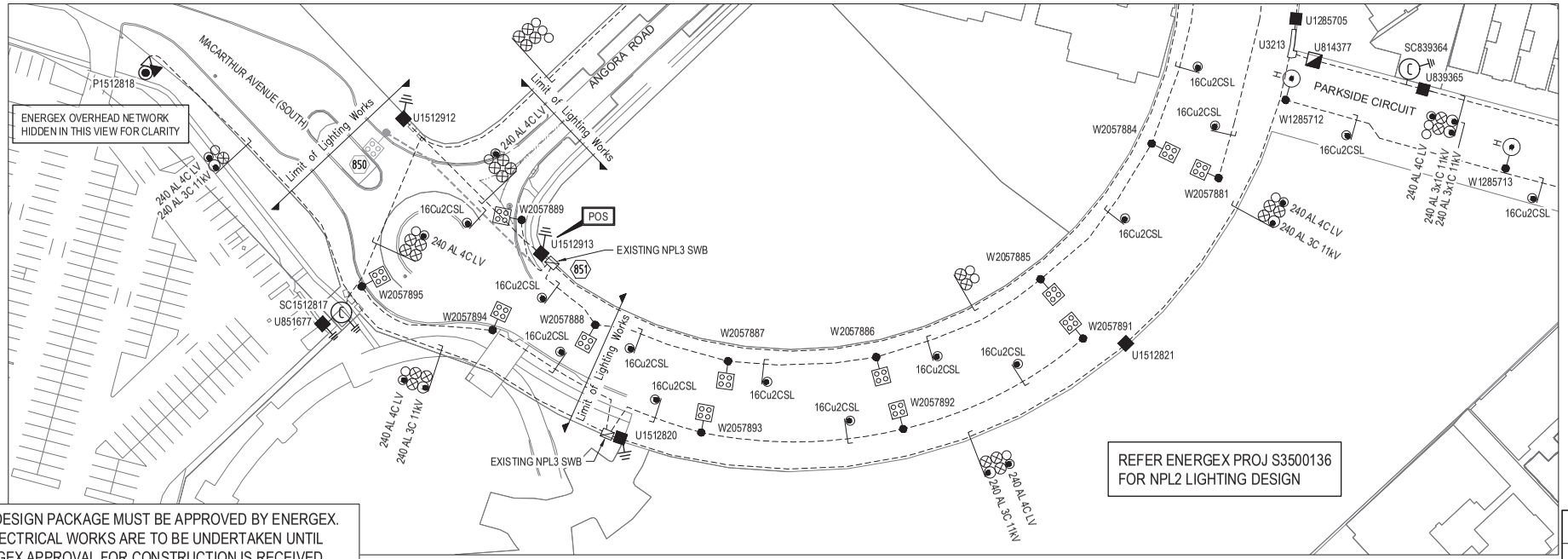
Northshore, Hamilton
Package 01
Economic Development Queensland
Electrical Reticulation Recovery
Layout Plan
Drawing No. 2521E-01-818 **Rev 1**
Dev. App. No.
Sheet No. 9 of 27
Issue for Approval



LAYOUT PLAN 1



LAYOUT PLAN 2

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ENERGEX APPROVAL FOR CONSTRUCTION IS RECEIVED.

ENERGEX PROJECT No: S3500138
PROJECT SUBURB: HAMILTON
SHEET 2 OF 4
DESIGNER DETAILS
STEVE GIBSON: (07) 3324 7826

REVISION		DATE	DES/DFT	WR	APP'D
3	Issue for Energex Approval	6/07/21	SG/RC	010	GP
2	Issue for Tender	9/02/21	SG/RC	0	0
1	Draft 50% Detailed Design	30/10/20	US/RC	003	KH

Neal Digby
RPEQ 16172

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Principal
Economic Development Queensland
1 William Street
Brisbane, 4000

All setting out should be carried out in accordance with GAA/Council's standard drawings or as nominated on hard copy plans provided by SMEC. Any digital information supplied by this office is for information only. Any discrepancies should be discussed with the superintendent.

Project Leader
G. Pereira
Designed
S. Gibson
Drawn
R.Chiruta
Checked
N. Digby
Authorised
G. Pereira
Date
Dec-2020

Scale @ A1
1:500
0 5 10 20

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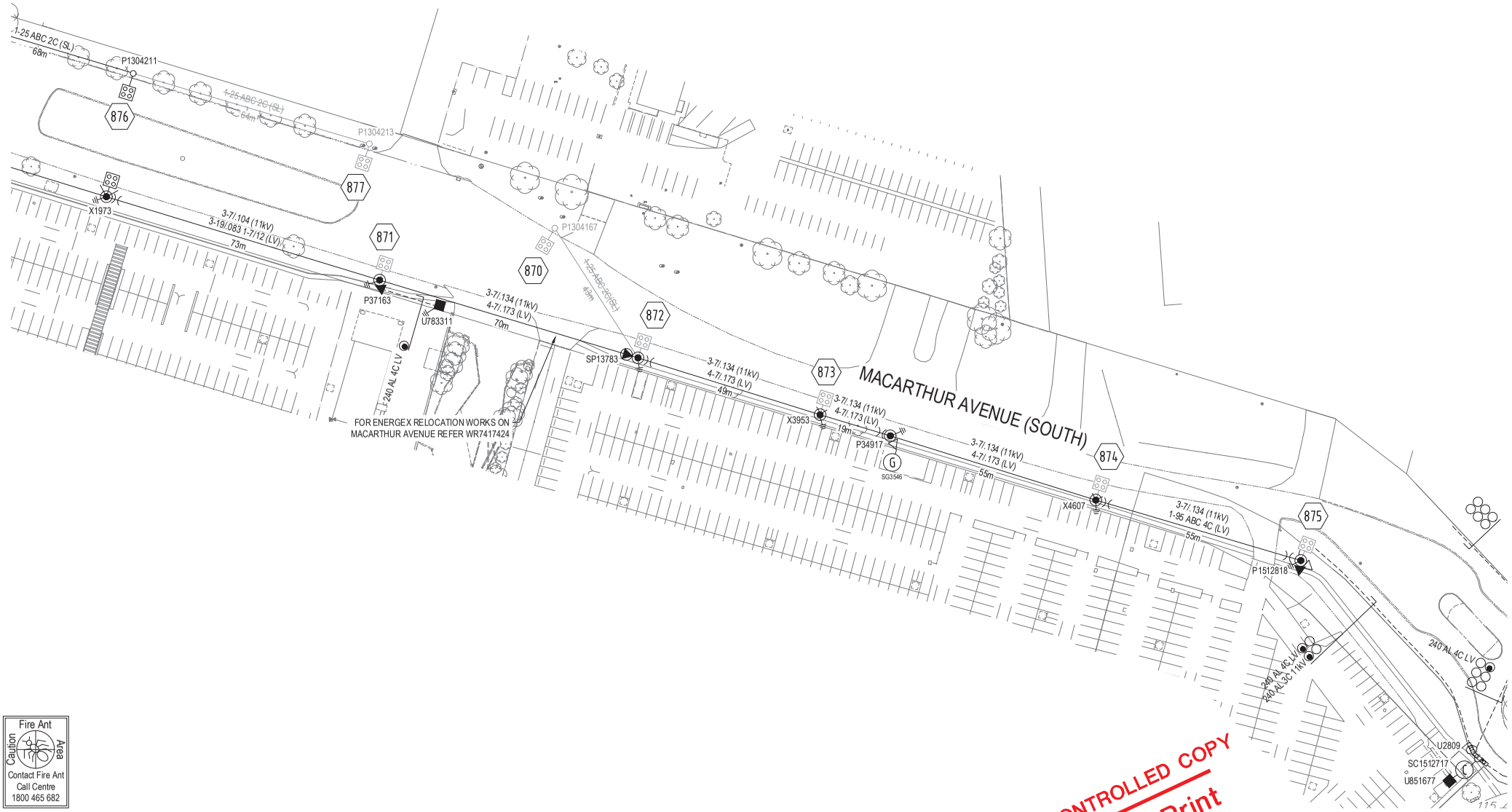
Northshore, Hamilton
Package 01
Economic Development Queensland
NPL3 Road Lighting
Layout Plan

Drawing No. 2521E-01-851 **Rev** 3
Dev. App. No.
Sheet No. 2 of 4

Issue for Approval



Fire Ant Caution Area
Contact Fire Ant Call Centre 1800 465 682

THIS DESIGN PACKAGE MUST BE APPROVED BY ENERGEX.
NO ELECTRICAL WORK IS TO BE UNDERTAKEN UNTIL ENERGEX APPROVAL FOR CONSTRUCTION AND CONNECTION TO SUPPLY IS RECEIVED.

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Check Print

SITE CONTACT DETAILS		ALIGNMENTS		STORMWATER	LOCATE	LOTS	–
NAME	–	ENERGEX OH	3.0m	SEWERAGE	LOCATE	CANCELLING LOTS	–
		ENERGEX UG	0 – 900mm	OTHER	LOCATE		
COMPANY	–	TELSTRA	LOCATE			LOCAL AUTHORITY	BCC
		GAS	LOCATE	WORKS CO-ORDINATOR	–	UBD REF:	–
PHONE	–	H.P.GAS	LOCATE	CONST PROJECT NO.	–	PEGGED?	ON REQUEST
MOBILE	–	WATER	LOCATE	WORK REQUEST NO.	–		

ENERGEX PROJECT No: S3500145
PROJECT SUBURB: HAMILTON
SHEET 2 OF 3
DESIGNER DETAILS
STEVE GIBSON: (07) 3324 7826

REVISION		DATE	DES/DFT	WKR	APP'D
3	Issue for Energex Approval				
2	Issue for Tender				
1	Draft 50% Detailed Design				

REVISION IN PROGRESS

CHECK PRINT

	PRELIM INITIAL	FINAL DATE
MARKED UP BY		
BACKDRAFTED BY		
DRAFTING SELF CHECK COMPLETED		
DRAFTING CHECK COMPLETED		
ENGINEERING SIGN OFF		

Neal Digby
PEQ 16172

.....

Principal
Economic Development Queensland
William Street
Brisbane, 4000

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Northshore, Hamilton
Package 01
Economic Development Queensland
NPL2 Road Lighting Revovery
Layout Plan

Drawing No. 2521E-01-861 **Rev** 3
Dev. App. No.
Sheet No. 2 of 3

Issue for Approval

Appendix D **Brisbane City Council Code Responses**

Table 8.2.15.3—Criteria for assessable development

Performance outcomes	Acceptable outcomes	Compliance Outcome
PO1 Development protects the environmental values and ecological health of receiving waters and does not subject assets to accelerated corrosion.	**AO1** Development ensures that: (a) no potential or actual acid sulfate soils are disturbed; or Note—This can be demonstrated through the submission of an acid sulfate soil investigation report with reference to the Potential and actual acid sulfate soils planning scheme policy. (b) the disturbance impacts in an area that hosts potential acid sulfate soils are appropriately managed, if less than 500m^3 of soil is disturbed and the watertable is not affected; or Note—This can be demonstrated through the submission of an acid sulfate soil investigation report and a preliminary acid sulfate soil management plan, with reference to the Potential and actual acid sulfate soils planning scheme policy. (c) impacts are appropriately managed if 500m^3 or more of soil is disturbed or the watertable in an area that hosts potential or actual acid sulfate soils is affected. Note—This can be demonstrated through the submission of an acid sulfate soil investigation report and a full acid sulfate soil management plan, with reference to the Potential and actual acid sulfate soils planning scheme policy using levels of testing commensurate with the level of risk. If the investigation demonstrates that an acid sulfate soil management plan is not required, only an investigation report is required.	Early geotechnical works are to be carried out to identify any ASS. If it is found to exist on site, the contractor will create a management plan and carry out works in accordance to the acceptable outcomes listed.

Table 8.2.6.3.A—Performance outcomes and acceptable outcomes

Performance outcomes	Acceptable outcomes	Comments
Section A—If for accepted development subject to compliance with identified requirements (acceptable outcomes only) or assessable development for a dwelling house including a secondary dwelling		
PO1 Development involving any habitable or non-habitable part of the dwelling house, including any secondary dwelling, is: a. located and designed to minimise the risk to people and structures from coastal hazards; b. located to minimise amenity impacts, disruption to residents, recovery time and rebuilding and restoration costs after a coastal hazard event.	**AO1** Development for a dwelling house including, any secondary dwelling, complies with the flood planning levels in Table 8.2.6.3.B. Editor's note—Information about flooding from storm tide is provided in Council's FloodWise Property Report.	Not Applicable
Section B—If for accepted development subject to compliance with identified requirements (acceptable outcomes only) or assessable development other than for a dwelling house		
PO2 Development other than for a park is located and designed to: a. minimise the risk to all persons from coastal hazards; b. minimise flood damages to the development and contents of buildings; c. provide suitable amenity; d. minimise disruption to residents, recovery time, and rebuilding or restoration costs after coastal hazard events.	**AO2** Development achieves minimum flood planning levels consistent with Table 8.2.6.3.C. Editor's note—Information about flooding from storm tide is provided in Council's FloodWise Property Report.	The design achieves all listed performance outcomes.
PO3 Development for a park ensures that the design of the park and location of structures and facilities responds to	**AO3** Development involving a building or structure in a park: a. complies with the minimum flood planning levels in Table 8.2.6.3.C; or	Not Applicable

coastal hazards and balances the safety of intended users with: a. maintaining continuity of operations; b. impacts of flooding on asset life and ongoing maintenance costs; c. efficient recovery after flood events; d. recreational benefits to the city; e. availability of suitable land within the park. Note—The Infrastructure design planning scheme policy provides more detail on standards and specifications for public assets.	b. is not located below the 20% AEP storm-tide level if Table 8.2.6.3.C does not apply to the type of structure.	
Section C—If assessable development other than for a dwelling house		
General		
PO4 Development has access which provides for safe vehicular and pedestrian movement in the development, including emergency services access during and after a coastal hazard event.	**AO4** Development locates access points and driveways in the flood free area (or the area of the lowest flood risk) of the site.	The design achieves all listed performance outcomes.
PO5 Development for pedestrian and cyclist paths: a. provides a suitable level of trafficability; b. manages the impacts of flooding on asset life and ongoing maintenance costs; c. balances route availability with recreational and transport connectivity benefits to the city.	**AO5.1** Development for off-road pedestrian and cyclist paths: a. is not located in the Erosion prone area – coastal erosion subcategory; or b. complies with the minimum flood planning levels in Table 8.2.6.3.H. Note—If the site is subject to more than 1 type of flooding, the requirement that affords the highest flood planning level will apply. **AO5.2** All new on-road cyclist and pedestrian facilities comply with the road flood immunity and trafficability standards for the applicable category of road in Table 8.2.6.3.H or Table 8.2.6.3.I	The design achieves all listed performance outcomes.
PO6 Development does not:	**AO6**	The design achieves all listed performance outcomes.

a. impact adversely on the safety or amenity of an adjoining site; b. impact adversely on the ability of others to implement future coastal hazard adaptation actions.	Development does not concentrate, intensify or divert floodwater, erosion impacts or cause nuisance ponding onto other premises.	
PO7 Development involving essential electrical services or a basement storage area is suitably located and designed to ensure public safety and minimise the need for flood recovery and economic consequences of damage during a flood.	**AO7.1** Development ensures that: a. all essential electrical services comply with the flood planning levels in Table 8.2.6.3.C; or b. if a basement contains essential electrical services or a private basement storage area, the basement is a waterproof structure with walls and floors impermeable to the passage of water and all entry points and services are located at or above the relevant flood immunity level in Table 8.2.6.3.C. Note—A basement storage area is a basement-level area for private storage, other than a bike storage room, change room, building maintenance storage and non-critical electrical services. **AO7.2** Development involving a basement that relies on a pumping solution to manage floodwater ingress or for dewatering after a flood, provides an appropriately flood protected backup power source for those pumps.	The design achieves all listed performance outcomes.
PO8 Development involving the storage and handling of hazardous materials avoids or minimises risks to public health and safety and the environment, by: a. protecting underground tanks for hazardous materials against the forces of buoyancy, velocity flow and debris impacts; b. securing above-ground tanks against flotation and lateral movement; c. preventing damage to pipework or entry of floodwater into pipework;	**AO8.1** Development does not include the storage or handling of hazardous chemicals that exceed the hazardous chemicals flood hazard threshold quantities in Table 8.2.6.3.J. **AO8.2** Development involving the processes listed in Table 8.2.6.3.F is consistent with the standards contained in the Management of hazardous chemicals in flood affected areas planning scheme policy and can operate without risk of environmental harm during a coastal hazard.	The design achieves all listed performance outcomes.

d. preventing damage to or off-site release of packages, drums or containers. Note—A chemical hazards flood risk report prepared in accordance with the Management of hazardous chemicals in flood affected areas planning scheme policy can assist in demonstrating achievement of this performance outcome. Note—A pump drainage system is not an acceptable measure to meet the performance outcome.	Note—The Management of hazardous chemicals in flood affected areas planning scheme policy sets out further information and processes including risk assessment for the management of hazardous chemicals in coastal hazard areas.	
Additional performance outcomes and acceptable outcomes for essential community infrastructure		
PO9 Development involving essential community infrastructure: a. maintains function during and immediately after a coastal hazard event or is part of a network that is able to maintain the function of the essential community infrastructure without parts of the development which are unable to function during a coastal hazard event; b. is designed and sited to avoid adverse impacts on the community or the environment due to the impacts of coastal hazard on infrastructure, facilities or access and egress routes; c. retains site access necessary to maintain function of the development during a coastal hazard event; d. maintains function or is part of a network which is able to remain functional even when other infrastructure may be compromised in a flood event; e. contains mitigation measures which are not entirely dependent on human activation to respond to a flood event.	**AO9** Development involving essential community infrastructure: a. is ancillary and is not relied upon for the provision of the essential service during a coastal hazard event; or b. is located above the flood immunity levels set out in Table 8.2.6.3.E; c. has access to, or provides, the necessary backup emergency electricity and communications supply in times of flood; d. if the essential community infrastructure has a city-wide emergency function, that part of the development is not located in an area that becomes isolated by a flood up to the event listed for that development type in Table 8.2.6.3.E.	The design achieves all listed performance outcomes.
Additional performance outcomes and acceptable outcomes for vulnerable uses, difficult to evacuate uses or assembly uses		
PO10	**AO10**	The design achieves all listed performance outcomes.

Development for vulnerable or difficult to evacuate uses and assembly uses optimises vehicular access and efficient evacuation from the development to parts of the road network unaffected by coastal hazard. Note—A coastal hazard risk assessment may be required to address the performance outcome or acceptable outcome that deals with evacuation and isolation arrangements, and the ability to take refuge in place. Editor's note—Further guidance for risk assessment is contained in the Coastal hazard planning scheme policy and the Flood planning scheme policy.	Development for vulnerable uses, difficult to evacuate uses or assembly uses: a. is not isolated in any event up to the relevant flood planning level as specified in Table 8.2.6.3.D; or b. is supported by a critical route or interim critical route identified in the Critical infrastructure and movement network overlay; or c. can achieve vehicular evacuation to a suitable coastal hazard-free location. Note—A suitable coastal hazard-free location is of a size and nature appropriate to provide for the size and characteristics of the population likely to need evacuation to that area.	
Section D—If for reconfiguring a lot		
General		
PO11 Development locates and designs all lots and roads resulting from reconfiguring a lot to: a. ensure the safety of people; b. minimise damage to property and services; c. facilitate safe and efficient evacuation; d. avoid isolation during a coastal hazard event; e. provide suitable amenity in that it is not frequently flooded or subject to tidal inundation, or nuisance ponding. Note— • Consideration of the 0.2% AEP flood is relevant to determining an acceptable level of safety for development. • Flood warning time is available for storm-tide flooding. • Filling for flood immunity cannot be assumed to mitigate the flood hazard for a flood event greater than the defined flood event.	**AO11.1** Development ensures that the road and lot layout does not create new lots isolated by storm-tide flooding at the defined flood event. **AO11.2** Development involving reconfiguring a lot ensures flood immunity for all lots is provided in compliance with Table 8.2.6.3.G.	The design achieves all listed performance outcomes.
PO12 Development that results in 6 lots or less and no new road provides:	**AO12** Development for reconfiguring a lot that results in 6 lots or less and no new road in the High storm-tide inundation area sub-category or the Medium storm-tide inundation	The design achieves all listed performance outcomes.

a. land with sufficient flood immunity to construct a dwelling house; b. an open space area that is safe and has suitable amenity in that it is not frequently flooded or subject to tidal inundation, nuisance ponding or seepage; c. a lot that is not substantially burdened by a stormwater easement or flood mitigation infrastructure; d. appropriate amenity for any adjoining residential area.	area sub-category provides at least 80% of each new lot at or above the flood planning levels in Table 8.2.6.3.G. Note—This is to ensure that each new lot will not be affected by tidal influences up to the highest astronomical tide event with an allowance for 800mm of sea level increase through climate change. The development will still need to meet the relevant flood immunity standards.	
PO13 Development provides acceptable flood immunity for its purpose that minimises the risk to people from coastal hazard, creates safe access and evacuation routes, minimises damage to property and services, and provides suitable amenity.	**AO13** Development involving reconfiguring a lot that results in more than 6 lots or a new road provides flood immunity for: a. all lots in compliance with Table 8.2.6.3.G; b. a new road in compliance with Table 8.2.6.3.H; c. an existing road fronting the development, or providing primary access within 200m of the development, in compliance with Table 8.2.6.3.I. Note—The Flood planning scheme policy contains supporting information about existing roads and serviceability during floods.	
PO14 Development involving a new road, bridge or culvert is designed to minimise impacts to flood behaviour, minimise disruption to traffic during storm-tide inundation and allow for emergency access and evacuation.	**AO14** Development for a new road provides flood immunity in compliance with Table 8.2.6.3.H.	The design achieves all listed performance outcomes.
PO15 Development for pedestrian and cyclist paths: a. provides a suitable level of trafficability; b. manages the impacts of flooding on asset life and ongoing maintenance costs; c. balances route availability with recreational and transport connectivity benefits to the city.	**AO15.1** Development for off-road pedestrian and cyclist paths: a. are not located in the Erosion prone area – coastal erosion subcategory; or b. complies with the minimum flood planning levels in Table 8.2.6.3.H. Note—If the site is subject to more than 1 type of flooding, the requirement that affords the highest flood planning level will apply.	The design achieves all listed performance outcomes.

	AO15.2 All new on-road cyclist and pedestrian facilities comply with the road flood immunity and trafficability standards for the applicable category of road in Table 8.2.6.3.H or Table 8.2.6.3.I.	
Section E—If for a material change of use, reconfiguration of a lot or operational works on a premises in an erosion prone area in a coastal management district where the chief executive is not identified as a referral agency under the Regulation Editor's note—Examples of development where the chief executive is not identified as a referral agency under the Regulation include operational work for: • interfering with quarry material, as defined under the Coastal Act, on State coastal land above high-water mark; or • disposing of dredge spoil, or other solid waste material, in tidal water; or • constructing an artificial waterway; or • removing or interfering with coastal dunes on land other than State coastal land, where that operational work only involves: • prescribed tidal works in a canal; or • tidal works that is for the installation, maintenance or repair of overhead cables or lines that extend over tidal water; or • for tidal works that is boring or tunnelling under the bed of tidal water, works that do not disturb the bed of the tidal water.		
PO16 Development does not occur in an erosion prone area within a coastal management district unless the development cannot be feasible located elsewhere and is: a. coastal dependant development; or b. temporary, readily relocatable or able to be abandoned development; or c. essential community infrastructure; or d. minor redevelopment (as defined in the SPP) of an existing permanent building or structure that cannot be relocated or abandoned. The development mitigates the risks to people and property to an acceptable or tolerable level.	**AO16** No acceptable outcome is prescribed.	The design achieves all listed performance outcomes.

9.4.3.3 Performance outcomes and acceptable outcomes

Table 9.4.3.3.A—Performance outcomes and acceptable outcomes

Performance outcomes	Acceptable outcomes	Comments
PO1 Development for filling or excavation minimises visual impacts from retaining walls and earthworks.	**AO1** Development ensures that the total height of any cut and fill, whether or not retained, does not exceed: a. 2.5m in a zone in the Industry zones category; b. 1m in all other zones, or if adjoining a sensitive zone.	The design achieves all listed performance outcomes.
PO2 Development of a retaining wall proposed as a result of filling or excavation: a. is designed and constructed to be fit for purpose; b. does not impact adversely on significant vegetation; c. is capable of easy maintenance. Editor's note—A retaining wall also needs to comply with the Building Regulation and embankment gradients will need to comply with the Building Regulation. Note—Guidance on the protection of native vegetation is included in the Biodiversity areas planning scheme policy.	**AO2.1** Development of a retaining structure, including footings, surface drainage and subsoil drainage: a. is wholly contained within the site; b. if the total height to be retained is greater than 1m, then: i. the retaining wall at the property boundary is no greater than 1m above the ground level; ii. all further terracing from the 1m high boundary retaining wall is 1 vertical unit:1 horizontal unit; iii. the distance between each successive retaining wall (back of lower wall to face of higher wall) is no less than 1m horizontally to incorporate planting areas. **AO2.2** Development of a retaining wall over 1m in height protects significant vegetation on the site and on adjoining land and is designed and constructed in accordance with the structures standards in the	The design achieves all listed performance outcomes.

	Infrastructure design planning scheme policy and certified by a Registered Professional Engineer Queensland.	
	AO2.3 Development provides a retaining wall finish that presents to adjoining land that is maintenance free if the setback is less than 750mm from the boundary.	
	AO2.4 Development for filling only uses clean fill that does not include any construction rubble, debris, weed seed or viable parts of plant species listed as an undesirable plant species in the Planting species planning scheme policy.	
PO3 Development ensures that a rock anchor is designed and constructed to be fit for purpose.	**AO3** Development ensures that a rock anchor: a. is constructed in accordance with the standards in the Infrastructure design planning scheme policy; b. where it extends beyond the property boundary, is supported by a letter of consent from the adjoining land and building owners.	Not Applicable to this development.
PO4 Development protects all services and public utilities.	**AO4** Development protects services and public utilities and ensures that any alteration or relocation of services or public utilities meets the standard design specifications of the responsible service authorities.	The design achieves all listed performance outcomes.
PO5 Development provides surface and sub-surface drainage to prevent water seepage, concentration of run-off or ponding of stormwater on adjacent land.	**AO5** Development ensures all flows and subsoil drainage are directed to a lawful point of discharge of a surface water diversion drain, including to the top or toe of a retaining wall in accordance with the stormwater drainage section of the Infrastructure design planning scheme policy.	The design achieves all listed performance outcomes.

PO6 Development ensures that the design and construction of all open drainage works is undertaken in accordance with natural channel design principles, being the development of a stormwater conveyance system for major flows, by using a vegetated open channel or drain that approximates the features and functions of a natural waterway to enhance or improve riparian values of those stormwater conveyance systems. Editor's note—Guidance on natural channel design principles can be found in the Council's publication Natural channel design guidelines.	**AO6** Filling or excavation does not involve the construction of open drainage.	The design achieves all listed performance outcomes.
PO7 Development for filling or excavation: a. does not degrade water quality or adversely affect environmental values in receiving waters; b. ensures site sediment and erosion control standards are best practice.	**AO7.1** Development for filling or excavation provides water quality treatment that complies with the stormwater drainage section of the Infrastructure design planning scheme policy. **AO7.2** Development provides erosion and sediment control standards that are in accordance with the stormwater drainage section of the Infrastructure design planning scheme policy.	The design achieves all listed performance outcomes.
PO8 Development for filling or excavation is conducted such that adverse impacts at a sensitive use due to noise and dust are prevented or minimised. Note—A noise and dust impact management plan prepared in accordance with the Management plans planning scheme policy can assist in demonstrating achievement of this performance outcome.	**AO8.1** Development ensures that no dust emissions extend beyond the boundary of the site, including dust from construction vehicles entering and leaving the site. **AO8.2** Development for filling or excavation activity only occurs between the hours of 6:30am and 6:30pm Monday to Saturday, excluding public holidays.	A Construction Management Plan will be prepared by the Contractor in accordance with BCC's requirements.
PO9 Development ensures that vibration generated by the filling or excavation operation does not exceed the	**AO9**	A Construction Management Plan will be prepared by the Contractor in accordance with BCC's requirements.

vibration criteria in Table 9.4.3.3.B, Table 9.4.3.3.C, Table 9.4.3.3.D and Table 9.4.3.3.E. Note—A noise management report prepared in accordance with the Noise impact assessment planning scheme policy can assist in demonstrating achievement of this performance outcome.	Development involving filling or excavation does not cause a ground-borne vibration beyond the boundary of the site.	
PO10 Development ensures that heavy trucks hauling material to and from the site do not affect the amenity of established areas and limits environmental nuisance impact on adjacent land.	**AO10** Development ensures that heavy trucks hauling material to and from the site: a. occur for a maximum of 3 weeks; b. use a major road to access the site; c. only use a minor road for the shortest-most-direct route that has the least amount of environmental nuisance if there is no major road alternative.	A Construction Management Plan will be prepared by the Contractor in accordance with BCC's requirements.
PO11 Development for filling or excavation protects the environment and community health and wellbeing from exposure to contaminated land and contaminated material.	**AO11** Development does not involve: a. excavation on land previously occupied by a notifiable activity or on land listed on the Environmental Management Register or the Contaminated Land Register; b. filling with material containing a contaminant.	The design achieves all listed performance outcomes.
PO12 Development provides for: a. landscaping for water conservation purposes; b. water sensitive urban design measures which are employed within the landscape design to maximise stormwater use and to reduce any adverse impacts on the landscape; c. stormwater harvesting to be maximised and any adverse impacts of stormwater minimised.	**AO12.1** Development provides landscaping which is designed using the standards in the Landscape design guidelines for water conservation planning scheme policy. **AO12.2** Development ensures that the design and requirements for irrigation are in compliance with the standards in the Landscape design guidelines for water conservation planning scheme policy.	The design achieves all listed performance outcomes.
	AO12.3 Development provides areas of pavement, turf and mulched garden beds which are drained.	

	Note—This may be achieved through the provision and/or treatment of swales, spoon drains, field gullies, sub-surface drainage and stormwater connections.	
PO13 Development ensures cutting and filling for the development of canals or artificial waterways avoids adverse impacts on coastal resources and processes.	**AO13** Development does not involve the creation of canals or artificial waterways.	Not applicable.

9.4.3.3 Performance outcomes and acceptable outcomes

Table 9.4.3.3.A—Performance outcomes and acceptable outcomes

Performance outcomes	Acceptable outcomes	Comments
PO1 Development for filling or excavation minimises visual impacts from retaining walls and earthworks.	**AO1** Development ensures that the total height of any cut and fill, whether or not retained, does not exceed: a. 2.5m in a zone in the Industry zones category; b. 1m in all other zones, or if adjoining a sensitive zone.	The design achieves all listed performance outcomes.
PO2 Development of a retaining wall proposed as a result of filling or excavation: a. is designed and constructed to be fit for purpose; b. does not impact adversely on significant vegetation; c. is capable of easy maintenance. Editor's note—A retaining wall also needs to comply with the Building Regulation and embankment gradients will need to comply with the Building Regulation. Note—Guidance on the protection of native vegetation is included in the Biodiversity areas planning scheme policy.	**AO2.1** Development of a retaining structure, including footings, surface drainage and subsoil drainage: a. is wholly contained within the site; b. if the total height to be retained is greater than 1m, then: i. the retaining wall at the property boundary is no greater than 1m above the ground level; ii. all further terracing from the 1m high boundary retaining wall is 1 vertical unit:1 horizontal unit; iii. the distance between each successive retaining wall (back of lower wall to face of higher wall) is no less than 1m horizontally to incorporate planting areas. **AO2.2** Development of a retaining wall over 1m in height protects significant vegetation on the site and on adjoining land and is designed and constructed in accordance with the structures standards in the	The design achieves all listed performance outcomes.

	Infrastructure design planning scheme policy and certified by a Registered Professional Engineer Queensland.	
	AO2.3 Development provides a retaining wall finish that presents to adjoining land that is maintenance free if the setback is less than 750mm from the boundary.	
	AO2.4 Development for filling only uses clean fill that does not include any construction rubble, debris, weed seed or viable parts of plant species listed as an undesirable plant species in the Planting species planning scheme policy.	
PO3 Development ensures that a rock anchor is designed and constructed to be fit for purpose.	**AO3** Development ensures that a rock anchor: a. is constructed in accordance with the standards in the Infrastructure design planning scheme policy; b. where it extends beyond the property boundary, is supported by a letter of consent from the adjoining land and building owners.	Not Applicable to this development.
PO4 Development protects all services and public utilities.	**AO4** Development protects services and public utilities and ensures that any alteration or relocation of services or public utilities meets the standard design specifications of the responsible service authorities.	The design achieves all listed performance outcomes.
PO5 Development provides surface and sub-surface drainage to prevent water seepage, concentration of run-off or ponding of stormwater on adjacent land.	**AO5** Development ensures all flows and subsoil drainage are directed to a lawful point of discharge of a surface water diversion drain, including to the top or toe of a retaining wall in accordance with the stormwater drainage section of the Infrastructure design planning scheme policy.	The design achieves all listed performance outcomes.

PO6 Development ensures that the design and construction of all open drainage works is undertaken in accordance with natural channel design principles, being the development of a stormwater conveyance system for major flows, by using a vegetated open channel or drain that approximates the features and functions of a natural waterway to enhance or improve riparian values of those stormwater conveyance systems. Editor's note—Guidance on natural channel design principles can be found in the Council's publication Natural channel design guidelines.	**AO6** Filling or excavation does not involve the construction of open drainage.	The design achieves all listed performance outcomes.
PO7 Development for filling or excavation: a. does not degrade water quality or adversely affect environmental values in receiving waters; b. ensures site sediment and erosion control standards are best practice.	**AO7.1** Development for filling or excavation provides water quality treatment that complies with the stormwater drainage section of the Infrastructure design planning scheme policy. **AO7.2** Development provides erosion and sediment control standards that are in accordance with the stormwater drainage section of the Infrastructure design planning scheme policy.	The design achieves all listed performance outcomes.
PO8 Development for filling or excavation is conducted such that adverse impacts at a sensitive use due to noise and dust are prevented or minimised. Note—A noise and dust impact management plan prepared in accordance with the Management plans planning scheme policy can assist in demonstrating achievement of this performance outcome.	**AO8.1** Development ensures that no dust emissions extend beyond the boundary of the site, including dust from construction vehicles entering and leaving the site. **AO8.2** Development for filling or excavation activity only occurs between the hours of 6:30am and 6:30pm Monday to Saturday, excluding public holidays.	A Construction Management Plan will be prepared by the Contractor in accordance with BCC's requirements.
PO9 Development ensures that vibration generated by the filling or excavation operation does not exceed the	**AO9**	A Construction Management Plan will be prepared by the Contractor in accordance with BCC's requirements.

vibration criteria in Table 9.4.3.3.B, Table 9.4.3.3.C, Table 9.4.3.3.D and Table 9.4.3.3.E. Note—A noise management report prepared in accordance with the Noise impact assessment planning scheme policy can assist in demonstrating achievement of this performance outcome.	Development involving filling or excavation does not cause a ground-borne vibration beyond the boundary of the site.	
PO10 Development ensures that heavy trucks hauling material to and from the site do not affect the amenity of established areas and limits environmental nuisance impact on adjacent land.	**AO10** Development ensures that heavy trucks hauling material to and from the site: a. occur for a maximum of 3 weeks; b. use a major road to access the site; c. only use a minor road for the shortest-most-direct route that has the least amount of environmental nuisance if there is no major road alternative.	A Construction Management Plan will be prepared by the Contractor in accordance with BCC's requirements.
PO11 Development for filling or excavation protects the environment and community health and wellbeing from exposure to contaminated land and contaminated material.	**AO11** Development does not involve: a. excavation on land previously occupied by a notifiable activity or on land listed on the Environmental Management Register or the Contaminated Land Register; b. filling with material containing a contaminant.	The design achieves all listed performance outcomes.
PO12 Development provides for: a. landscaping for water conservation purposes; b. water sensitive urban design measures which are employed within the landscape design to maximise stormwater use and to reduce any adverse impacts on the landscape; c. stormwater harvesting to be maximised and any adverse impacts of stormwater minimised.	**AO12.1** Development provides landscaping which is designed using the standards in the Landscape design guidelines for water conservation planning scheme policy. **AO12.2** Development ensures that the design and requirements for irrigation are in compliance with the standards in the Landscape design guidelines for water conservation planning scheme policy.	The design achieves all listed performance outcomes.
	AO12.3 Development provides areas of pavement, turf and mulched garden beds which are drained.	

	Note—This may be achieved through the provision and/or treatment of swales, spoon drains, field gullies, sub-surface drainage and stormwater connections.	
PO13 Development ensures cutting and filling for the development of canals or artificial waterways avoids adverse impacts on coastal resources and processes.	**AO13** Development does not involve the creation of canals or artificial waterways.	Not applicable.

8.2.11.3 Performance outcomes and acceptable outcomes

Table 8.2.11.3.A—Performance outcomes and acceptable outcomes

Performance outcomes	Acceptable outcomes	Comments
Section A—If for accepted development subject to compliance with identified requirements (acceptable outcomes only) or assessable development for a dwelling house including any secondary dwelling Note—Development for a dwelling house does not require assessment against any other sections of this code.		
PO1 Development involving any habitable or non-habitable part of a dwelling house, including any secondary dwelling, is located and designed to: a. minimise the risk to people from flood hazard; b. achieve acceptable flood immunity; c. minimise property impacts from a flood event up to and including the defined flood event; d. minimise disruption to residents, recovery time and rebuilding or restoration costs after a flood event up to and including the defined flood event.	**AO1.1** Development for a dwelling house including any secondary dwelling: a. is not located in the Brisbane River flood planning area 1, 2a or 2b sub-categories or the Creek/waterway flood planning area 1 or 2 sub-categories; or b. is only located in these sub-categories, if a Registered Professional Engineer Queensland certifies that the dwelling house and any secondary dwelling are structurally designed to be able to resist hydrostatic and hydrodynamic loads associated with flooding up to and including the defined flood event. **AO1.2** Development for a dwelling house and any secondary dwelling complies with the minimum flood planning levels in Table 8.2.11.3.B. Note—If located in an area that has no flood level information available from the Council such as an overland flow path, a Registered Professional Engineer of Queensland with expertise in undertaking flood studies is to certify that the flood level and development levels for the dwelling house and any secondary dwelling achieve the required flood planning levels in Table 8.2.11.3.B.	Not applicable
	AO1.3	

	Development involving a building undercroft complies with the minimum clearance requirements in Table 8.2.11.3.E. Editor's note—For creek/waterway, storm-tide and river flooding, applicable flood planning information is available from Council's FloodWise Property Report. Note—The Flood planning scheme policy provides guidance on undercroft design.	
PO2 Development within the Creek/waterway flood planning area sub-categories or Overland flow flood planning area sub-category: a. maintains the conveyance of flood waters to allow flow and debris to pass predominantly unimpeded through the site; b. does not concentrate, intensify or divert floodwater onto upstream, downstream or adjacent properties; c. will not result in a material increase in flood levels or flood hazard on upstream, downstream or adjacent properties.	**AO2** Development: a. is not located within the Creek/waterway flood planning area 1, 2 or 3 sub-categories or the Overland flow flood planning area sub-category; or b. provides an open undercroft area from natural ground level to habitable floor level for any area inundated by the defined flood event; or Note—This undercroft area is not suitable for providing non-habitable rooms, secure storage of valuables, or future enclosing for storage or car parking. The clear area may include structural elements such as columns and floor substructure. The Flood planning scheme policy provides guidance on undercroft design. Editor's note—An open undercroft design may be achieved through a 'valance' treatment around the perimeter of an otherwise internally clear undercroft. Editor's note—For Creek/waterway, storm-tide and river flooding, applicable flood planning information is available from Council's FloodWise Property Report. c. a report from a Registered Professional Engineer Queensland certifies that the development in the Creek/waterway flood planning area or Overland flow flood planning area sub-categories will not result in a material increase in flood level or flood hazard on upstream, downstream or adjacent properties. Note—Flood studies demonstrate that the development and engineering design methods conform to the principles within the Flood planning scheme policy and the Infrastructure design planning scheme policy.	Not Applicable

Section B—If accepted development subject to compliance with identified requirements (acceptable outcomes only) or assessable development other than for a dwelling house or reconfiguring a lot Note—If development that is accepted development subject to compliance with identified requirements complies with the acceptable outcomes of this part, no further assessment against this code is required.		
PO3 Development: a. is compatible with flood hazard in a defined flood event; b. minimises the risk to people from flood hazard; c. does not reduce the ability of evacuation resources including emergency services to access and evacuate the site in a flood emergency, with consideration to the scale of the development; d. minimises impacts on property from flooding; e. minimises disruption to residents, business or site operations and recovery time due to flooding; f. minimises the need to rebuild structures after a flood event greater than the defined flood event. Note—Where Table 8.2.11.3.C identifies that a flood risk assessment is required, compliance with this performance outcome can be achieved by submitting a flood risk assessment, which may be included within a flood study, addressing the criteria within this performance solution. Preparing flood risk assessments and flood studies is required to be in accordance with the Flood planning scheme policy. Note—An emergency management plan prepared in accordance with the Flood planning scheme policy, which sets out procedures for evacuation due to flooding may be used to demonstrate compliance with this performance outcome.	**AO3** Development for a material change of use is identified in Table 8.2.11.3.C as compatible with the flood hazard in the relevant flood planning area.	Not applicable
PO4 Development for a park ensures that the design of a park and location of structures and facilities responds to the flood hazard and balances the safety of intended users with: a. maintaining continuity of operations; b. impacts of flooding on asset life and ongoing maintenance costs; c. efficient recovery after flood events;	**AO4.1** Development involving a building or structure in a park complies with the flood planning levels specified in Table 8.2.11.3.D. **AO4.2** Development involving a building or structure in a park where Table 8.2.11.3.D does not apply:	Not Applicable

d. recreational benefits to the city; e. availability of suitable land within the park.	a. is not located within the 20% AEP flood extent of any creek/waterway or overland flow path; or b. is located above the 20% AEP flood level of any creek/waterway or overland flow path.	
Section C—If for assessable development other than for a dwelling house		
PO5 Development is located and designed to: a. minimise the risk to people from flood hazard on the site; b. minimise flood damage to the development and contents of buildings up to the defined flood event; c. provide suitable amenity; d. minimise disruption to residents, recovery time and the need to rebuild structures after a flood event up to and including the defined flood event.	**AO5.1** Development complies with the flood planning levels specified in Table 8.2.11.3.D. Note—If located in an area with no Council-derived flood levels such as an overland flow path, a Registered Professional Engineer Queensland with expertise in undertaking flood studies is to derive the applicable flood level and certify that the development meets the required flood planning levels in Table 8.2.11.3.D. The study is to demonstrate that the development and engineering design methods conform to the principles within the Flood planning scheme policy and the Infrastructure design planning scheme policy. **AO5.2** Development is: a. not located in the: i. Brisbane River flood planning area 1, 2a, or 2b sub-categories; ii. Creek/waterway flood planning area 1 or 2 sub-categories; iii. Overland flow flood planning area sub-category; or b. only located in these sub-categories if a Registered Professional Engineer Queensland with expertise in undertaking flood studies certifies that: i. the development design, siting and any mitigation measures will ensure the development is structurally adequate to resist hydrostatic, hydrodynamic and debris impact loads associated with flooding up to the defined flood event; and	The design achieves all listed performance outcomes.

	ii. the risk to people is managed to an acceptable level.	
PO6 Development involving essential electrical services or a basement storage area is suitably located and designed to ensure public safety and minimise flood recovery and economic consequences of damage during a flood.	**AO6.1** Development ensures that: a. all areas containing essential electrical services comply with the flood planning levels in Table 8.2.11.3.D; or b. if a basement contains essential electrical services or a private basement storage area, the basement is a waterproof structure with walls and floors impermeable to the passage of water with all entry points and services located at or above the relevant flood planning level in Table 8.2.11.3.D. Note—A basement storage area does not include a bike storage room, change room, building maintenance storage and non-critical electrical services. **AO6.2** Development involving a basement that relies on a pumping solution to manage floodwater ingress or for dewatering after a flood provides a secondary pump system with a backup power source for the pump.	Not applicable.
PO7 Development does not directly or indirectly create a material adverse impact on flood behaviour or drainage on properties that are upstream, downstream or adjacent to the development.	**AO7.1** Development: a. does not block, or divert floodwaters for any area affected by creek/waterway or overland flow flooding, excluding storm-tide flooding and Brisbane River flooding sources; or b. does not result in a material increase in flood level or hydraulic hazard on upstream, downstream or adjacent properties. Note—Compliance with this acceptable solution can be demonstrated by the submission of a flood study by a Registered Professional Engineer of Queensland with expertise in undertaking flood studies demonstrating that the development and engineering design methods	The design achieves all listed performance outcomes.

	conform to the principles within the Flood planning scheme policy and the Infrastructure design planning scheme policy. **AO7.2** Development retains existing overland flow paths and does not rely wholly on piped solutions to manage major flows.	
	AO7.3 Development which creates a new overland flow path or significantly modifies an existing overland flow path via earthworks does not materially worsen hydraulic hazard on the site from existing conditions. Note—Compliance with this acceptable solution can be demonstrated by the submission of a flood study by a Registered Professional Engineer of Queensland with expertise in undertaking flood studies demonstrating that the development and engineering design methods conform to the principles within the Flood planning scheme policy and the Infrastructure design planning scheme policy.	
PO8 Development for filling or excavation in an area affected by creek/waterway flooding does not directly, indirectly or cumulatively cause any material increase in flooding or hydraulic hazard or involve significant redistribution of flood storage from high to lower areas in the floodplain. Note—This can be demonstrated by undertaking earthworks in compliance with the Compensatory earthworks planning scheme policy. Note—This part of the code applies to all development other than a dwelling house and any secondary dwelling which involves filling or excavation, whether or not the development application comprises a separate development application for operational work involving filling or excavation.	**AO8** Development ensures that no filling or excavation greater than 100mm is located in the Creek/waterway flood planning area 1, 2 or 3 sub-categories if contained in the 5% AEP flood extent of any Creek/waterway flood planning area sub-category for which no waterway corridor has been mapped in the Waterway corridors overlay.	The design achieves all listed performance outcomes.
PO9 Development ensures that the building and site design: a. maintains the conveyance capacity of existing overland flow paths and creek/waterways; b. ensures floodwaters and flood debris can pass predominantly unimpeded under a structure or	**AO9.1** Development involving a building undercroft in the Creek/waterway flood planning area sub-categories or the Overland flow flood planning area sub-category: a. complies with the minimum building undercroft clearance requirements in Table 8.2.11.3.E;	Not Applicable

building to minimise property or building damage, including for a flood larger than the defined flood event; c. mitigates flood impacts by ensuring that filling, excavation and location of services are designed to allow for the conveyance of floodwater across the site. Note—The Flood planning scheme policy provides guidance on relevant considerations in determining minimum undercroft clearances and treatment of ground level in undercroft areas where floodwater conveyance is required underneath development.	b. not located directly above any part of a waterway corridor as mapped in the Waterway corridors overlay. **AO9.2** Development involving a building undercroft in the Creek/waterway flood planning area sub-categories or the Overland flow flood planning area sub category: a. has a ground level within the undercroft area that is free draining; b. does not involve excavation below ground level of more than 300mm within the undercroft area.	
PO10 Development for vulnerable uses, difficult to evacuate uses or assembly uses optimises vehicular access and efficient evacuation from the development to parts of the road network unaffected by flood hazard, in order to: a. protect safety of users and emergency services personnel; b. support efficient emergency services access and site evacuation with consideration to the scale of development. Note—A flood risk assessment may be required to address the performance outcomes or acceptable solutions which deal with evacuation and isolation arrangements, and the ability to take refuge. The Flood planning scheme policy provides information for undertaking flood risk assessments.	**AO10** Development for vulnerable uses, difficult to evacuate uses or assembly uses: a. is not isolated in any event up to the relevant flood planning level specified in Table 8.2.11.3.L; or b. has direct vehicle access to a critical route or interim critical route in the Critical infrastructure and movement network overlay for evacuation in a flood; or c. can achieve vehicular evacuation to a suitable flood-free location. Note—A suitable flood-free location is of a size and nature sufficient to provide for the size and characteristics of the population likely to need evacuation to that area.	The design achieves all listed performance outcomes.
PO11 Development has access which, having regard to hydraulic hazard, provides for safe vehicular and pedestrian movement and emergency services access to adjoining roads.	**AO11.1** Development provides an access or driveway into the site which is: a. trafficable during the defined flood event; b. not located in the Creek/waterway flood planning area 1 sub-category; c. not located in the Overland flow flood planning area sub-category if the hydraulic hazard is unsafe in the defined flood event;	The design achieves all listed performance outcomes.

	d. the access or driveway is not inundated by a 10% AEP flood. **AO11.2** Development located in the Creek/waterway flood planning area 1, 2, 3 or 4 sub-categories locates any disabled access in the highest part of the site. Note—explanation of hydraulic hazard provided in the Flood planning scheme policy.	
PO12 Development involving a new road, a bridge or culvert is designed to minimise impacts to flood behaviour, minimise disruption to traffic during a flood and allow for emergency access.	**AO12** Development involving a new road complies with the flood planning levels in Table 8.2.11.3.F.	The design achieves all listed performance outcomes.
PO13 Development for pedestrian and cyclist paths: a. provides a suitable level of trafficability; b. manages the impacts of flooding on asset life and ongoing maintenance costs; c. balances route availability with recreational and transport connectivity benefits to the city.	**AO13.1** Development for cyclist and pedestrian facilities other than on public roads, including those traversing through a park and adjacent to a watercourse and overland flow path, are located above the 39% AEP (2 year ARI) flood immunity from all flooding sources. Note—If the site is subject to more than one type of flooding, the requirement that affords the greatest level of protection will apply. **AO13.2** All new on-road cyclist and pedestrian facilities comply with the flood planning levels and trafficability standards for the applicable category of road in Table 8.2.11.3.F or Table 8.2.11.3.K.	The design achieves all listed performance outcomes.
PO14 Development which increases the residential population within the Brisbane River flood planning area sub-categories minimises the risk to people in all flood events with consideration to flood hazard, including warning time.	**AO14** Development in the Brisbane River flood planning area sub-categories in areas where the residential flood level is greater than 12.8m AHD involving: a. an increase in the number of residential dwellings; or b. additional residential lots	The design achieves all listed performance outcomes.

	is not subject to an unsafe hydraulic hazard in the 0.2% AEP flood event. Note—Explanation of a hydraulic hazard is provided in the Flood planning scheme policy.	
Additional performance outcomes and acceptable outcomes for essential community infrastructure		
PO15 Development involving essential community infrastructure: a. remains functional to serve community need during and immediately after a flood event, or is part of a network that is able to maintain the function of the essential community infrastructure when parts of the development are unable to function during or after a flood; b. is designed, sited and operated to avoid adverse impacts on the community or the environment due to the impacts of flooding on infrastructure, facilities or access and egress routes; c. is able to remain functional or is part of a network which is able to remain functional even when other infrastructure or services (such as electricity supply) may be compromised in a flood event; d. contains mitigation measures which are not entirely dependent on human activation to respond to a flood event. Note—Protection of function is required up to and including the flood event in Table 8.2.11.3.G.	**AO15** Development involving essential community infrastructure: a. is ancillary to and not relied upon for the provision of the essential service during a flood; or b. is located above the flood planning levels in Table 8.2.11.3.G; c. has access to or provides the necessary back-up emergency electricity and communications supply in times of flood; d. is designed and constructed to resist hydrostatic and hydrodynamic forces as a result of inundation by the flood event listed for the development type in Table 8.2.11.3.G; e. that services a local area: i. is able to be accessed in times of flood to service local community needs up to the event listed for that development type in Table 8.2.11.3.G; or ii. has a service continuity plan that demonstrates the continued provision of service during the relevant flood event.	Not Applicable
Additional performance outcomes and acceptable outcomes if development involves the processes in Table 8.2.11.3.H		
PO16 Development involving the storage and handling of hazardous materials avoids or minimises risks to public health and safety and the environment, by:	**AO16** a. Development does not include the storage or handling of hazardous chemicals that exceed the	Not Applicable

a. protecting underground tanks for hazardous materials against the forces of buoyancy, velocity flow and debris impacts; b. securing above-ground tanks for hazardous materials against flotation and lateral movement; c. preventing damage to hazardous materials pipework or entry of floodwater into hazardous materials pipework; d. preventing damage to or off-site release of packages, drums or containers storing hazardous materials. Note—A chemical hazards flood risk report prepared in accordance with the Management of hazardous chemicals in flood affected areas planning scheme policy can assist in demonstrating achievement of this performance outcome. Note—A pump drainage system is not an acceptable measure to meet the performance outcome.	hazardous chemicals flood hazard threshold quantities in Table 8.2.11.3.M. b. Development involving the processes listed in Table 8.2.11.3.H: i. where located in the Flood overlay area, occurs only in the Creek/waterway flood planning area 5 sub-category or the Brisbane River flood planning area 5 sub-category; or ii. is consistent with the standards contained in the Management of hazardous chemicals in flood affected areas planning scheme policy and can operate without risk of environmental harm during a flood event. Note—The Management of hazardous chemicals in flood affected areas planning scheme policy sets out further information and processes including risk assessment for the management of hazardous chemicals in flood planning areas.	
Additional performance outcomes and acceptable outcomes for reconfiguring a lot		
PO17 Development locates and designs all lots resulting from reconfiguring a lot to: a. minimise the risk to people from flood hazard; b. minimise damage to property from flood hazard; c. facilitate safe and efficient evacuation. Note— • Consideration of all floods up to the probable maximum flood is relevant to minimising the risk to people. • Flood warning time is not considered sufficient in the Creek/waterway planning area sub-categories or the Overland flow flood planning area sub-category. • Filling above the flood planning level for a flood event greater than the defined flood event cannot be assumed to mitigate the flood hazard.	**AO17.1** Development creating new lots is identified in Table 8.2.11.3.I as suitable within the relevant flood planning area. **AO17.2** Development provides for reconfiguring a lot design that achieves a road and lot layout which: a. provides trafficable vehicular egress for evacuation during a defined flood event; b. optimises hazard-free movement away from sources of flood hazard within the development. Note—Further advice on road and lot layout is contained in the Flood planning scheme policy. **AO17.3** Development which creates a new residential lot in an area subject to Brisbane River flooding, if the residential	The design achieves all listed performance outcomes.

	flood level is greater than 12.8m AHD is not subject to a hydraulic hazard greater than 0.6m^2/s DV or 0.6m deep in a 0.2% AEP flood. Note—Refer to the Flood planning scheme policy for further explanation on the 0.2% AEP flood.	
PO18 Development involving reconfiguring a lot: a. minimises the risk to people from flood hazard; b. creates safe evacuation routes or avoids isolation of the development during a flood greater than the defined flood event; c. minimises damage to property and services; d. provides lots and roads that are not frequently flooded or subject to nuisance ponding or seepage; e. ensures lots created for park or private open space minimise the risk to people from flood hazard and are fit for purpose; f. provides a lot that is not substantially burdened by flood mitigation infrastructure.	**AO18.1** Development involving reconfiguring a lot ensures: a. all lots comply with the flood planning levels in Table 8.2.11.3.J; b. a new road complies with the flood planning levels in Table 8.2.11.3.F. **AO18.2** Development involving reconfiguring a lot creating more than 6 residential lots or a lot for industry ensures the flood planning levels of a dedicated road fronting the development or providing primary access within 200m of the development: a. complies with Table 8.2.11.3.K; or b. has acceptable trafficability in accordance with the requirements in the Flood planning scheme policy and the Queensland Urban Drainage Manual. Note—The Flood planning scheme policy contains supporting information about trafficability on existing roads and serviceability during floods.	The design achieves all listed performance outcomes.
	AO18.3 Development protects the conveyance of flood hazard area by providing an easement over the: a. 2% AEP flood extent for overland flow flooding; b. 1% AEP flood extent for creek/waterway flooding.	

Table 9.4.9.3.A—Performance outcomes and acceptable outcomes

Performance outcomes	Acceptable outcomes	Comments
Section A—If for a material change of use, reconfiguring a lot, operational work or building work Note—Compliance with the performance outcomes and acceptable outcomes in this section should be demonstrated by the submission of a site-based stormwater management plan for high risk development only.		
PO1 Development provides a stormwater management system which achieves the integrated management of stormwater to: a. minimise flooding; b. protect environmental values of receiving waters; c. maximise the use of water sensitive urban design; d. minimise safety risk to all persons; e. maximise the use of natural waterway corridors and natural channel design principles. Editor's note—The stormwater management system to be developed to address PO1 is not intended to require management of stormwater quality.	**AO1** Development provides a stormwater management system designed in compliance with the Infrastructure design planning scheme policy.	The design achieves all listed performance outcomes.
PO2 Development ensures that the stormwater management system and site work does not adversely impact flooding or drainage characteristics of premises which are up slope, down slope or adjacent to the site.	**AO2.1** Development does not result in an increase in flood level or flood hazard on up slope, down slope or adjacent premises. **AO2.2** Development provides a stormwater management system which is designed in compliance with the standards in the Infrastructure design planning scheme policy.	The design achieves all listed performance outcomes.
PO3 Development ensures that the stormwater management system does not direct stormwater run-off through	**AO3.1** Development ensures that the location of the stormwater drainage system is contained within a road reserve,	The design achieves all listed performance outcomes.

existing or proposed lots and property where it is likely to adversely affect the safety of, or cause nuisance to properties.	drainage reserve, public pathway, park or waterway corridor. **AO3.2** Development provides a stormwater management system which is designed in compliance with the standards in the Infrastructure design planning scheme policy.	
	AO3.3 Development obtains a lawful point of discharge in compliance with the standards in the Infrastructure design planning scheme policy.	
	AO3.4 Where on private land, all underground stormwater infrastructure is secured by a drainage easement.	
PO4 Development provides a stormwater management system which has sufficient capacity to safely convey run-off taking into account increased run-off from impervious surfaces and flooding in local catchments.	**AO4.1** Development provides a stormwater conveyance system which is designed to safely convey flows in compliance with the standards in the Infrastructure design planning scheme policy. **AO4.2** Development provides sufficient area to convey run-off which will comply with the standards in the Infrastructure design planning scheme policy.	The design achieves all listed performance outcomes.
PO5 Development designs stormwater channels, creek modification works, bridges, culverts and major drains to protect and enhance the value of the waterway corridor or drainage path for fauna movement.	**AO5** Development ensures the design of stormwater channels, creek modifications or other infrastructure, permits terrestrial and aquatic fauna movement.	Not applicable
PO6 Development ensures that location and design of stormwater detention and water quality treatment:	**AO6.1** Development locates stormwater detention and water quality treatment:	The design achieves all listed performance outcomes.

a. minimises risk to people and property; b. provides for safe access and maintenance; c. minimises ecological impacts to creeks and waterways.	a. outside of a waterway corridor; b. offline to any catchment not contained within the development. **AO6.2** Development providing for stormwater detention and water quality treatment devices are designed in compliance with the standards in the Infrastructure design planning scheme policy.	
PO7 Development is designed, including any car parking areas and channel works to: a. reduce property damage; b. provide safe access to the site during the defined flood event.	**AO7.1** Development (including any ancillary structures and car parking areas) is located above minimum flood immunity levels in Table 9.4.9.3.B, Table 9.4.9.3.C, Table 9.4.9.3.D, Table 9.4.9.3.E and Table 9.4.9.3.F. Note—Compliance with this acceptable outcome can be demonstrated by the submission of a hydraulic and hydrology report identifying flood levels and development design levels (as part of a site-based stormwater management plan). **AO7.2** Development including the road network provides a stormwater management system that provides safe pedestrian and vehicle access in accordance with the standards in the Infrastructure design planning scheme policy.	The design achieves all listed performance outcomes.
PO8 Development designs stormwater channels, creek modification works and the drainage network to protect and enhance the environmental values of the waterway corridor or drainage path.	**AO8.1** Development ensures natural waterway corridors and drainage paths are retained. **AO8.2** Development provides the required hydraulic conveyance of the drainage channel and floodway, while maximising its potential to maximise environmental benefits and minimise scour. Editor's note—Guidance on natural channel design principles can be found in the Council's publication Natural channel design guidelines.	The design achieves all listed performance outcomes.

	AO8.3 Development provides stormwater outlets into waterways, creeks, wetlands and overland flow paths with energy dissipation to minimise scour in compliance with the standards in the Infrastructure design planning scheme policy.	
	AO8.4 Development ensures that the design of modifications to the existing design of new stormwater channels, creeks and major drains is in compliance with the standards in the Infrastructure design planning scheme policy.	
PO9 Development is designed to manage run-off and peak flows by minimising large areas of impervious material and maximising opportunities for capture and re-use.	**AO9** No acceptable outcome is prescribed.	The design achieves all listed performance outcomes.
PO10 Development ensures that there is sufficient site area to accommodate an effective stormwater management system. Note—Compliance with the performance outcome should be demonstrated by the submission of a site-based stormwater management plan for high-risk development only.	**AO10** No acceptable outcome is prescribed.	The design achieves all listed performance outcomes.
PO11 Development provides for the orderly development of stormwater infrastructure within a catchment, having regard to the: a. existing capacity of stormwater infrastructure within and external to the site, and any planned stormwater infrastructure upgrades; b. safe management of stormwater discharge from existing and future up-slope development; c. implication for adjacent and down-slope development.	**AO11.1** Development with up-slope external catchment areas provides a drainage connection sized for ultimate catchment conditions that is directed to a lawful point of discharge. **AO11.2** Development ensures that existing stormwater infrastructure that is undersized is upgraded in compliance with the Infrastructure design planning scheme policy.	The design achieves all listed performance outcomes.

PO12 Development provides stormwater infrastructure which: a. remains fit for purpose for the life of the development and maintains full functionality in the design flood event; b. can be safely accessed and maintained cost effectively; c. ensures no structural damage to existing stormwater infrastructure.	**AO12.1** The stormwater management system is designed in compliance with the Infrastructure design planning scheme policy. **AO12.2** Development provides a clear area with a minimum of 2m radius from the centre of an existing manhole cover and with a minimum height clearance of 2.5m.	The design achieves all listed performance outcomes.
PO13 Development ensures that all reasonable and practicable measures are taken to manage the impacts of erosion, turbidity and sedimentation, both within and external to the development site from construction activities, including vegetation clearing, earthworks, civil construction, installation of services, rehabilitation, revegetation and landscaping to protect: a. the environmental values and water quality objectives of waters; b. waterway hydrology; c. the maintenance and serviceability of stormwater infrastructure. Note—The Infrastructure design planning scheme policy outlines the appropriate measures to be taken into account to achieve the performance outcome.	**AO13** No acceptable outcome is prescribed.	The design achieves all listed performance outcomes.
PO14 Development ensures that: a. unnecessary disturbance to soil, waterways or drainage channels is avoided; b. all soil surfaces remain effectively stabilised against erosion in the short and long term.	**AO14** No acceptable outcome is prescribed.	The design achieves all listed performance outcomes.
PO15 Development does not increase:	**AO15** No acceptable outcome is prescribed.	The design achieves all listed performance outcomes.

a. the concentration of total suspended solids or other contaminants in stormwater flows during site construction; b. run-off which causes erosion either on site or off site.		
Section B—Additional performance outcomes and acceptable outcomes which apply to high-risk development, being one or more of the following: a. a material change of use for an urban purpose which involves greater than 2,500m^2 of land that: i. will result in an impervious area greater than 25% of the net developable area; or ii. will result in 6 or more dwellings. b. reconfiguring a lot for an urban purpose that involves greater than 2,500m^2 of land and will result in 6 or more lots; c. operational work for an urban purpose which involves disturbing greater than 2,500m^2 of land.		
PO16 Development ensures that the entry and transport of contaminants into stormwater is avoided or minimised to protect receiving water environmental values. Note—Prescribed water contaminants are defined in the *Environmental Protection Act 1994*. Note—Compliance with the performance outcome should be demonstrated by the submission of a site-based stormwater management plan for high-risk development only.	**AO16** Development provides a stormwater management system which is designed in compliance with the standards in the Infrastructure design planning scheme policy.	The design achieves all listed performance outcomes.
PO17 Development ensures that: a. the discharge of wastewater to a waterway or external to the site is avoided; or b. if the discharge cannot practicably be avoided, the development minimises wastewater discharge through re-use, recycling, recovery and treatment. Note—The preparation of a wastewater management plan can assist in demonstrating achievement of this performance outcome. Editor's note—This code does not deal with sewerage which is the subject of the Wastewater code.	**AO17** No acceptable outcome is prescribed.	The design achieves all listed performance outcomes.

Section C—Additional performance outcomes and acceptable outcomes for assessable development for a material change of use or reconfiguring a lot		
PO18 Development protects stormwater infrastructure to ensure the following are not compromised: a. the long term infrastructure for the stormwater network in the Long term infrastructure plans; b. the existing and planned infrastructure for the stormwater network in the Local government infrastructure plan; c. the provision of long term, existing and planned infrastructure for the stormwater network which: i. is required to service the development or an existing and future urban development in the planning scheme area; or ii. is in the interests of rational development or the efficient and orderly planning of the general area in which the site is situated. Editor's note—A condition which requires a proposed development to keep permanent improvements and structures associated with the approved development clear of the area of long term infrastructure, may be imposed.	**AO18** Development protects stormwater infrastructure in compliance with the following: a. for long term infrastructure for the stormwater network, the Long term infrastructure plans; b. for existing and planned infrastructure for the stormwater network, the Local government infrastructure plan; c. the standards for stormwater drainage in the Infrastructure design planning scheme policy.	The design achieves all listed performance outcomes.
PO19 Development provides for the payment of extra trunk infrastructure costs for the following: a. for development completely or partly outside the priority infrastructure area in the Local government infrastructure plan; b. for development completely inside the priority infrastructure area in the Local government infrastructure plan involving: i. trunk infrastructure that is to be provided earlier than planned in the Local government infrastructure plan;	**AO19** No acceptable outcome is prescribed.	The design achieves all listed performance outcomes.

ii. long term infrastructure for the stormwater network which is made necessary by development that is not assumed future urban development; iii. other infrastructure for the stormwater network associated with development that is not assumed future urban development which is made necessary by the development. Editor's note—The payment of extra trunk infrastructure costs for development completely inside the priority infrastructure area in the Local government infrastructure plan is to be worked out in accordance with the Charges Resolution. Editor's note—See section 130 Imposing Development conditions (Conditions for extra trunk infrastructure costs) of the *Planning Act 2016*.		

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