Planning Scheme Policy
Advertising Devices

For State Approval - Major Amendment 1 - December 2017

Table of amendments

Date of adoption and effective date	Planning scheme policy version number	Amendment type	Summary of amendments

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Planning scheme policy – Advertising devices

Adoption

Moreton Bay Regional Council adopted this planning scheme policy on 24 November 2015.

Commencement

This planning scheme policy will take effect from 1 February 2016. Amendments to this planning scheme policy are included at **Table of Amendments** (inside front cover).

1. Introduction

This policy supports the Moreton Bay Regional Council Planning Scheme and has been made by Council in accordance with Chapter 3, Part 4, Division 2 and Part 5, Division 1 of the *Sustainable Planning Act 2009*.

1.1 Purpose

Signage in the region is an important planning and community matter that if left unregulated, will lead to a proliferation of advertising devices potentially leading to visual disorder and a loss of amenity, adversely affecting the natural and built environment and safety of pedestrians, cyclists and motorists.

The purpose of this planning scheme policy is to provide guidance for satisfying planning scheme assessment criteria regarding advertising devices. This policy includes the following guideline material:

a) advertising device types;
b) explanatory text and visual guidance for assessment criteria;
c) signface area calculation; and
d) township character design.

1.2 Application

It is recognised that the issue of advertising is a subjective nature, as there will always be differing perceptions as to what is acceptable or desirable and what is not. The Advertising devices code, in partnership with this planning scheme policy, seeks to provide a consistent balance with emphasis on safe, well designed and effective advertising that enhances, rather than detracts, from its environment and adjoining streetscape.

This planning scheme policy applies to all advertising devices assessable against the MBRC Planning Scheme. The information contained within this policy is for guidance and will assist in addressing relevant assessment criteria.

Assessable advertising devices include those that are defined as an 'Advertising device' (see Section 1.3 Interpretation below) and located on private land. Where an advertising device is located on public land, or where the device does not fit the definition of 'Advertising device' (e.g. temporary or mobile devices), compliance is to be in accordance with the Moreton Bay Regional Council Subordinate Local Law No.1 (Administration) 2011.

Regulatory signage (e.g. road signage) is excluded from compliance with the MBRC Planning Scheme and Council's Local Law.

1.3 Interpretation

Terms used in this planning scheme policy are defined in Schedule 1 – Definitions of the planning scheme. Where a term is not defined in Schedule 1, section 1.3 Interpretation of the planning scheme applies.

2. Advertising device types

The Advertising devices code contains six types of advertising device, including awning, fence, freestanding, projecting, roof and wall/façade advertising devices. The Advertising devices code criteria differs according to the type of advertising device proposed. This section contains a description and examples of the six types of advertising devices.

2.1 Awning advertising device

An awning advertising device is described as being painted or otherwise affixed to an awning, verandah or the like. The below table provides examples of common types of awning advertising devices.

Examples	Description	
Above awning	An advertising device positioned on top of an awning, veranda or the like. Such advertising devices are generally not supported as an acceptable outcome and would require sufficient justification against the relevant performance outcome/s of the Advertising devices code.	
Awning face	An advertising device painted on, or otherwise affixed to, the face/fascia of an awning, veranda or the like.	
Under awning	An advertising device attached or suspended below an awning, veranda or the like.	

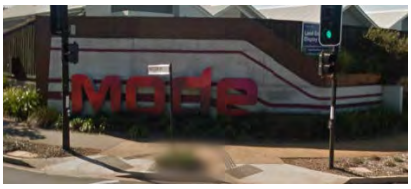
2.2 Fence advertising devices

A fence advertising device is described as being painted or otherwise affixed to a fence. The below table provides examples of common awning advertising devices.

Examples	Description	
Boundary fence	An advertising device painted on, or otherwise affixed to a fence or wall erected along the boundary of a site.	
Business name plate	An advertising device that displays the name or occupation of the business or occupier of premises, painted or otherwise affixed to a building, wall or fence at the premises or is free-standing on the premises.	

2.3 Freestanding advertising devices

A freestanding advertising device is described as being positioned on the ground or mounted on one or more vertical supports. The below table provides examples of common freestanding advertising devices.

Examples	Description	
Billboard	An advertising device, the width of which is greater than the height, containing a freestanding display surface mounted directly on the ground or on one or more vertical supports. Example includes third-party signs.	
Ground	An advertising device incorporating in a monolithic structure which sits directly on or rises out of the ground. Example include estate entrance sign.	
Pylon	An advertising device, the height of which is greater than the width, mounted directly on the ground or on one or more vertical supports. Example include shopping centre signs.	

2.4 Projecting advertising device

A projecting advertising device is described as being attached or mounted at right angles to a building or structure.

Examples	Description	
Projecting	A rigid advertising device affixed to, and projecting at approximately right angles out from, a wall of the building or structure to which it is affixed.	

2.5 Roof advertising devices

A roof advertising device is described as being painted or otherwise affixed to a roof or parapet of a building. The below table provides examples of common roof advertising devices.

Examples	Description	
Created roofline	An advertising device positioned on the roof, façade or wall of a building which changes the horizontal or angular lines of the building's roof.	
Rooftop	An advertising sign affixed to an upper part of a building in such a location that the roof of that building would normally form the predominant backdrop to the sign when it is viewed from the ground.	
Sign written roof device	An advertisement either painted directly onto the roof of a building or fitted flat against the finished roof surface of the building. The term does not include an animated sign.	

2.6 Wall/façade advertising device

A wall/façade advertising device is described as being painted or otherwise affixed to the wall or façade of a building or structure. The below table provides examples of common wall/façade advertising devices.

Examples	Description	
Wall sign	An advertising device painted or otherwise affixed to an external wall of a building or structure.	 
Façade sign	An advertising device painted or otherwise affixed to the façade of a building or structure.	

2.7 Non-changeable and changeable advertising devices

Advertising devices can be further categorised into two broad types: non-changeable or changeable.

2.7.1 Non-changeable advertising devices

Non-changeable advertising devices contain displays that are changed manually on site (i.e. the advertisement display does not change until the display is changed manually), and which may be externally illuminated.

2.7.2 Changeable advertising devices

Changeable advertising devices have the capability to mechanically or electronically change the advertisement message being displayed automatically or remotely.

Common changeable advertising devices incorporate digital displays. Such devices use LED (Light Emitting Diode) technology which enables luminance to be controlled and adjusted, usually automatically. Digital displays are frequently incorporated into freestanding advertising devices but may form part of other Advertising device types. There are generally two types of digital displays, static and non-static, as described below:

a) Static:
   Capable of displaying words, symbols, figures or images. The advertisement message contains no movement other than an instantaneous display change.

b) Non-static:
   Non-static displays are capable of displaying movement, be it animation, video, vision, moving pictures, changes in luminance and/or any effect that gives the impression of movement.

3. Illumination and digital displays

Illuminated advertising devices are specifically designed to contain internal or external means of illumination of the entire advertisement message or a portion of the device. Some common examples of the forms of illumination of advertising devices include:

Type	Description	
Non-changeable advertising devices		
Externally illuminated	Externally illuminated devices have an external light source which is used to illuminate the advertisement message. For example, through the use of fluorescent and/or incandescent bulbs e.g. down light.	 A freestanding (billboard) advertising device containing external illumination utilising down lights. Down lit is the preferred method of externally illuminating advertising devices rather than up lit which can cause lighting impacts on the surrounding environment.
Internally illuminated	Non-changeable internally illuminated refers to illuminated devices where the illumination of the entire device is constant in form, intensity and colour during the hours of which the device is illuminated.	 An example of a freestanding (pylon) advertising device containing static internal illumination.
Changeable advertising devices		
Internally illuminated	Changeable internally illuminated refers to an illuminated advertising device where the illumination of the entire device is not constant in form, intensity or colour. This type of illumination is usually associated with digital displays.	 An example changeable freestanding (pylon) device that utilises internal illumination.

It is recognised that digital advertising is a rapidly growing outdoor advertising format. As LED (light emitting diode) technology becomes more affordable, digital advertising becomes more viable. In the right location and where appropriately designed, digital displays can provide numerous benefits such as consolidation of signage, reducing visual clutter and provide public service announcements e.g. traffic crashes, emergencies, Amber Alerts, etc.

However, in the wrong location and where poorly designed, digital displays and illuminated devices can create a hazard to motorists, cyclists and pedestrians and can create obtrusive lighting impacting nearby uses.

Note - Where an advertising device is visible or adjacent to State-controlled road (including a motorway, such as the Bruce Highway), the Advertising device must comply with the criteria located in Transport and Main Road's *Roadside Advertising Guideline*. Please refer to www.tmr.qld.gov.au.

Advertising devices should only be illuminated where they respond to the ambient light conditions of the surrounding lighting environment. This will ensure there is no unacceptable glare (brighter than its surroundings as to make the device illegible) or reflectance (so bright as to cause distraction) that could result in a hazard to road users and/or produce unacceptable light spillage to the surrounding environment (Refer to **4.2 Obtrusive lighting** for more information relating to light spillage).

Note - Ambient light refers to the light that is already present in a scene, before any additional lighting is added. For example, the ambient light conditions of a major commercial and retail centre is high compared to the ambient light conditions of a rural area.

The preference for internally illuminated advertising devices is to exhibit consistent apparent brightness in all lighting conditions, by maintaining a consistent ratio between the ambient light (illuminance) and light emitted by the device (luminance). Due to the rate of change in ambient light conditions during dusk and dawn periods, particular attention needs to be given to the luminance levels that are output during these periods to ensure an apparent brightness is maintained during all hours of the day and night.

Measuring luminance - Refer to the Roadside Advertising Guideline, Appendix D: Brightness/luminance levels.

3.1 Road user safety

While it is recognised that the main purpose of an advertising device is to capture attention, from a road user safety perspective this can result in attention being diverted from the task of driving, cycling or walking. All advertising devices should ensure a high level of safety for all road users therefore the principles contained in this section should be considered when assessing or proposing an internally illuminated (non-static) advertising device.

Note - It should be noted that the Advertising devices code does not regulate the display content of an Advertising device i.e. the message. However, where an Advertising device initiates or intimidates a traffic control device or where it gives instructions to 'stop', 'halt' or other similar messages, consideration must be taken into account of how this could affect road user safety.

3.1.1 Location

Consideration towards the location of changeable internally illuminated advertising devices where traffic conditions require additional attention and decision making e.g. complex traffic environments, is especially important. Such locations include, but are not limited to:

a) roundabouts;
b) cross sections;
c) school zones;
d) railway level crossings;
e) un-signalised t-intersections;
f) terminating lanes;
g) mid-block pedestrian facility areas;
h) y-intersections;
i) where an official traffic sign is displaying an important message;
j) intersection of sections of road, which, because of lane configuration or geometry, may require an increased level of driver concentration.

Of additional importance are variables that influence the distractive potential of advertising devices in the vicinity of the above locations. These include, but are not limited to:

a) physical attributes of the advertising device (e.g. luminance, size, etc.);
b) display content, especially when automatically changeable (e.g. advertisement transition and dwell time).

In these situations, careful consideration should be given to the design and location of the device and how it interacts with the surrounding environment in order to avoid distracting road users.

3.1.2 Dwell and transition time

The length of time for which an advertisement message is displayed should be as long as possible to reduce the frequency of sudden change that can capture attention involuntarily. The idea behind this is to limit the number of message changes that road users are exposed to. Therefore, a changeable internally illuminated advertising device visible from 1000m away on a 60km/h road needs to have a much longer dwell time than an advertising device that is visible from only 100m away on an 80km/h or more road. Given this the following dwell times are recommended for static digital displays:

a) where visible from a Council-controlled road with a speed limit of 80km/h or greater, 25 seconds;
b) where visible from a Council-controlled road with a speed limit of less than 80km/h, 10 seconds;
c) for State-controlled roads, refer to the *Roadside Advertising Guideline*.

The transition time between individual advertisements should be instantaneous e.g. 1 second or less. This is to reduce the likelihood of a driver perceiving any blanking of the display and to avoid the display appearing black between different advertisements. Other methods of advertisement change are not permitted. The display should also not be split to display multiple advertisements on the one device.

3.2 Obtrusive lighting

Illuminated advertising devices, like all advertising devices, should ensure minimal impact on the desirable characteristics of the natural and built environment in its immediate locality. Apart from the visual impact caused by illuminated advertising devices in the context of road user safety, illumination also has the potential to cause negative amenity impacts, especially on residential uses. Effects on residents generally involve a perceived change in amenity arising from:

a) the illumination from spill light being obtrusive, especially when the light enters a habitable room that is not normally illuminated from on-street sources;
b) the direct view of brightness from normal viewing directions causing annoyance, distraction or discomfort.

The tolerable levels of the above parameters will differ depending on the ambient light conditions already in place and the surrounding environment. It is recommended *Australian Standard AS4282 Control of the Obtrusive Effects of Outdoor Lighting* is referred to when proposing and/or assessing illuminated advertising devices.

Some methods to manage impacts include, but are not limited to:

a) controls on lighting fixtures and direction of lighting i.e. adjustment to lighting if necessary;
b) setting a maximum or average illumination level;
c) prohibiting an advertising device's illumination from spilling over onto nearby properties; and
d) setting hours of operation e.g. curfew hours.

3.3 Illumination by place

The public's perception of illuminated advertising devices varies depending on the place, surrounding environment and consistent day/night ambient light conditions.

Major commercial and retail areas: Major commercial and retails areas generally contain high off-street ambient lighting. The higher order centres of Caboolture-Morayfield, Redcliffe-Kippa-Ring, North Lakes and Strathpine contain some of the highest ambient lighting conditions in the Region. Illuminated advertising devices in major commercial and retail areas, where appropriately designed and located, have the least likelihood to cause adverse amenity impacts on the surrounding environment given the existing ambient light of the environment. However, illumination should still not adversely impact upon residential uses in these areas.

Industrial areas: Like major commercial and retail areas, industrial areas generally contain high off-street ambient lighting. Therefore, illuminated advertising devices, where appropriately designed and located, have the least likelihood to cause adverse amenity impacts on the surrounding environment given the existing ambient light of the environment.

Residential areas: The expectation for a residential area is generally a high level of amenity and privacy with little to no intrusion from illumination associated with advertising devices, therefore:

a) Illuminated advertising devices should not establish in a residential place. Illumination in these areas has the highest risk of causing obtrusive lighting.
b) Where in a Community activity or Neighbourhood hub, the device must not cause obtrusive or intrusive lighting to a residential premise and must not detrimentally affect the character or amenity of the surrounding residential area. Refer to *Australian Standard AS4282 Control of the Obtrusive Effects of Outdoor Lighting* for more information regarding obtrusive lighting.

Rural areas: Generally, the ambient light conditions within a rural area are relatively low. Therefore, illuminated advertising devices have the potential to cause adverse visual and character impacts on the surrounding environment as well as potentially creating road safety issues. Where appropriately located and designed, externally illuminated advertising devices may be appropriate.

4. Design, scale, height and location of Advertising devices

A streetscape is made up of a complex series of individual components which create a scene rich with detail. This is what people find interesting in a high quality environment and this is what the planning scheme seeks to deliver through active frontage and modulation.

Advertising devices are acknowledged as an essential part of a streetscape as well as the overall built environment and landscape. They provide critical information to the community in identifying businesses, services and providing public service announcements. Appropriately located and well designed, constructed and maintained advertising devices are generally well regarded and accepted by the community.

However, where advertising devices are inappropriate in scale, number and/or height they have the potential to negatively affect a place's character and visual amenity. Advertising devices also have the potential to create unacceptable hazards to vehicles, cyclists and/or pedestrians, cause nuisance to surrounding land uses, restrict key vistas and viewing corridors for people and property, and block sunlight and breezes.

The number, type, design, scale, height and location of advertising devices and how they interact with the adjoining streetscape and surrounding landscape and environment should be carefully considered where a proposal departs from the acceptable outcomes of the Advertising devices code. This section focuses on three main principles: visual aspect, clutter and character.

Streetscape - The streetscape is generally considered to be composed of the visual elements of a street, including the road, adjoining buildings, footpath, street furniture, trees, open spaces, signage, etc. that when combined form the street's character.

Landscape - The landscape comprises all the visible features of the surrounding land, often considered in terms of aesthetic appeal.

4.1 Height and visual dominance

A key objective for the location of signs for advertisers has been the optimum height needed to obtain effective visibility of the advertising component of the sign to its desired target. Freestanding advertising devices offer the greatest opportunity to achieve this objective and are therefore the most common form of advertising device within the Region's centres.

However, this approach has led to a proliferation of excessively tall freestanding signs in some parts of the Region, each larger than the other and all competing for their desired targets attention. An example of this can be found along Morayfield Road, which contains a number of visually dominant and overbearing advertising devices within proximity to one another.

Morayfield Road - Signs reach 15m in some locations, many times taller than the building containing the business that the sign is advertising. Visually dominant advertising devices such as these within a streetscape and landscape compromise the outcomes sort for the Centre zone in the Planning Scheme.

Generally, Advertising devices should not exceed the dominant skyline including the parapet of buildings, structures, vegetation and other advertising devices on the site and in the immediate locality, when viewed from finished or natural ground level. Where a proposal is considered visually dominant and overbearing, or has the potential to impact upon view corridors vistas or cause overshadowing, a photo montage which clearly demonstrates the advertising device's impact on the streetscape and landscape should accompany the application.

Freestanding pylon advertising devices that excessively protrude above surrounding buildings, structures and other advertising devices. In both situations, the devices could have been 6m (e.g. the acceptable outcome) and still quite visible within the streetscape.

Freestanding advertising devices that sit within the dominate skyline relative to the adjoining building, structure and other advertising devices.

4.2 Visual clutter and proliferation

The overall amount of advertising devices in relation to the streetscape and the cumulative effect of many devices can create visual clutter and detract from the existing and future planned character and amenity of an area. A proliferation of advertising devices on any site should be minimised in order to

avoid visual clutter, duplication of the same advertisement message, visual distractions for road users and adverse impacts on the amenity of the streetscape and environment.

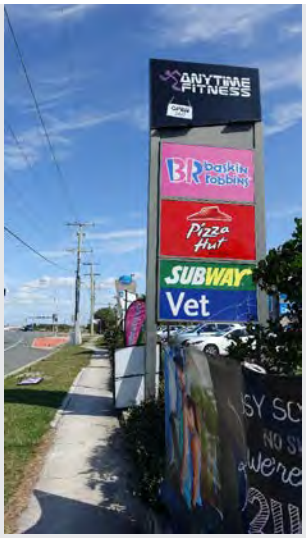
Note - What constitutes "clutter" will differ depending on the location. For instance, the Region's centres contain multiple advertising devices visible along a given sightline. Where appropriately designed and located, these devices can contribute to the fabric of the place and promote businesses and economic growth within the area. Clutter will result however where there is an overabundance of advertisements placed on a single advertising device, location or site.

New advertising devices should be consolidated, rationalised or reduced on sites where a reasonable amount of signage already exists. This can be achieved through a number of means, including, but not limited to, incorporating new advertising devices into existing signage or using changeable advertising devices such as digital displays, where appropriate. Furthermore, a highly cluttered environment makes it difficult to locate and prioritise processing of driving-critical information. Therefore, roadside advertising should not be placed in locations where there is already a number of existing signs and distracting material visible to road users.

An example of a clutter of advertising devices i.e. an overabundance of devices on a site or sightline.

A clutter of advertising devices can also reduce the effectiveness of individual devices and decrease the public's ability to locate critical information. Advertising devices on a site should not obscure the view of other signage on adjoining sites and within a sightline. Therefore, consideration should be given to the location of the advertising device on the site and how the device sits within the streetscape. Pylon and ground freestanding advertising devices are the preferred freestanding type in the region's centres as they are usually less intrusive in the street scene due to their vertical nature.

An example of a freestanding billboard advertising device which restricts views to the freestanding pylon advertising device in the background.



Examples of advertising devices that do not restrict the viewing rights of other advertising devices. Pylon freestanding advertising devices are the preferred type of freestanding advertising device in the Region's centres and on land identified as a Community activity or Neighbourhood hub because they do not block each other when seen from an acute angle.

4.3 Established and desired character

Just like buildings, advertising devices should be designed with the most appropriate design response in mind in order to complement and reflect the established and desired character, streetscape and environmental values of an area and site. The design of an Advertising device and its location affects the character of a place. Advertising devices that are well designed, appropriate in scale and height and appropriately located can add interest, character and vibrancy to the built environment.

Where appropriately located and designed, advertising devices may be positioned as to screen the unsightly aspects of the built environment e.g. infrastructure, substations, loading areas, blank facades, etc.

Note - An Advertising device which advertises a business, item or matter not conducted on the land on which the device is located or a commodity or service not available on that land is known as a third party advertising device.

Advertising devices should incorporate modulation into the supporting structure. See through elements and more visually rich detailing at the top of the advertising device can add interest. If the device is framed by background elements such as buildings, landscaping or natural environment, see through elements can reduce the perceived bulkiness of some advertising devices. Large advertising devices subdivided into a number of elements (individual tenancies with individual colours and logos) is considered to be relatively interesting to look at because it includes a degree of intricacy missing from a large individual sign, in the same way that a large building should be modulated with smaller elements

	
An example of a freestanding pylon advertising device containing little modulation and a basic colour scheme, and as such does not add any form of interest to the streetscape.	An example of a freestanding pylon advertising device containing modulation and subdivided elements identifiying individual tenancies through the use of logos and colours. The building in which the teancies are located in is articuted in similar fashion to the advertising device.

Like other forms of development, consideration must be given to the design and location of an advertising device dependent on the surrounding character and amenity.

Major commercial and retail areas:

The majority of centres within the region are currently characterised by self-contained buildings with off-street car parking areas dominating the street frontage. Historically, the best method to inform road users of what is contained on a site has been roadside advertising, usually in the form of multiple visually dominant and overbearing advertising devices. The planning scheme seeks to deliver vibrant and attractive development within the Centre zone, with the primary focus on street activation and the pedestrian environment. The design and location of advertising devices in major commercial and retail places should respond to and reflect the outcomes of the Centre zone.

Industrial areas:

Industrial areas are usually characterised by an overabundance of advertising devices, with no uniformity in design and location. The proper management of the design and location of advertising devices in industrial areas can contribute to the visual quality of area and more effectively advertise businesses within the area.

Residential areas:

The expectation for a residential place is generally a high level of amenity and privacy with little to no intrusion from large advertising devices or illumination associated with advertising devices. However, given that a number of small scale commercial, retail and community uses are appropriate in General residential and Rural residential zoned areas where forming a Neighbourhood hub or Community activity, advertising devices associated with these uses need to appropriately respond to the surrounding residential character and amenity. The following principles should be considered when locating an Advertising device in a residential area:

a) Advertising devices located in a Community activity or Neighbourhood hub are visually compatible with the development on-site and the character of the residential place.
b) Advertising devices for businesses within a residential area i.e. Home based business, should clearly identify the use and businesses without detracting from the residential character or amenity of the immediate locality.
c) Third party advertising devices do not establish in a residential area.

Rural areas:

Rural places contribute to the sense of place and identity of the region. Third party advertising is the most common method of advertising in the rural places, due to the high exposure levels along the arterial roads and highways that traverse these areas. Advertising devices need to be carefully designed and located where in a rural place in order to avoid impacts on the visual amenity and character of the landscape and to ensure road safety. The following principles should be considered when locating an Advertising device in a rural area:

a) Advertising devices should be low key in appearance, with consideration to their shape, colour, height and construction in order to be compatible with the surrounding natural environment, geography and rural character.
b) Generally, no more than one (1) freestanding advertising device should be visible along a given sightline along a highway or major arterial road in order to prevent the proliferation of visual clutter.
c) Third party advertising devices are generally located along arterial roads and highways and promote rural tourism, operations, services or events within the Region.
d) Advertising devices should not establish in a significant view or vista and should protect the visual character of the locality. It should be noted that where an advertising device is to be located on land mapped as Regionally significant (Hills) on Overlay map - Scenic amenity, additional criteria applies.
e) Advertising devices for rural businesses should clearly identify the use and businesses without detracting from the rural character or amenity of the immediate locality.

Advertising devices in a rural place promoting a local business on-site, low key in appearance and compatible with the natural environment.

5. Sign face area calculation

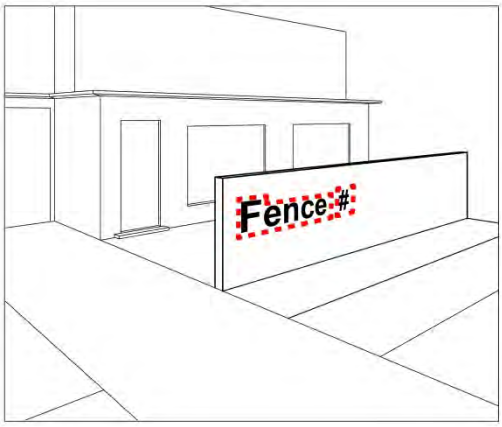
The section provides information and illustrative guidance for calculating sign face area of advertising devices i.e. SAO3 and AO1.3 of the Advertising devices code.

5.1 Awning advertising devices

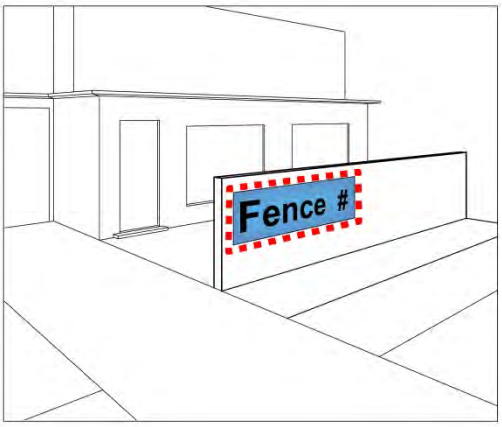
Continuous regular area around advertising device text.

Continuous regular area around an advertising device with a differentiating background.

5.2 Fence advertising devices

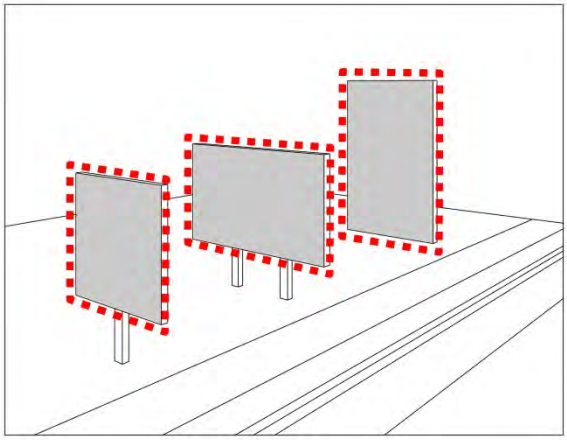


Continuous regular area around advertising device text.



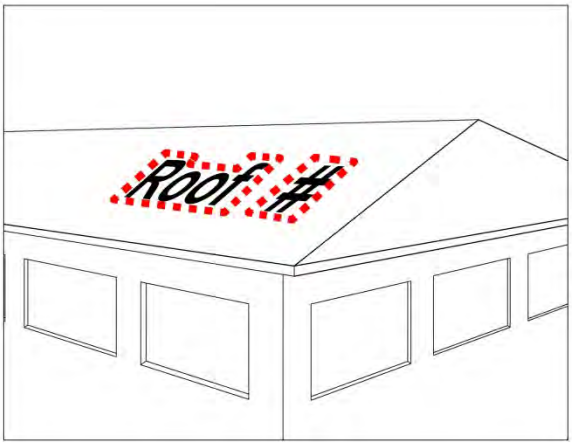
Continuous regular area around an advertising device with a differentiating background.

5.3 Freestanding advertising devices

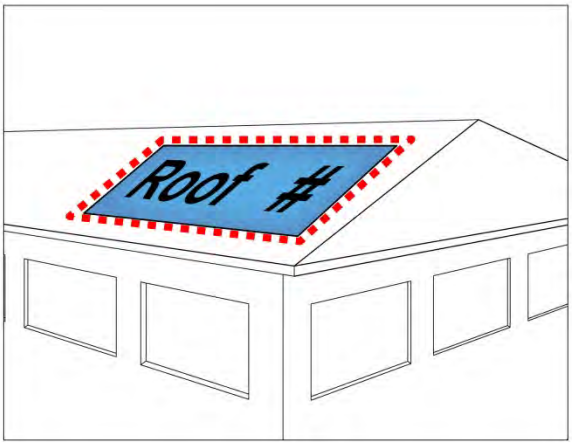


Continuous area around a freestanding advertising device.

5.4 Roof advertising devices

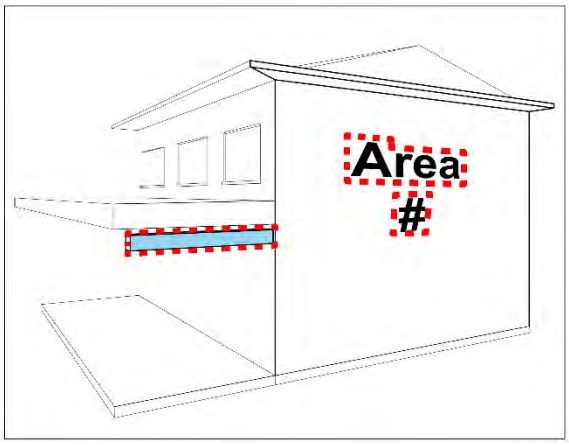


Continuous regular area around advertising device text.

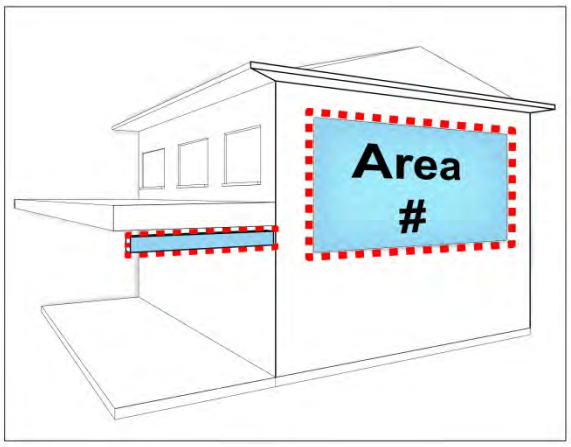


Continuous regular area around an advertising device with a differentiating background.

5.5 Wall/façade and Projecting advertising devices



Continuous regular area around advertising device text.



Continuous regular area around an advertising device with a differentiating background.

5.6 Three dimension advertising devices

Continuous regular area using the outermost extremities

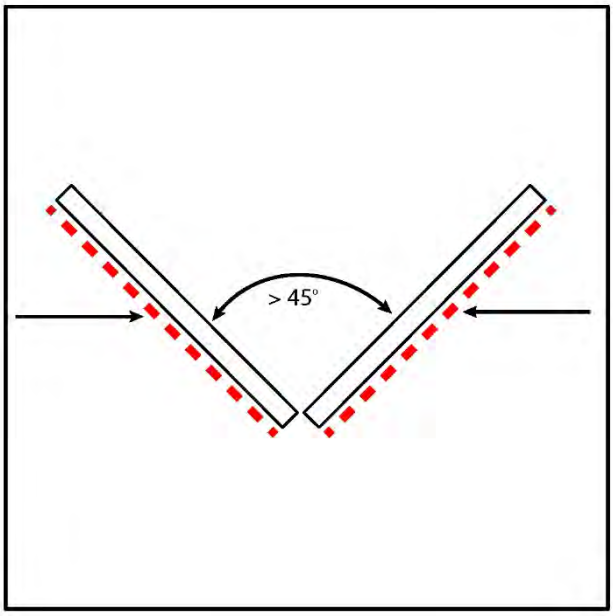
5.7 Further sign face area calculation information

For sign face area calculation purposes:

a) Where an Advertising device features two (2) display faces with an internal angle of 45 degrees or less, only one (1) of the display faces forms part of the maximum total sign face area total calculation.

a) Advertising devices that feature two (2) display faces with an internal angle greater than 45 degrees must calculate each display face as a separate sign face area.

b) Advertising devices that include more than two (2) display faces must calculate the additional display faces as a separate signface area.



Signface area calculation for advertising devices with an internal angle greater than 45 degrees.

6. Advertising devices in the Township zone

This section provides guidance for designing and integrating advertising devices into the Township zone. Areas within the Township zone have a traditional and historic character, each area featuring a unique identity and sense of place. Poorly designed signage can detract from the visual aesthetics and character of a township, whereas signage of an appropriate design, scale, colour and location can be complementary and enhance the traditional identity of the township. Like elsewhere in the Region, visual clutter created by too many or inappropriate sign types is also discouraged. Signage should be integrated into the façade but not dominate.

Provisions within the planning scheme seek to ensure that advertising devices are designed and installed appropriately to contribute to, and not detract from, the rich character of these areas. The following design information can be used to assist in addressing relevant planning scheme assessment criteria.

6.1 Traditional township design and style

The following design principles are to be adopted into advertising devices where located in the Township zone:

a) Traditional rather than modern design and styling that reinforces the Australian country town character that is present throughout the Township zone;
b) Styling that relates to both the natural and man-made streetscapes and landscapes that have resulted over the history of the area;
c) Traditional lettering and graphic styles involving shaded letters, the mixing of sizes and styles of letters and ornamental scrolls that reflect the period of the building;
d) Modern 'trademark' advertising devices are generally inappropriate within the Township zone. These advertising devices can be modified through the use of perimeter margins and surrounding wall surfaces printed/styled with sympathetic heritage colours and designs;
e) Third party advertising does not establish in the Township zone.

Examples of signage appropriately designed and styled within the Township context.

6.2 Township context and building integration

It is important to pay particular attention to the streetscape within the Township zone. Careful consideration should be given to the placement of advertising devices in relation to:

a) Advertising devices should not detract from the design form of buildings and the overall township context;
b) Advertising devices should be integrated into the design and elevation of the building or structure. Opportunities for the integration of advertising devices within the Township zone may be more limited than in other areas, such as newer centres;
c) Advertising devices should be discreet and should complement the building, streetscape and surrounding township context.

Signage within multiple tenancies that is integrated into the built form of the buildings along a township main street.

Signage that reflects the design and elevation of the building and surrounding streetscape.

An example of poor signage that does not integrate with the building, streetscape or surrounding township context

6.3 Appropriately locating advertising devices in the Township zone

Historically, advertising devices were placed so as to allow the architectural details of buildings to remain prominent. Advertising devices should be placed in locations on the building or item which would traditionally have been used as advertising areas (e.g. walls, building facades, awnings, windows) thereby leaving architectural details of buildings uncovered and exposed to public view.

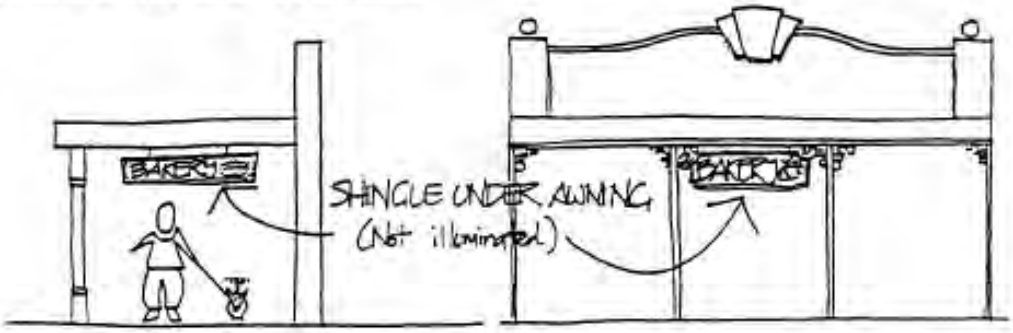
The following advertising device types are preferred within the Township zone:

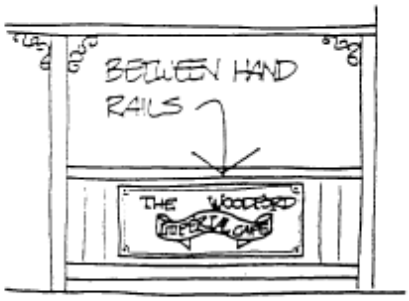
a) under awning or awning fascia signs;
b) wall/façade signs – generally on windows, around entrances or projecting at right angles to the building where an awning or verandah is not present or where appropriate;
c) freestanding signs at low level;
d) as a panel on a front fence.

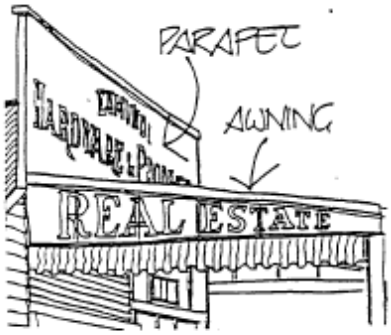
Examples of appropriate under awning and awning fascia signage.

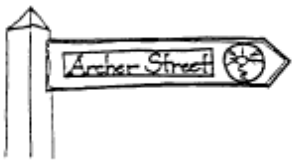
An example of wall/façade signage located above the building entrance.

Examples of 'good' signage are as follows:









PUBLIC SIGNAGE (above and at right) – consistent style; possibly incorporate logo.

Planning Scheme Policy
Centre and Neighbourhood Hub Design

For State Approval - Major Amendment 1 - December 2017

Table of amendments

Date of adoption and effective date	Planning scheme policy version number	Amendment type	Summary of amendments

Contents

Planning scheme policy – Centre and neighbourhood hub design

Adoption
Moreton Bay Regional Council adopted this planning scheme policy on 24 November 2015.

Commencement
This planning scheme policy will take effect from 1 February 2016. Amendments to this planning scheme are included at **Table of Amendments** (inside front cover).

1. Introduction
This policy supports the Moreton Bay Regional Council Planning Scheme and has been made by Council in accordance with Chapter 3, Part 4, Division 2 and Part 5, Division 1 of the Sustainable Planning Act 2009.

1.1 Purpose
The purpose of this planning scheme policy is to:

a) provide additional information in the form of images and explanatory text to provide guidance about satisfying assessment criteria identified in the planning scheme;
b) encouraging more innovative and site-specific design solutions and less 'cookie cutter' development.

1.2 Application
This planning scheme policy may be applied to development in centres or neighbourhood hub's in all applicable zones.

1.3 Interpretation
Terms used in this planning scheme policy are defined in Schedule 1 – Definitions of the planning scheme. Where a term is not defined in Schedule 1, section 1.3 Interpretation of the planning scheme applies.

For the ease of interpreting this planning scheme policy, the following terms and meanings are reproduced from Schedule 1.

Term	Definition
Bulky goods retail	A building or place used primarily for the sale by retail, wholesale or auction, or hire or display of, goods that are of a size or weight which requires: a) a large area for handling, display or storage; or b) direct vehicular access to the site by members of the public for the purpose of loading or unloading goods into or from vehicles after purchase or hire, but does not include a building or place used for the sale of foodstuffs or clothing unless their sale is ancillary to the sale, hire or display of bulky goods. Note: In interpreting the above, 'primarily' is considered to be a use where 50% or more of the total GFA is used to store or display bulky goods. Note: In interpreting the above a 'bulky good' is considered to be a good or item (including any associated packaging for that good or item) having at least one dimension of 1m or greater. This does not include the packaging or delivery method of multiple goods or items e.g. on a pallet etc.

1.4 Who should use the Centre and neighbourhood hub design Planning scheme policy
This planning scheme policy is intended to be used by developers and designers, development assessment planners, development and building professionals.

This document may be referred to in information requests.

1.5 How to read the Centre and neighbourhood hub design Planning scheme policy

This planning scheme policy is not a prescriptive tool, it is intended to raise general awareness about centre and neighbourhood hub design and initiate innovative ideas and solutions.

1.6 Disclaimer

Diagrams and photos used in the planning scheme policy may not comply with all components of the planning scheme. Some diagrams and photos have been used to illustrate a particular element and should be used as such.

Where conflict between the planning scheme and the content, diagram's or images in this policy, the planning scheme prevails.

2. Centres network

Moreton Bay will have a strong network of centres that provide a focal point for compact, self-contained and diverse communities. Residents will have convenient access to an appropriate mix of commercial, retail, social and recreation opportunities.

2.1 Higher order centres

Higher order centres are the main centres for administration, business, shopping and civic investment in the region. Higher order centres provide the greatest mix of land uses and the highest development densities. Higher order centres have a central, highly accessible core which contains the highest density of development, and accommodates land uses such as major and specialist retail, professional and other specialist services and civic, education, health and cultural facilities that benefit from a highly accessible location. Higher order centres are located around a significant transit node, and are at the centre of feeder transport networks serving the surrounding communities. These centres, provide the largest number and range of employment opportunities to serve the region's population.

2.2 District centres

District centres provide a wide range of services and facilities at a significantly lower scale and intensity than higher order centres. District centres serve a smaller catchment population than higher order centres (generally 20,000 – 50,000 people). District centres provide a focal point for inter-suburban transport networks and for surrounding neighbourhoods. District centres provide health, education and community facilities and a range of shops including full-line supermarkets and specialist stores to cater for weekly shopping needs.

2.3 Local centres

Local centres provide a limited range of services, including convenience and weekly retail activities, to a cluster of local neighbourhoods. They have high local accessibility, particularly for pedestrian and cycle traffic and act as a focal point and meeting place for the local community. Local centres serve a small catchment (generally 5,000-10,000) and are generally defined by the presence of a full-line supermarket or a fully functioning main street that caters for a catchment of the same size.

2.4 Specialised centres

Specialised centres provide for the establishment of retail uses which have specific location or land requirements that are difficult to achieve within higher order, district or local centres. For example bulky goods retail often need a large area for the handling, display or storage of goods or direct vehicular access by members of the public to the site to load or unload goods. Over time these uses have tended to locate on the fringe of existing centre and incorporate uses not of a specialised or bulky nature, creating specialised centres servicing a sub-regional population. In the future these centres will form individual precincts and destinations in their own right, rather than being located at the periphery of a higher order, district or local centre. The precinct mapping will reflect the existing specialised centres.

Specialised centres will strictly cater for uses such as bulky goods retails, showrooms, hardware and trade supplies, garden supply centres and similar uses. Specialty shops, office uses and supermarket uses that are preferred in higher order, district and local centres are not supported in specialised centres. It should be noted that the establishment of showrooms within existing higher order and district centres will be supported by the planning scheme, provided they are designed to provide active street frontages and compliment the intended character of the centre.

Note: Refer to interpretation section 1.3 of this Planning scheme policy for definition of Bulky goods retail.

3. What is a neighbourhood hub

Previously a large number of local and neighbourhood centres were included within the centre zone. The planning scheme recognises the limited impact these small scale centres have on the larger centres and recognise their importance in terms of forming the heart of communities and walkable neighbourhoods. This is further emphasised in the vision for residential place types within the Strategic framework. Residential place types, especially suburban and next generation, should expect to see retail, commercial and community uses that meet convenience, day-to-day needs and provide informal and safe meeting places for residents. Providing for the incidental shopping needs of people within a walkable catchment will also contribute to a decrease in daily car use and increase the use of active and public transport.

Accordingly, all centres that are not of a size and scale to be considered a local centre (those with a full-line supermarket or a fully functioning main street) as descried above will be contained in the surrounding zone and precinct e.g. General residential zone, Next generation neighbourhood precinct. Provisions to guide the type, size, location and design of these non-residential uses and the formation of neighbourhood hubs is contained in the relevant residential precinct of the General residential zone code.

Neighbourhood hub's are similar to centres in that they are walkable, pedestrian focused and concentrate activity at the street level through providing active frontages, and streets that are not dominated by car parking etc. Neighbourhood hub's are to be of a small scale and are ideally located adjoining park, public open space or a civic space or forecourt as these spaces increase the level of activity, provide areas for interaction, improving amenity and casual surveillance. Neighbourhood hub's should be located on the corner of a sub-arterial or collector road to maximise the movement economy for small businesses. The length of the main street in a neighbourhood hub should generally not exceed 200m to remain compact and walkable, they should be located in the centre of a 10min (800m) walkable catchment. To maintain economic competitiveness, the location of neighbourhood hub's should reduce catchment overlap and establish a defined neighbourhood, therefore neighbourhood hub's and the catchments they serve should be clearly separated from other neighbourhood hub's and centres.

(Landsborough)

4. Out of centre development

The management of out of centre development is vital to achieving the objectives and vision described in the Strategic framework. At the same time it is acknowledged that to remain economically viable, vibrant and attractive centres will continue to evolve with time. The planning scheme needs to cater for that evolution. For the life of this planning scheme it is intended that specialised and higher order centres within the region do not expand in land area. New higher order and specialised centres are not to occur. Accordingly, consolidation and redevelopment of existing specialised and higher order centres is encouraged.

The expansion of the land area of district centres in to land not within the centre zone will be considered based on how the planning scheme outcomes are met. Economic factors contribute to, but are not the sole factor in this assessment. The expansion of a district centre must also maintain the scale and function of a district centre. New district scale centres, other than those identified in the Strategic framework, are not to establish in the life of this planning scheme.

Local centres and neighbourhood hubs, are considered to be essential elements in the establishment of walkable neighbourhoods. Accordingly, the planning scheme allows for the expansion and the establishment of new local centres and neighbourhood hub's provided they are well designed, located and distributed within the region. New local centres and neighbourhood hub's should not impact on existing centres. New local centres and neighbourhood hub's should be provided centrally within the residential neighbourhood and not on the urban fringe.

5. Urban structure

(Bulimba)

5.1 Location

While the scale of centres and neighbourhood hub's vary greatly in function, activities and scale the principles behind the ideal location for centres and neighbourhood hub's is relatively similar.

The right location for a centre or hub in its broader context contributes greatly to a centres ability to function and produce the desired outcomes specified in the Planning scheme codes and Strategic framework.

(Coolum)
Close to frequent public transport.

Centres (other than specialised centres) and neighbourhood hub's should establish where they:
have convenient and proximate access to public transport;
adjoin or contain areas of public open space, whether natural or recreational;
concentrate and focus activity to the street, creating a 'main street;
are centred around a main street, that is a primary or secondary through street (this will vary depending on the context) with a grid street pattern beyond;
are centrally located within the catchment they are serving;
contain or are adjoined by higher residential densities than other areas of the region.

(Peregian)
Close to public open space.

(Cotton Tree)
Close to higher density residential uses.

(Bulimba)

5.2 Connectivity

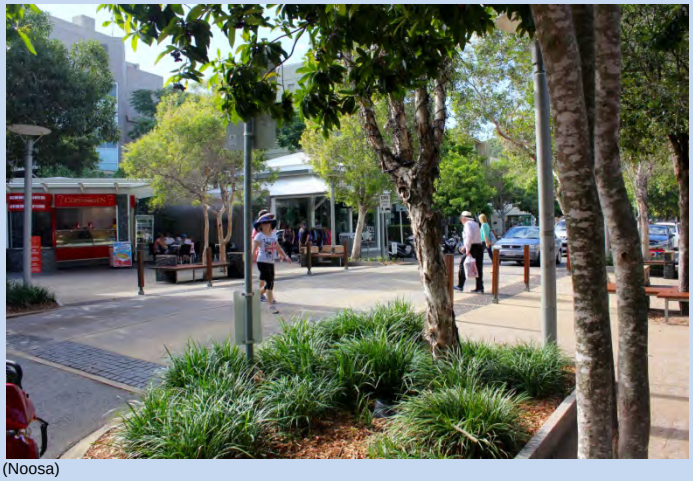
Connectivity is a measure of the permeability of an urban environment for pedestrian, cyclists and vehicles. High connectivity is important for a centre as it makes it easier for visitors to access and navigate their way around and to reach key destinations.

To establish good connectivity streets and buildings are to be designed to:

a) establish and maintain clear sightlines;
b) facilitate the most direct route options for pedestrians and cyclists;
c) allow for alternative routes via lanes and through block links;
d) provide street environments that are safe and interesting.

Cul-de-sacs are to be avoided as they make walking and cycling journeys longer and reduce route choices. If it is not possible to extend a road or lane to the road network a pedestrian and cycle link may be viable, provided these links are safe to use. Blocks within centres should be smaller in size, length and shape. The redevelopment of existing centres should consider:

a) the breaking down of larger blocks;
b) the realignment of irregular shaped blocks;
c) the provision of direct pedestrian through-block links to increase permeability.



(Noosa)
Multiple Shared zones across a main street

(Kawana)

(Kawana)
Mid-block pedestrian connection

(Kawana)
Pedestrian connection through site onto major road

5.3 Main street

The planning scheme places a high importance on main streets forming the core of centres within the MBRC region. This shift in focus from previous planning schemes is aimed at creating places for people. With the intent being that this will then flow on to increased productivity, and economic and community benefits. A main street usually refers to a vibrant and active street with a continuous row of shops, small office spaces and restaurants. Main streets are usually located along a recognised major thoroughfare that can also be a significant public transport route, though preferably not an arterial or sub-arterial road. Main streets often run perpendicular to a sub-arterial road, with these forming the ends of main streets. Residential uses are located above or behind active, commercial uses.

In district and higher order centres main streets generally consist of active retail and commercial uses built on both sides of the street, while local centres or neighbourhood hub's would generally only contain active retail and commercial use buildings on one side of the street with a public transport node, park, or medium density residential uses on the other side.

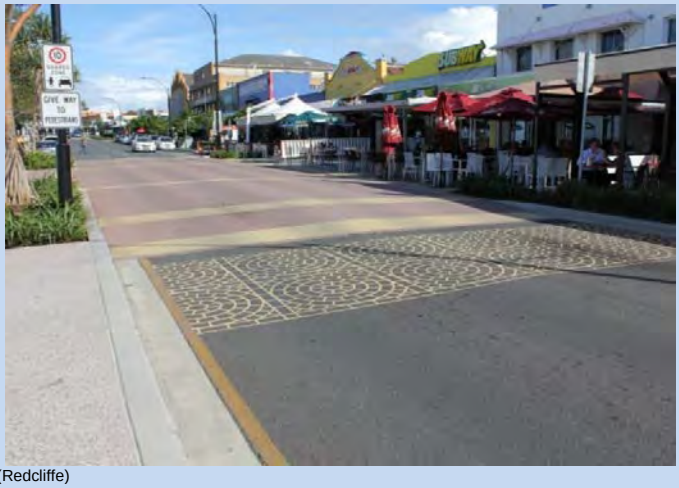
Main streets rely on high volumes of vehicular traffic, pedestrians, and frequent public transport to support active land uses. Traffic should be calmed along the main street to improve pedestrian safety and amenity. Refer to Planning scheme policy – integrated design for traffic calming measures.

A successful main street should:	
Buildings and uses	**Street**
contain continuous active frontages along the main street; ensure that the main street is the most pleasant experience for pedestrians with protection from the weather; include a diversity of uses along the main street that operate at different times of the day and days of the week, to create continuous activity and vibrancy to the centre; include residential uses that increase the viability of convenience shopping, retail and restaurants and increase safety within a centre. Residential uses in centres, especially on main streets should be contained within mixed-use buildings with residential uses above or behind commercial uses.	Include high-quality public domain finishes, including generous footpath widths for greater pedestrian volumes and space for outdoor dining, public art and street furniture; design the street to support active and public transport such as cycle lanes and bus stops; priorities pedestrians and cyclists; incorporate on-street parking to support local business, encourage a turnover of visitors and activity through the main street. This can also assist with traffic calming; include build-outs for street trees and street furniture etc.

(Cotton Tree)
Accessible public transport, bus stop.

(Noosa)
Build outs with landscaping and street furniture.

(Maroochydore)
Wide foot paths, ramps and street trees



(Redcliffe)
Outdoor dining, slow traffic

(Noosa)
Two sided main street.

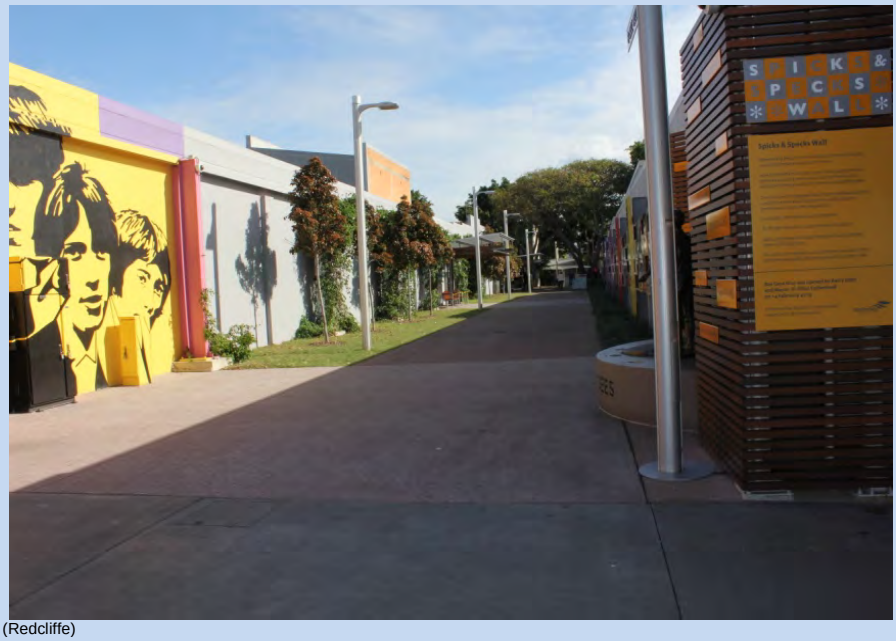
(Landsborough)
One sided main street.

(Ascot)
On-street parking.

5.4 Lanes

The main function of a lane in a centre is to provide a service access to buildings, such as deliveries and waste collection. The aim traditionally has been to conceal service areas from main streets and public thoroughfares. Development on land adjoining a lane (secondary frontage) should be designed to ensure buildings backing onto the lane incorporate windows at ground level and above ground level and balconies that overlook the lane to allow passive surveillance.

The design and location of lanes should support the pedestrian network, provide access and servicing areas. The use of materials and signage in the lane should be implemented to clearly show pedestrian and vehicle usage, and that although lanes are different, they are still part of the overall street network. It is important that lanes run parallel to the main street and have a straight alignment. This is to ensure visibility, safety and legibility at each end, it also reduces vehicle crossings and disruption to pedestrians and traffic flow on main streets. Redevelopment of existing lanes should include the connection of any dead-end lanes to the street network to improve access, servicing and safety.



(Redcliffe)
Pedestrian lane providing connectivity to the main street.

(Coolum)
View from a lane through to a main street. Windows overlooking lane.

(Peregian)
Pedestrian lane providing connectivity.

(Coolum)

6. Maintaining and establishing character and a sense of place

(Redcliffe)

6.1 Key sites

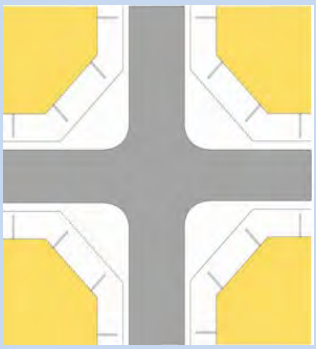
Key sites are locations within a centre that have a high degree of visibility and have the opportunity to contribute to the visual interest and character of the place taking on elements of the locational character e.g. coastal, urban, traditional or heritage etc. Key sites are often located on corners within a centre or are located at the entrance to the centre. Key sites should be carefully developed to contribute to the character and richness of the centre through the inclusion of landmark elements and careful design.

Key sites are most common on prominent and feature corners. On prominent corners, buildings must have attractive active frontage facing both directions. On feature corners, buildings will have an elevation directly addressing the corner with a door opening directly out onto it. Feature corners are often located on busy junctions where a lot of people are present both in cars and on foot. By addressing the junction directly, they create interesting space.

(Ascot)
Key Site

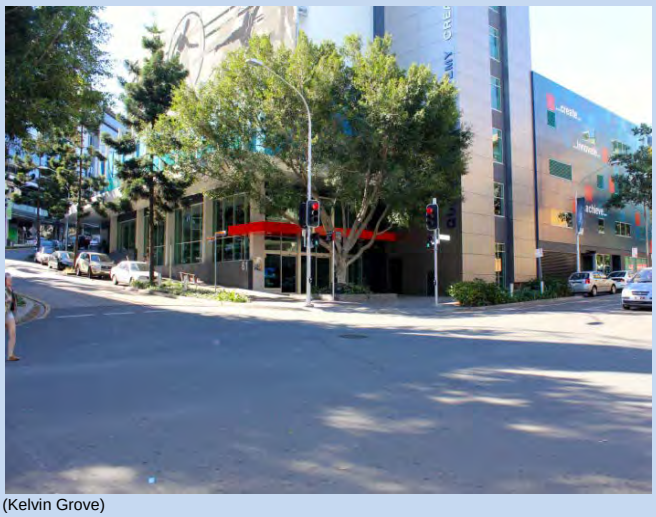
(Bulimba)
Junction

Some corner treatment forms



Junction

(Kelvin Grove)
Junction



(Kelvin Grove)
Junction

(Kelvin Grove)
Key site

(Kelvin Grove)
Junction

(Kelvin Grove)
Key site

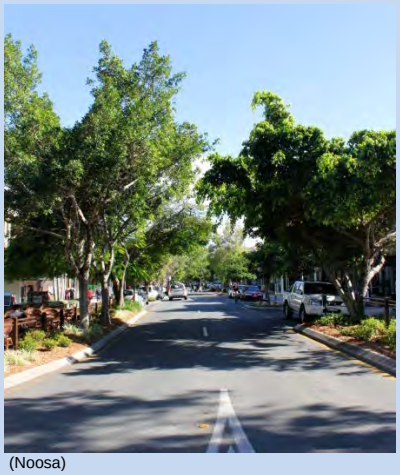
6.2 Views and vistas

A view is a range of vision. Vistas are a view seen through a boarder, for example along a narrow avenue or between a row of trees, or a distant scene or panorama. Views or vistas can be directed to water, open space, natural areas such as mountains, across a centre or to a landmark; they can be a discrete view down an alley or as grand as a city skyline. A view or vista can announce the arrival to a place or reinforce a sense of location and emphasise a sense of place. Views and vistas should align to highlight the context or surrounds of a place and to improve legibility.

Views of both the urban and natural environments should be identified and analysed before designing site layouts to take advantage of them. This is primarily achieved by maintaining the sightlines between places, preserving the ability to see a landmark as a focus of the view for example.

(North Lakes)

(Morayfield)

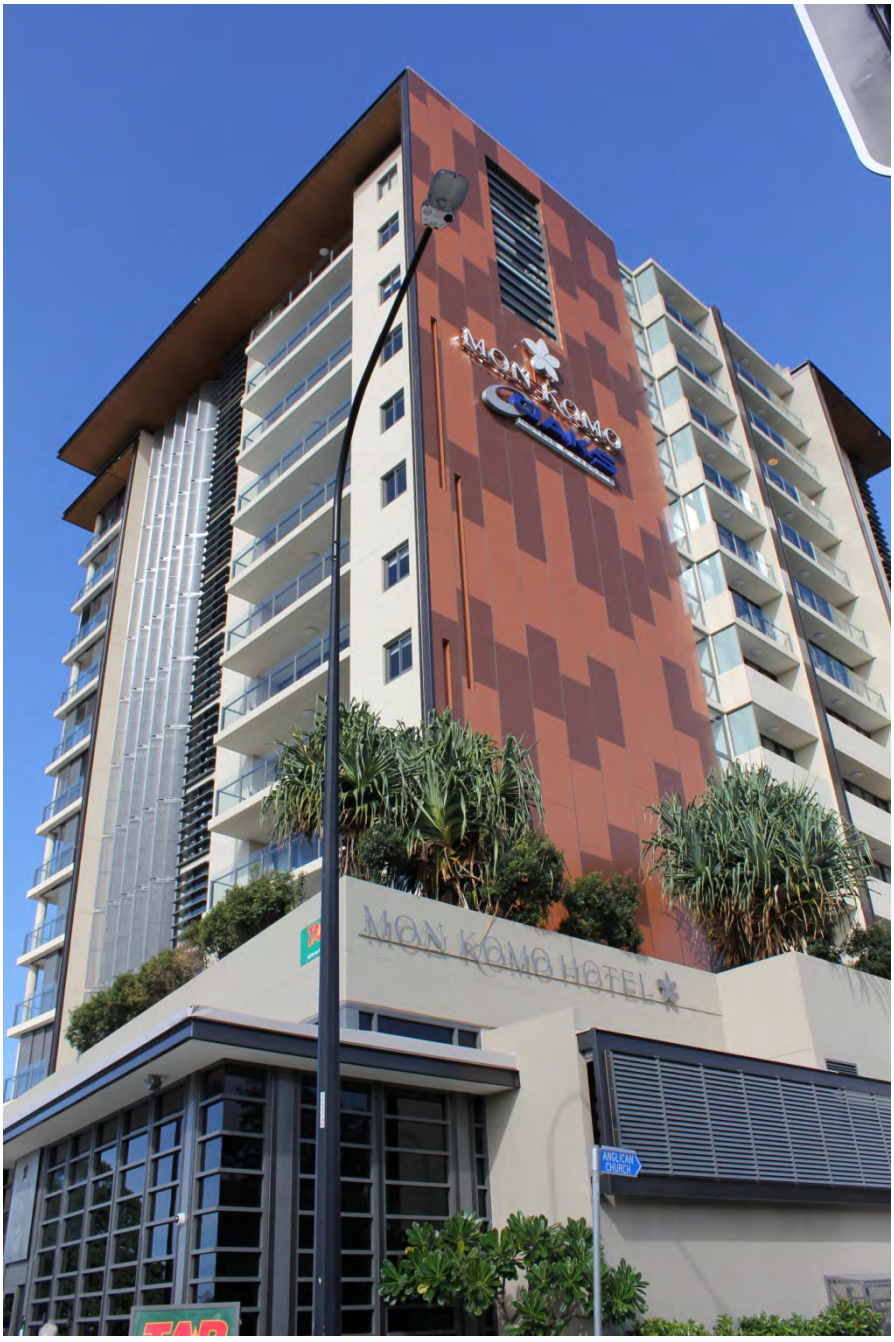


(Noosa)
View down a main street.

(Coolum)
View from a lane through to a main street.

(Buderim)
View from a supermarket through a break in buildings to the main street.

7. Urban form

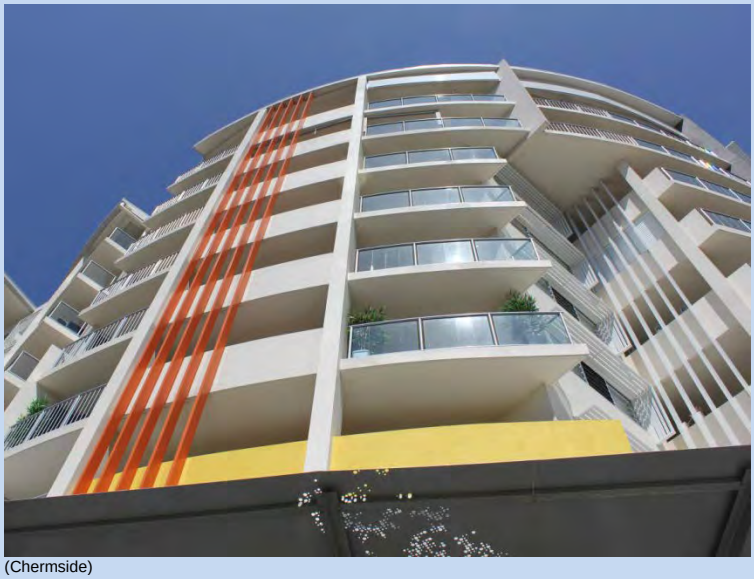


(Redcliffe)

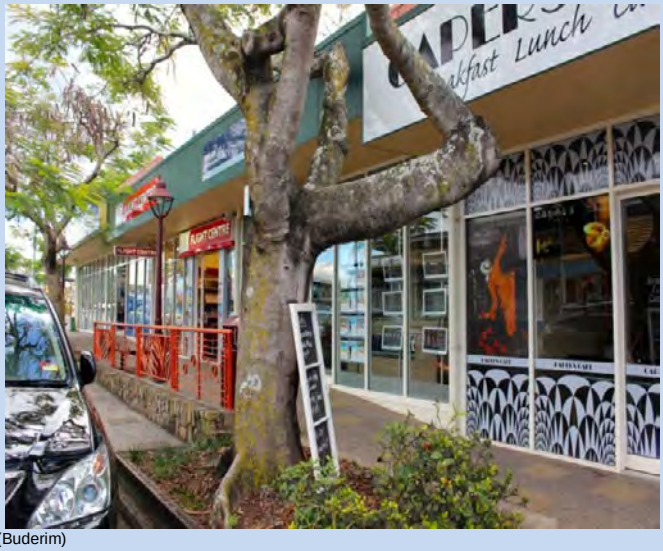
7.1 Building form and design

The design and form of buildings within a centre or neighbourhood hub needs to be carefully considered. Buildings have the ability to achieve many objective of a centre such as; adding to the character and appearance of a centre, providing pedestrian comfort, increasing the use or usability of a centre, make public spaces interesting and encourage people to stay, increase the safety (casual surveillance) of a centre as well as providing visual interest. To effectively achieve all of these objectives building design requires a number of factors to be considered with the most appropriate design response implemented, depending on the sites context. Factors to consider and examples of design responses are listed below (this list is not exhaustive):

Factors to consider	Building design response examples
Consistent building alignments and a defined public domain	Build to the street frontage, unless setbacks are required for on street dining or a public plaza or public open space.
Proportions	Vertical articulation - podiums, tall buildings provide architectural variation through a distinct top, middle and base section. Horizontal – sleeving.
Human scale	Incorporate podiums and setback taller parts of buildings, awnings.
Modulation	Breaking up the building into modules with the use of windows or balconies that are grouped or separated to create a pattern or rhythm. Ground floors are very active and are divided into modules with a width of 5-10m to be interesting for passers-by. Upper floors are viewed from further away and should be divided into modules 10-20m wide, to break up the building façade.
Active frontages at the ground floor and upper floors	Glazing, openings (doors and windows) and balconies.
Pedestrian activity and comfort	Awnings.
Avoiding large expanses of any single material. Consider maintenance, glare and heat load provided by some materials.	Building type, materials and finishes used.
Conceal service areas and equipment (e.g. lift overruns, service plants, vent stacks, telecommunication infrastructure, gutters, downpipes and signage) from primary frontages.	Screening and integration of services and equipment into the design of the building.
Emphasising important corners.	Active frontages are wrapped around corners and corner treatments applied.



(Chermside)
Variation in finishes and materials.

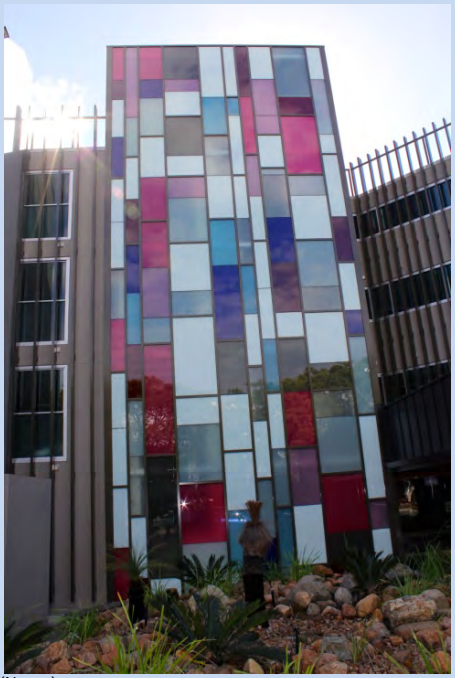


(Buderim)
Active uses and glazing.

(Maroochydore)
Top, middle, base sections.

(Buderim)
Consistent alignment at the street.

(Chermside)
Top, middle, base sections.



(Noosa)
Variation in materials and finishes.

(Kelvin Grove)
Modulation and awnings.

(Maroochydore)
Modulation and awnings.

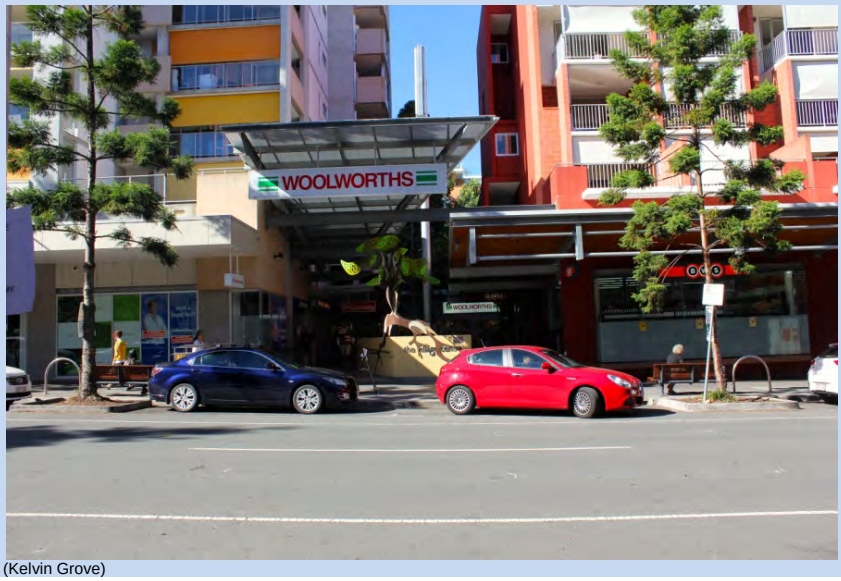
(Maroochydore)
Awning and visually interesting feature.

7.2 Integration - Shopping centres and large format uses

Traditional shopping centres conflict with the type of centres the Strategic framework and planning scheme are trying to create.

Centres under the Planning scheme	Traditional shopping centres
Diversity of activities (office, retail, entertainment, residential, community, social).	Retail with limited entertainment or community activities.
Broad spectrum of hours of operation and activity (18-24 hrs/day).	Hours of operation are limited (9am – 5pm) Insular focus, with large blank walls to external streets and a sea of at grade car parking.
Permeable environments.	Controlled movement through centre, non-permeable after hours.
Smaller compact centres offering diversity.	Large single purpose site.
Internal and external pedestrian environments.	Focus on internal pedestrian environment and external vehicular environments.
Public and active transport priorities over private motor vehicle.	Car reliant.
Reliant on connections to surrounding neighbourhoods for their success.	Poor connections to surrounding neighbourhoods.

Large format use buildings, or 'big-box' developments (e.g. shopping centres, retail stores, cinemas), are only supported in centres where the building design meets the objectives of the Planning scheme, including but not limited to activation of streets, designing for climatic conditions, mixed use outcomes and architectural design that contributes to the character of the centre. Re-development of sites within existing centres are expected to incorporate the same architectural and activity features as new developments



(Kelvin Grove)

Centre development (new and re-development of existing centres and sites) should consider the following:

integrate the internal and external layout of stand-alone shopping centres with the existing street network to improve walkability and legibility. Ensure pedestrian and cycle connections between the street network and the shopping centre are clear, direct, safe and attractive links that are well lit, with good signage and meet access requirements;

buildings should be designed to better define and enhance streets and the public domain by reducing setbacks from the street, through consistent building alignments, active frontages and streetscape elements such as awnings;

increase pedestrian access to shopping centres with entries that align with the street and existing connections filtering out into the surrounding neighbourhood. Pedestrian entries should be highly visible, connected to the public domain and easy to find; design pedestrian entrances, pathways and way finding signage to improve access, orientation and connections to and within the centre. This includes signage to direct visitors to transport, public buildings, other services and points of interest outside the centre;

enhance the look of new or existing large format buildings, by including smaller tenancies (sleeving) with active uses (retail, restaurants, cafes etc) to foster and increase activity. This will usually result in big-box uses being located mid-block or on upper levels;

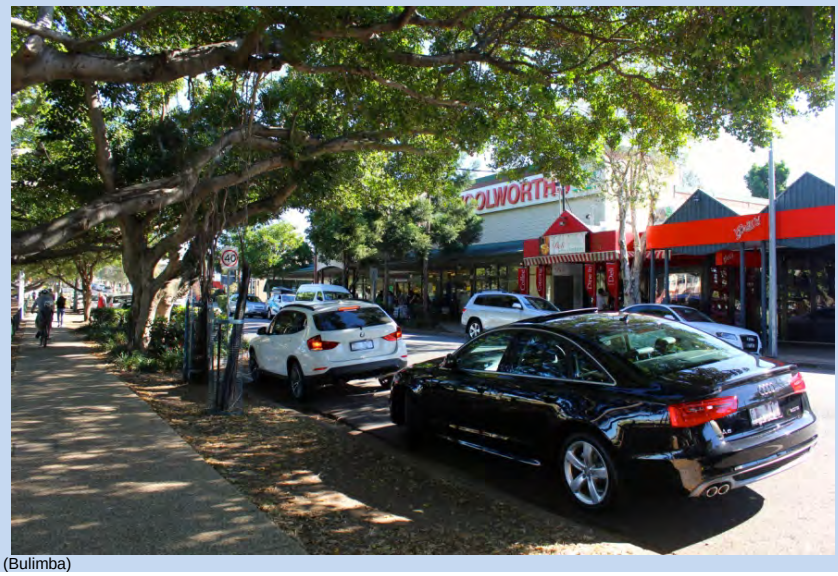
new development can create a transition between the shopping centre, the street and surrounding neighbourhood with the inclusion of both enclosed and open-air shopping areas;

incorporate active frontages to facilitate natural surveillance of footpaths, bus stops and taxi ranks. Avoid long expanses of blank walls along street frontages or other public areas;

provide a diverse range of tenancy sizes, uses and activities with a variety of open hours or peak periods of activity to be located within or close to the shopping centre, orientate intensive and extended-hour uses towards the street and around public spaces to ensure these areas around the centre have natural surveillance day and night;

utilise the roof above large format uses, to contribute to the mix of uses e.g. commercial suites, childcare centres or rooftop parking;

(Ashgrove Ave, Ashgrove)


(Bulimba)

(Ascot)

capitalise on well-designed public spaces that blend with the shopping centre designed to create a sense of place. These spaces will encourage shoppers to linger and interact. These spaces should be of a high standard and include landscaping, wide footpaths with high quality paving and plenty of street furniture such as seating, bicycle racks and bins;

provide end of trip facilities (e.g. bicycle parking) close to shopping centre entries;

service areas including loading and delivery areas, storage and loading bays are located away from public spaces, streets and housing;

large format uses are to be co-located within centres in proximity to other main attractions, shopping streets and public transport to reduce the need for large expanses of car parking, to reduce the number of vehicle trips, the number of car parking spaces needed and vehicle travel time.

(Ascot)

8. Activity and street elements

(Noosa)

8.1 Walkable – prioritising pedestrians and cyclists

Walkability is an important feature of successful centres. Walkable centres are generally defined by their:

a) connected/permeable pattern of public and private spaces;
b) mix of activities that provide opportunities for multi-purpose trips;
c) an attractive and interesting journey;
d) safe, navigable and attractive walking environments.

(Coolum)

Developments within centres should incorporate the following:

consider details such as directness, lighting, shade, places to stop and rest, landscaping, pavement and direction signs;

a mix of uses near each other such as shops, childcare centres, parks, public transport interchanges and community facilities to encourage multi-purpose trips;

safe places for people to walk and cycle, by ensuring public areas are overlooked by buildings and have clear sightlines, good lighting and are activated;

stimulating and attractive routes with a variety of path types, lanes, arcades, share ways or promenades to increase choice, enrich the urban experience and encourage repeated use;

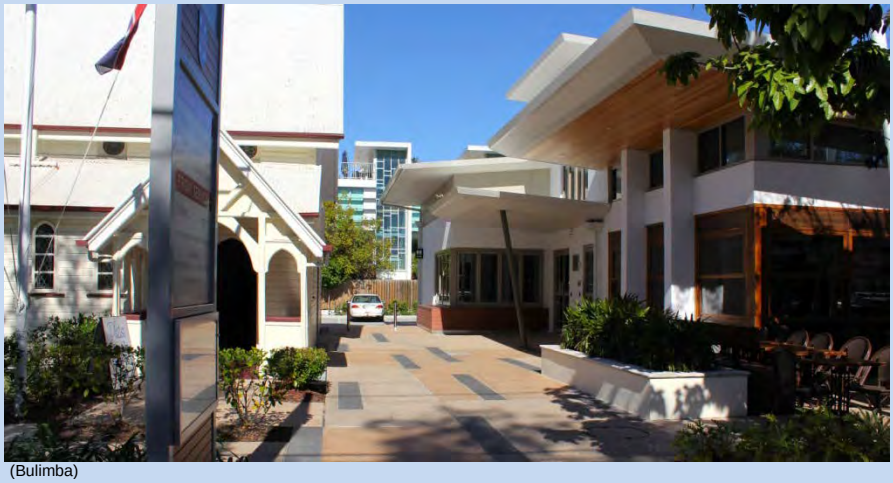
clearly located end of trip facilities;

access points to cater for all users, including; older people, children and people with disabilities;

emphasise public transport hubs in the design of a centre and make public transport an easy option for commuter through signage, lighting and safe direct routes between destinations and the public transport hub.


(Coolum)


(Kawana)
Easy to access end of trip facilities.


(Bulimba)
Pedestrian access to rear car park


(Maroochydore)

8.2 Public parks, squares and plazas

Successful centres create opportunities for social interaction. Parks, squares and plazas are important in the context of centres and neighbourhood hub's as they provide a focal point for this social interaction.

Parks, squares and plazas:

a) are often the defining feature of a centre and their quality and success draw people from a vast catchment. A busy square in a centre often symbolises a successful centre;
b) range in size, form, function and setting.
c) have local economic benefits by increasing property values and the success of businesses that use their proximity to the space wisely.

The success of a park, square or plaza within a centre is often defined by the buildings and activities that frame the space. In this regard it is important to ensure that buildings and activities fronting these spaces invite people to spend time in the space. For example a square is the ideal place for outdoor dining, away from the noise of busy roads. People in restaurants and cafes spilling out into the square will make the square a more exciting place to be. The edges of a public square are also important for people to stop and see what is happening and have more protection from inclement weather. The buildings around the edge of these spaces must be interesting and encourage people to linger outside, providing places and reasons to stop.

(Peregian)

The design and location of parks, squares and plazas within centres or development adjoining a park, square or plaza should include the following design elements:

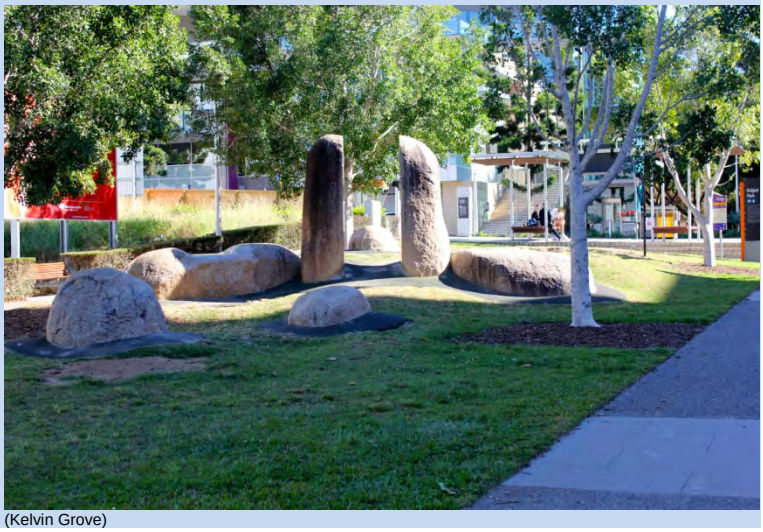
parks, squares and plazas within a centre should be located near transport nodes or public buildings (e.g. libraries or places of worship);
park and squares should provide a high standard of amenity and safety for visitors, with well-designed street furniture, shaded areas and lighting;
include multiple attractions and activities within or adjoin parks and squares to appeal to a wide range of people throughout the day and night (e.g. outdoor cafes, places to sit, fountains, playgrounds and artworks);
parks and squares should have an element of flexibility to host other activities (e.g. markets and festivals) this includes the provision of power, loading and temporary storage areas etc;
the edges of parks and squares should be activated (e.g. outdoor dining), especially at ground floor as spill out onto public spaces will add vitality and provide passive surveillance during the day and night;
parks and squares should be framed through strong building definition and addressing the public space. Buildings that front onto and overlooking parks and squares should incorporate openings, such as balconies and terraces to allow passive surveillance and improve internal outlook;
parks and squares should be easy to access for all abilities. Access can be improved with short distance road crossings, that are well marked, the availability of public transport etc;
ensure outdoor dining areas have a high standard of amenity, landscape, and outlook, solar access in winter and shading in summer and are not adversely affected by traffic through the use of traffic calming measures.

(Coolum)

(Peregian)

(Kelvin Grove)

(Noosa)



(Kelvin Grove)

(Kelvin Grove)

8.3 Active frontages and orientation

An active frontage is a concentration of activity or goings-on at the front of a site or building, adjoining a public area such as a street or park. Active frontages make a public space interesting and encourages people to linger and stay. To be an active frontage, many elements must be combined to ensure the space is interesting, inviting, walkable and safe. A key component to active frontages is the use itself, activities such as shops, small offices and cafes promote the most active street fronts. Residential buildings can also activate the street by providing a clear address, direct access from the street and direct outlook over the street.

Generally, buildings in centres, where active frontages are highly desirable, should be built to align with the street as a way of reinforcing the urban character and improving pedestrian amenity and activity at the street level. In some cases, buildings could be setback from the street alignment to create a square or a forecourt or to provide outdoor dining. Where an existing building is being utilised it is important to orientate the use or activity towards the street and/or public space to contribute to the level of activity in the public place. This can be achieved by ensuring the access is clear and welcoming with direct footpaths, landscaping, outdoor dining, and even incorporate streetscape elements such as artwork and street furniture.

(Noosa)


(Buderim)

Development or re-development within a centre should incorporate the following design and activity features:

active ground-floor uses are best located at the same general level as the footpath where they are directly accessible from the street;

the use of clear glazing in building fronts for all non-residential ground-floor uses will increase passive surveillance and add to the sense of street activity;

building frontages are to orientate and run generally parallel to the street alignment or public open space they adjoin;

building design and form should be carefully considered and include appropriate design responses to facilitate active frontages as previously discussed;

provision of a clear street address and direct pedestrian access from the primary street front for all residential developments;

multiple entrances for larger developments including at least an entrance per street frontage;

a 'fine grain' of uses and smaller tenancies that will allow for a greater diversity in activities and add to the character, such as smaller retail spaces, 'hole in the wall' shops/cafes, temporary stands, pop-up retail, performance spaces and other innovative uses of space.


(Coolum)


(Kelvin Grove))

(Kelvin Grove)


(Kelvin Grove)


(Ascot)

(Ascot)

(Bulimba)


(Noosa)

8.4 Crime prevention through environmental design (CPTED)

The aim of CPTED is to make the design of the built environment within centres safer and encourage user confidence. There are a number of things to consider when designing for safety and crime prevention.

(Bulimba)
Rear car parking area over looked by dwellings.

Development and re-development within a centre should include the following design outcomes:

buildings and spaces are to be designed to allow for passive surveillance of public areas to reduce the likelihood of crime. Improving an area's safety can promote user confidence, leading to higher pedestrian activity and improved economic viability of a centre;

provide activity and surveillance throughout the day and night by incorporating a mix of uses that extend the opening hours of the centre;

incorporate residential uses in to centres;

provide a high degree of legibility in the centre, especially for pedestrians and cyclists. This can be achieved through highly-visible public spaces, maintaining view corridors and sightlines, ensuring spaces are well lit at night, and have a clear pedestrian network;

clearly define where private and public spaces meet to differentiate ownership and promote the safety of all users of the built environment. It is noted that there is a balance between privacy and allowing for passive surveillance to ensure safety in public areas.

(Kelvin grove)
Residential uses in centres.

(Noosa)
Outdoor dining increases activity at the street at night.

8.5 Water sensitive urban design (WSUD)

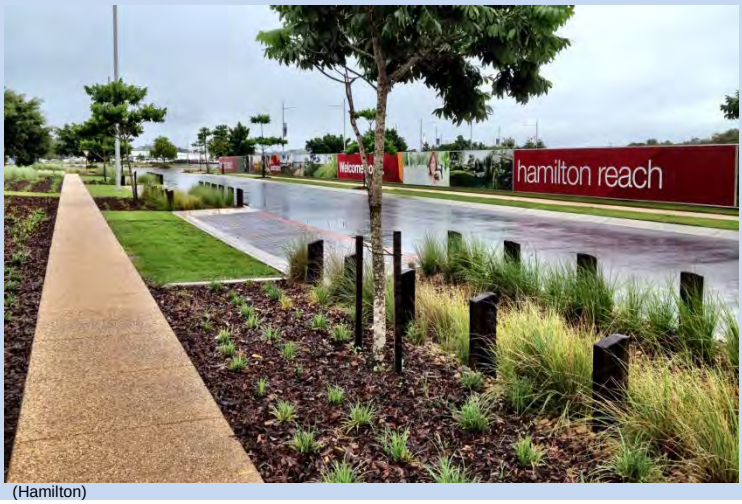
Water Sensitive Urban Design (WSUD) is a multi-disciplinary approach to water management and restoring water balance in the urban environment. It incorporates water infrastructure, landscape design and built form that is more sympathetic to natural hydrological and ecological processes.

Urban development reduces the areas in catchments where water can filter and seep into the soil. This leads to increases in the volume and velocity of stormwater flows, which in turn results in erosion of downstream waterways and increased levels of pollutants released into natural waterways.

WSUD reduces these impacts as it captures stormwater flows for re-use, controls stormwater release into the water cycle and filters pollutants. This can help reduce demand for potable water through water re-use and also protect and enhance natural water systems. Additionally, WSUD elements such as bioswales, detention basins, rain gardens and permeable pavement materials can be included in the built environment to create public open spaces that also beautify the area.

In centres WSUD should be integrated into the streetscape, public and private places. New devices such as tree pits and rain gardens can be used to irrigate vegetation within centres whilst reducing the quantity of flows and improving the quality of run-off into rivers and streams.

For further information on water sensitive urban design measures refer to Planning scheme policy – Integrated design.



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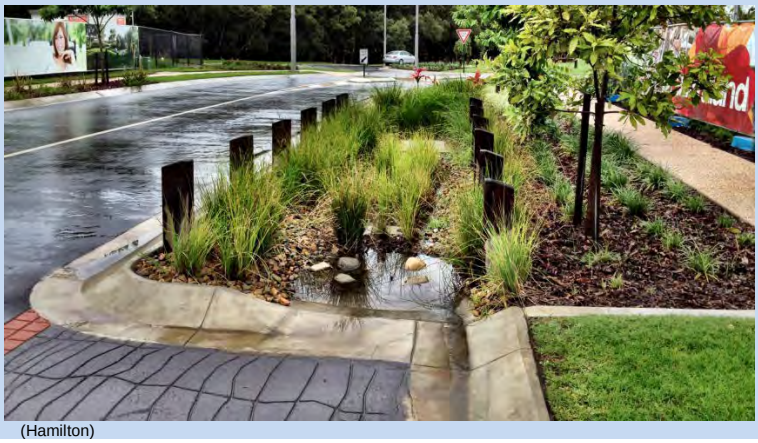
(Hamilton)


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8.6 Mixed use

A diverse mix of uses is essential in delivering a successful centre (excluding specialised centres). The compactness and diversity of uses in centres can significantly reduce the number and distance of trips dependent on private motor vehicles. Effective mixed use centres create opportunities for people to conduct one trip to cater for multiple purposes (i.e. shopping, banking, libraries, entertainment and dining). Effective mixed-use centres provide the opportunity for people to access these centres without the need for a private motor vehicle, through integrated public and active transport networks and the location of residential living options throughout and surrounding a centre.

Centres with a diverse mix of uses can also provide more opportunities for social interaction, improved safety and economic and social diversity that lead to greater economic resilience. The appropriate mix of uses can vary from centre to centre and is dependent on the location or context, market demand and the scale of development.

Mixing uses may be achieved vertically, in a mixed use building (such as providing offices or residential space over retail uses) or horizontally along a street. The planning scheme focuses on vertical mixing of uses as a preferred option as it is more likely to increase activity through the day and night, is more resource efficient and can improve passive surveillance of the public domain.

(Cotton Tree)

When developing or planning for mixed-use the following design outcomes should be achieved:

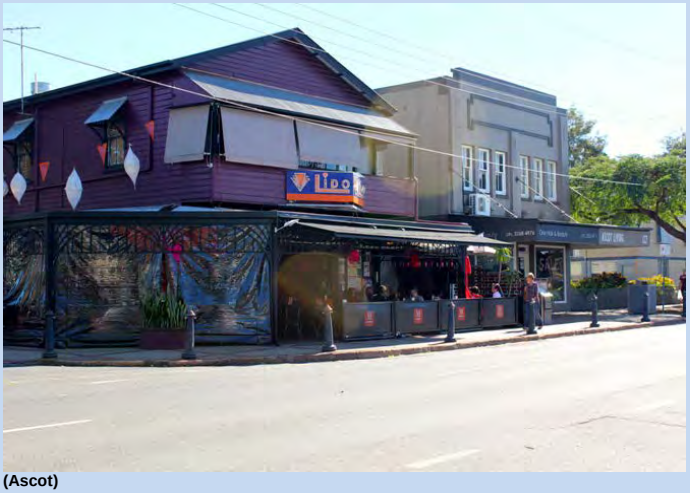
the day-to-day needs of the local community should be provided for. Providing what is an appropriate mix of community facilities including health care, social services and cultural spaces for the particular centre;

higher order and district centres should include residential uses in centres, including Dwelling units (live-work buildings), to increase safety and activity during the night;

entries to residential uses should be distinguishable from retail and commercial uses, including separate pedestrian entries from vehicle entries that are accessible from the street and other public areas;

uses that extend activity within centres after hours and on weekends add diversity, activity and casual surveillance.

(Buderim)



(Ascot)

(Maroochydore)

Mixed use buildings with separate residential entrance

(Cotton Tree)

(Maroochydore)

(Ascot)

(Kelvin Grove)

9. Transport access and parking

(Redcliffe)

9.1 Car parking

9.1.1 On-site car parking

Car parking needs to be carefully considered to ensure it does not prevent the achievement of compact, active and walkable centres. Centres rely heavily on the appropriate (not necessarily high) number of car parking spaces and the careful location and design of car parking areas. On-site parking includes those located underground (basement), those at ground level (at-grade) and in multi-storey buildings or roof tops. Four possible design solutions for on-site car parking areas are discussed below:

a) At-grade parking:
At-grade parking should be located to reduce negative impacts on the streetscape by maintaining active uses at the street and areas of public realm. Therefore at-grade car parking areas should be located to the rear of the site, away from the street frontage. At-grade parking should be well screened and landscaped with plantings between parking bays to provide screening and improve the appearance as well as reduce heat loads from the car park surface and reflectivity from cars. Access to on-site parking from rear service lanes or side streets should be provided so as to avoid interrupting pedestrian flows on the main street.

b) Underground and semi-underground parking:
Underground and semi-underground parking reduces the visual impact of car parking and is a more efficient use of the site as the surface area can then be used to increase gross floor area and public open space areas such as parks, squares and plazas.

c) Multi-storey or roof top car parking:
Multi-story or roof top car parking reduces the visual impact of car parking and is a more efficient use of land compare to at-grade parking for example.

(Kawana)
Keep 'back of house' areas tidy.

(Cotton Tree)
Clustered/shared car park.

(Coolum)
Rear parking with connection through to main street.

(Coolum)
Access to rear car park from main street.

(Coolum)
Access to main street from rear car park.

(Coolum)
Car parking area at rear.

(Kawana)
Screen at grade parking with landscaping to reduce visual dominance.

(Maroochydore)
At grade and multi-storey parking located behind the building.

(Maroochydore)
Screened at grade parking.

(Ascot)
Using slope to reduce the visual dominabce of at grade parking.

(Buderim)
Car aparking at the rear allows for a continuouse active frontage and pedestrian safety.

(Bulimba)
Shared driveway providing access to shared car parking area at the rear

(Bulimba)
Car aprking and serivicing area at rear.

9.1.2 Reduction measures for on-site parking numbers

In order for development to provide parking below the specified minimums set in the planning scheme a reduction should only be considered when coupled with a demand reduction measure as described below:

a) Shared parking:
In mixed use centres there are opportunities to share car parking between uses with different peak trading times. The advantage of shared parking facilities is that they are more efficient. Each space can be used more hours during the day, week or month. There are no significant operating and management constraints to preclude the development of shared parking facilities. However, a number of factors must be considered to ensure efficient design, operation and management of shared parking facilities. These include local peak times of demand, availability of access by a number of different users, clear information about appropriate use and availability, and a good pedestrian (or public transport) access between the facility and the destination it serves. In order for this to be accomplished land owner cooperation is essential as it often requires easements. Careful design of car parking areas should allow for breaks in fencing, landscaping adjoining side and rear boundaries to accommodate shared parking.

b) Unbundled parking:
Unbundled parking refers to the strategy of separating the costs of purchasing or leasing residential and commercial property from parking resources. For example, in a medium density residential development, dwellings may be purchased separately from the car park. This “unbundles” the cost of parking from the cost of living and supports the principle of consumer choice. For example, unbundled car-parks associated with residential development in centres can cost an additional 20-25% of the total purchase price of small dwellings.

c) Green Travel Plans:
Green travel plans are a management tool designed to assist all types of developments (particularly commercial and residential) reduce travel demands associated with various types of everyday trips such as the journey to work. Travel plans help to address issues affecting how people choose to travel, such as company cars and free parking in commercial environments. In many situations some changes may catalyst large reductions in vehicle use, including, parking car cash-out provides commuters who normally receive free parking to take cash instead, PT passes – involves providing employees or new residents with a substantial public transport pass in place of a car park, provisions of transport information and personalised travel planning services for new residents or employees and end of trip facilities for cyclists, including showers and locker. Travel plans thus support other parking strategies undertaking a detailed assessment of the barriers to shifting mode. It is important to realise, however that the motivation to conduct travel plans is best provided by the accurate realisation of the costs associated with vehicle travel. For this reason, the use of travel plans is expected to increase when the perceived value of parking reflects its underlying costs.

The below table outlines the indicative impact the above demand reduction measures will have on the specified parking minimums:

Demand reduction measure	Indicative reduction
Shared parking	Every 4 spaces shared with another use reduces required provision by 1 space.
Unbundled parking	For every 2 spaces unbundled, the minimum provision can be reduced by 1 space up to a maximum reduction of 20%.
Green travel plans	Provision of satisfactory green travel plan can reduce the minimum parking requirement up to a maximum of 15%.
Motorcycle parking	A motorcycle space can replace 1 car space up to 15% of the parking requirement.
Bicycle parking	Every 2 additional bicycle spaces (above minimum required) offsets 1 car space, up to 15% of the minimum parking requirements.

9.1.3 On-street parking

In the design and development of new centres and neighbourhood hub's on-street parking should be integrated into the overall design of the street. Refer to street types in Planning scheme policy – Integrated design for cross sections. On-street car parking is popular and convenient for retail and essential services. It can benefit local businesses and is likely to be well used at all times. Poorly designed on-street car parking can look unattractive, be visually intrusive and make an area less pleasant for pedestrians.

On-street car parking can be used to slow traffic, provide a protective buffer between pedestrians and moving vehicles, and add activity to the street. On-street car parking in centres can reduce demand for on-site parking and pressure on small sites and businesses to provide parking on their premises.

In designing a centre or neighbourhood hub the following should be considered:

a) provide parallel parking on all streets through and surrounding centres as it is the most legible for vehicles and pedestrians. Other types of parking layouts may be suitable on some streets;
b) reduce the visual impact of on-street parking by breaking a line of cars with kerb build-outs for landscaping, street furniture, outdoor dining or street trees;
c) improve on-street car parking efficiency with clearly marked parking spaces on the road or with changes in pavement material.

(Redcliffe)
Parallel parking

(Kawana)
Clearly mark parking spaces on the road or utilised changes in pavement material.

(Cotton Tree)
Breaking a line of cars with kerb build-outs for landscaping, street furniture, outdoor dining or street trees.

9.2 Access, driveways and loading

To establish walkable centres, where the pedestrian is prioritised the location, size and design of vehicle access and loading areas needs to be carefully considered.

Vehicle crossings over footpaths can disrupt pedestrian movement and threaten safety. The design of vehicle access to buildings also influences the quality of the public domain. Overly wide vehicle access points detract from the streetscape and limit the active use of street frontages. The design and location of vehicle access to developments should minimise conflicts between pedestrians and vehicles on footpaths, particularly along pedestrian priority places. There should also be the least visual intrusion and disruption of the streetscape, and no disruption to the function of major roads.

The design of developments within centres should carefully consider the size and quantity of vehicle and service crossings within the centre as well as what is required for their development to maintain pedestrian movement and streetscape continuity, and reinforce a high-quality public domain. Vehicle access from lanes and minor streets should be maximised wherever possible, preserving continuity of the streetscape and prioritising pedestrian movement and safety and minimising impacts on major roads. Where vehicle entry points must be via a main street the crossover must be integrated into building design to reduce their impact on the streetscape and public domain. For this same reason combining or sharing vehicle access points is encouraged in centres. Front loading bays, contained within the road reserve may be considered in some locations to service small tenancies.

The design and location of driveways including drive thru facilities should not run parallel to the street frontage, instead they should be located mid-block (not on a corner) and run behind the building.

(Kawana)
Combine vehicle access points for adjoining buildings.

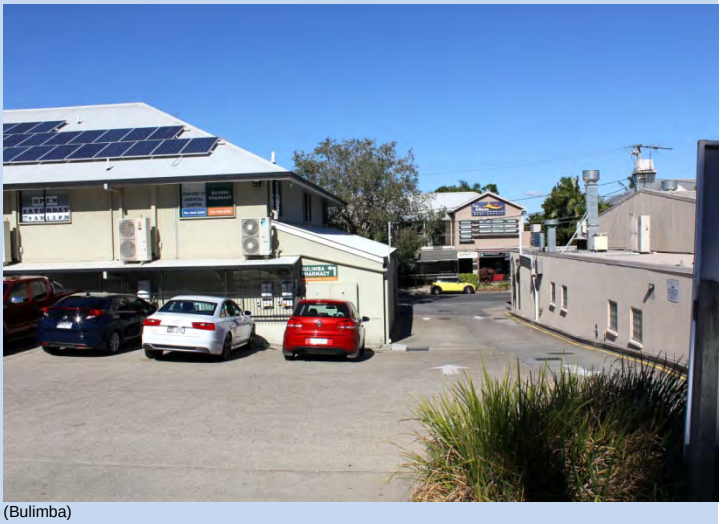
(Maroochydore)
Shared driveway to rear servicing area.

(Caloundra)
Drive through running behind the building not along the street frontage.

(Caloundra)
Drive through running behind the building not along the street frontage.

(Coolum)
Drive through running behind the building not along the street frontage.

(Coolum)
Drive through running behind the building not along the street frontage.



(Bulimba)
Single driveway to shared rear car parking and servicing area.

(Redcliffe)
Reduced vehicle crossovers maintain an uninterrupted active frontage.

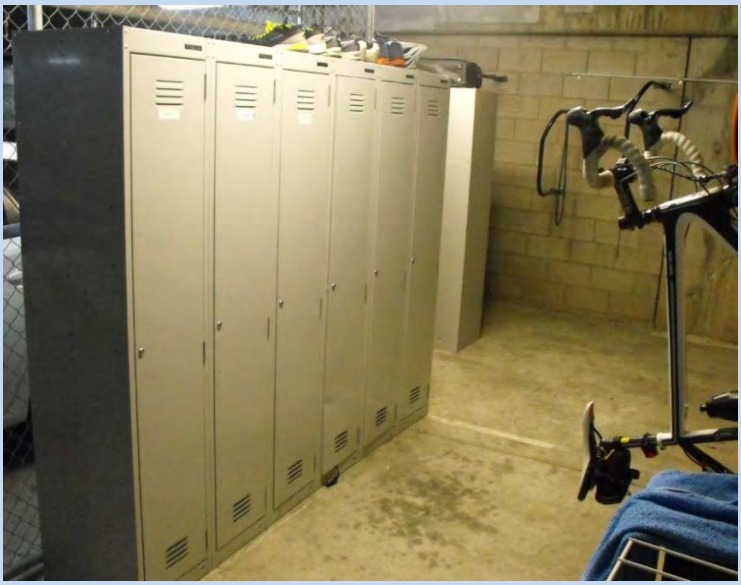
9.3 End-of-trip facilities

End-of-trip facilities are broadly described as dedicated places that support people using non-motorised ways to travel to and from their destination rather than driving a car or relying solely on public transport. They include an area to park and secure bicycles, and provides lockers and change rooms where cyclists, joggers and walkers can shower, change and securely store their belongings.

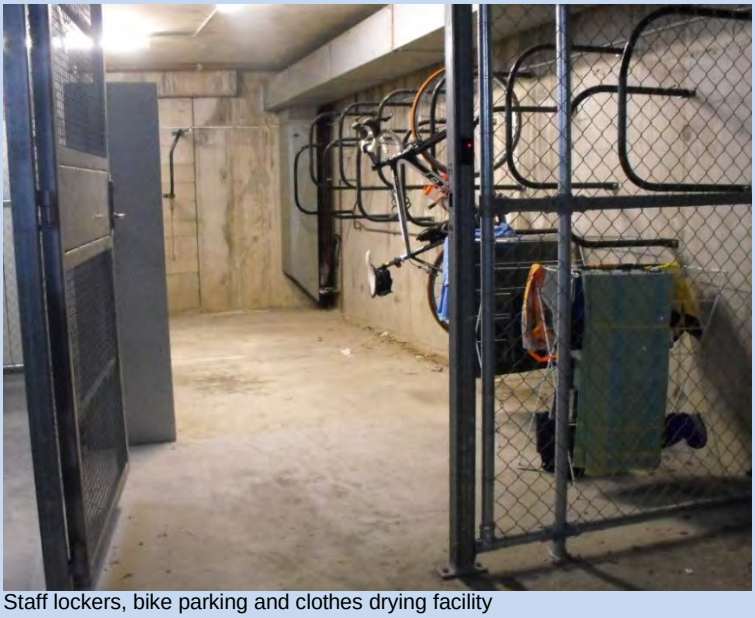
Providing end-of-trip facilities encourages people to use non-motorised transport options and promote a healthy, more active population. End-of-trip can also support transport options by increasing cycling and walking trips, thereby reducing reliance on cars.

Studies indicate that building owners and tenants can also expect significant benefits from providing end-of-trip facilities for workplaces. This can include a healthier workforce, increased staff well-being, higher productivity, an improved corporate image and reduced demand for car parking.

The end-of-trip facilities, as prescribed in the MBRC Planning Scheme, should be easily accessible to users so that it is located either within the building or on-site within 100m of a main entrance to the building.



Staff lockers



Staff lockers, bike parking and clothes drying facility

Staff lockers and staff facilities

10. References / Resources / Acknowledgements

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Planning Scheme Policy
Environmental Areas and Corridors

For State Approval - Major Amendment 1 - December 2017

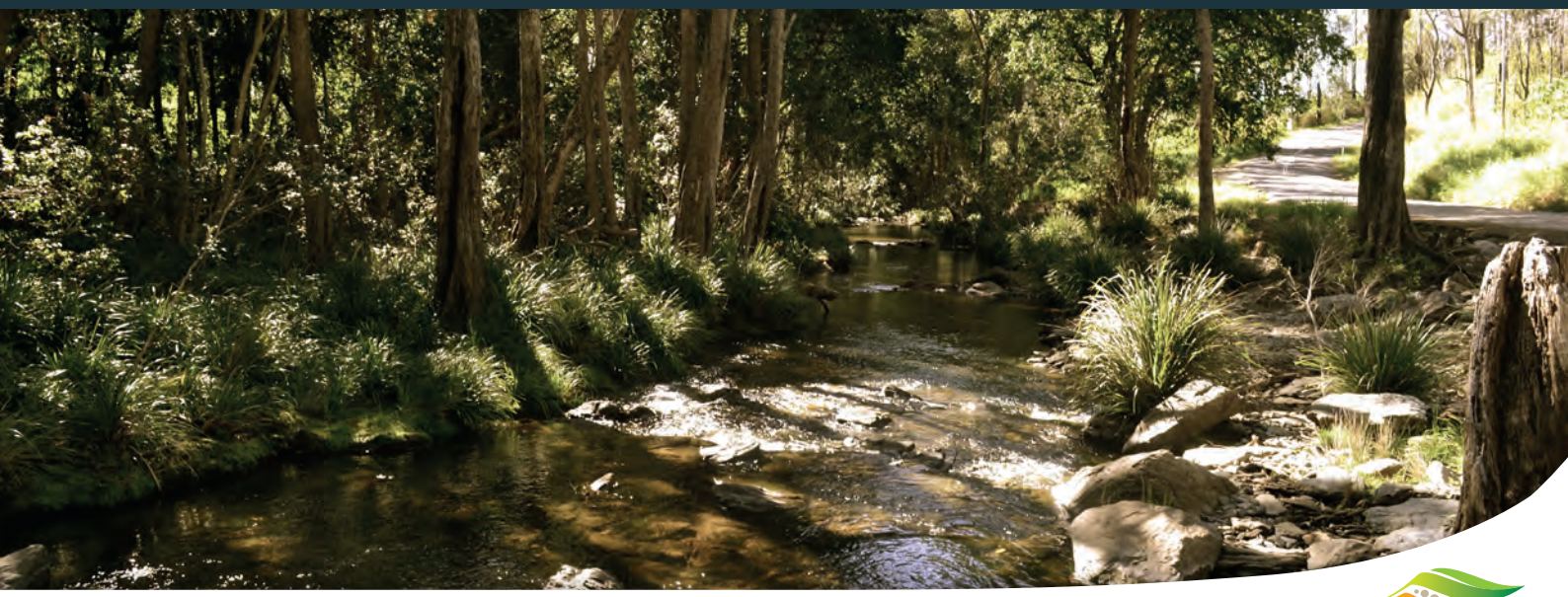


Table of amendments

Date of adoption and effective date	Planning scheme policy version number	Amendment type	Summary of amendments

Planning scheme policy – Environmental Areas and Corridors

Table of Contents

Adoption

Moreton Bay Regional Council adopted this planning scheme policy 24 November 2015.

Commencement

This planning scheme policy took effect 1 February 2016. Amendments to this planning scheme policy are included at **Table of Amendments** (inside front cover)

1. Introduction

This planning scheme policy supports the Moreton Bay Regional Council Planning Scheme and has been made by Council in accordance with Chapter 3, Part 4, Division 2 and Part 5, Division 1 of the *Sustainable Planning Act 2009*.

1.1 Purpose

This planning scheme policy:

a) outlines information Council may require for the assessment of a development application;
b) provides guidance and advice for the achievement of outcomes of the Environmental areas overlay assessment criteria;
c) provides guidance and advice for developers and decision makers on how development can achieve high quality development design outcomes; and
d) provides guidance and advice for counterbalancing environmental values where permitted as a last resort, through the use of environment offsets.

1.2 Application

This planning scheme policy applies to development applications (code and impact assessable development) for land mapped by the:

a) Environmental areas overlay;
b) Environmental offset receiving areas overlay.

This planning scheme policy also informs development affecting **habitat trees** on land not mapped by the above overlay maps.

1.3 Interpretation

Terms used in this planning scheme policy are defined in Schedule 1 – 1.2 Administrative definitions. Additional terms are also detailed in Section 0 - Glossary.

2. Environmental Areas

Moreton Bay region contains outstanding environmental areas including a diverse range of ecosystems across terrestrial, wetland, waterway, and coastal areas. Thousands of plant, animal, and fungi species have been recorded in the region, including many threatened species.

Environmental areas are important ecological landscapes vital to protecting and maintaining the health and ***resilience*** of ***biodiversity*** within the region, and for the ongoing provision of ***ecosystem services*** to our community. Environmental areas support wildlife breeding and refuge and describe a range of habitat types from ***native vegetation***, wetland, and coastal areas to places with scattered vegetation which wildlife use to forage, move through, breed and shelter.

2.1 Elements of the Environmental Areas Overlay

The Environmental areas overlay represents, where spatially possible, the Moreton Bay region's most environmentally important areas recognised as Matters of National Environmental Significance (MNES)[1], Matters of State Environmental Significance (MSES) and Matters of Local Environmental Significance (MLES).

2.1.1 Matters of State and Local Environmental Significance

Matters mapped under the Environmental areas overlay map include State and Local matters and are classified into one of two main categories: ***High Value Areas*** or ***Value Offset Areas***.

High Value Areas represent high value environmental matters of State or Local significance. These matters are to be protected from development impacts and cannot attract offsets under this planning scheme.

Value Offset Areas represent valued environmental matters of State or Local significance where offsets may be allowed if values cannot be avoided or mitigated. For further information on MSES offsets please refer to section 1.14, and for MLES offsets please refer to section 1.15.

A full list of individual MSES and MLES mapped values contained within the Environmental areas overlay map is provided below.

HIGH VALUE AREAS	
Matters of State Environmental Significance	
Matters of State Environmental Significance (MSES)	The State Planning Policy 2017 defines matters of state environmental significance and includes the following: • Protected areas (including all classes of protected area except coordinated conservation areas) under the *Nature Conservation Act 1992.* For example - National Parks and Nature Refuges. • Marine parks and land within a 'marine national park', 'conservation park', 'scientific research', 'preservation' or 'buffer' zone under the *Marine Parks Act 2004.* • Areas within declared fish habitat areas that are management A areas or management B areas under the Fisheries Regulation 2008. • Threatened wildlife under the *Nature Conservation Act 1992* and special least concern animal under the Nature Conservation (Wildlife) Regulation 2006. This includes koala habitat and migratory bird habitat (taking in Ramsar sites). • Regulated Vegetation under the *Vegetation Management Act 1999* that is: - Category B areas on the regulated vegetation management map, that are 'endangered' or 'of concern' ***regional ecosystems***; or - Category C areas on the regulated vegetation management map that are 'endangered' or 'of concern' regional ecosystems; or - Category R areas on the regulated vegetation management map; or - areas of essential habitat on the essential habitat map for wildlife prescribed as 'endangered wildlife' or 'vulnerable wildlife' under the *Nature Conservation Act 1992*; or

[1] MNES – Please refer to the *Environment Protection and Biodiversity Conservation Regulations 2000* (Commonwealth)

	- regional ecosystems that intersect with watercourses identified on the vegetation management watercourse map; or - regional ecosystems that intersect with wetlands identified on the vegetation management wetlands map. • Wetlands in a wetland protection area or wetlands of high ecological significance shown on the Map of Referable Wetlands under the Environmental Protection Regulation 2008. • Wetlands and watercourses in high ecological value waters as defined in the Environmental Protection (Water) Policy 2009, schedule 2. • Legally secured offset areas managed by the Queensland Government. Mapping consists of: MSES mapping version 4.1 Additionally, the *Environmental Offsets Regulation 2014* designates ***non-juvenile koala habitat trees*** as a matter of state environmental significance where they occur in areas of bushland habitat under the *Planning Regulation 2017*.
Matters of Local Environmental Significance	

Matters of Local Environmental Significance (MLES)	MLES include environmental values, important to achieving local environmental outcomes and that are not already mapped as MSES. Mapped MLES areas may contain shorebird habitat areas, biodiversity planning assessment mapping, strategic green corridors and mapped local environmental offsets.
	
	Mapping consists of:
	• **Shorebird Habitat:** Shorebird Habitat Mapping Project for MBRC by Queensland Wader Study group and Jill Dening, 2009.
	• **Biodiversity Planning Assessments:** generated using the Biodiversity Assessment and Mapping Methodology produced by EHP. 'State habitat for EVR taxa' values have been removed from this dataset.
	• **Local conservation agreements:** Vegetation protected in through local conservation agreements such as covenants and approved local offsets.
	• **Local area green networks:** Strategic green networks developed from MBRC Local Development Area Plans. Local Development Area Plans exist over parts of:
	  • Narangba
	  • Morayfield
	  • Burpengary
	  • Joyner

MLES Wetlands	MLES wetlands include locally significant wetlands not already identified by MSES. Mapping consists of Locally important wetlands identified through the State Wetland Management Area mapping.
VALUE OFFSET AREAS	
Matters of State Environmental Significance – Koala Offsets	
MSES - Koala Offsets	The *Environmental Offsets Regulation 2014* designates non-juvenile koala habitat trees as a matter of state environmental significance where they occur in bushland habitat or high or medium rehabilitation areas under the *Planning Regulation 2017*. MSES - Koala Offsets are areas within: • the Priority Koala Assessable Development Area that are mapped as High or Medium Value Rehabilitation Areas on the SEQ Koala Habitat Values Map. • the Koala Assessable Development Area that are mapped as High or Medium Value Rehabilitation Areas on the SEQ Koala Habitat Values Map. • the Koala Assessable Development Area that are mapped as Bushland Habitat Areas on the SEQ Koala Habitat Values Map and within the SEQ urban footprint.
Matters of Local Environmental Significance – Waterways Buffer	
	Land adjacent to waterways requires special management to safeguard water quality, water dependent ecosystems and fish habitats. Where native ***vegetation clearing*** is proposed within an MLES waterway buffer (100m, 40m and 20m) and the clearing is

MLES Waterways buffer	not exempt, a legally secured environmental offset is required to ensure water quality outcomes for waterways are achieved. Mapping consists of: • 100m buffer to (W1) - Major freshwater streams and estuaries of high ecological value within the MBRC determined hydrological network. • 40m buffer to (W2) - Freshwater streams and minor estuaries within the MBRC determined hydrological network. • 20m buffer to (W3) - Minor freshwater tributaries that extend the MBRC determined hydrological network.
Matters of Local Environmental Significance – Wetlands Buffer	
 **MLES Wetlands buffer**	Where native vegetation clearing is proposed within 100m of mapped wetlands, and the clearing is not exempt, a legally secured environmental offset is required to ensure water quality outcomes for wetlands are achieved. Mapping consists of: • 100m buffer to MLES and Ramsar Wetlands.

2.1.2 Matters of National Environmental Significance (MNES)

MNES refer to natural values and features protected under the authority of the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). In the Moreton Bay region, this can include:

- national heritage properties;
- wetlands of international importance;
- listed threatened species and communities; and
- listed migratory species.

Development applications proposing to clear koala habitat need to consider the requirement under the EPBC Act. Development projects should refer to the Commonwealth Protected Matters Search Tool that will help determine whether MNES are likely to occur in the project area. An example of a MNES is the Grey-headed Flying Fox and the Koala.

2.1.3 Habitat trees and habitat infrastructure

Habitat trees are trees with large canopies and or structural hollows where animals live, breed and shelter. Many native animals of the Moreton Bay Region are dependent upon habitat trees for their survival. Old and dead trees can continue to be habitat trees.

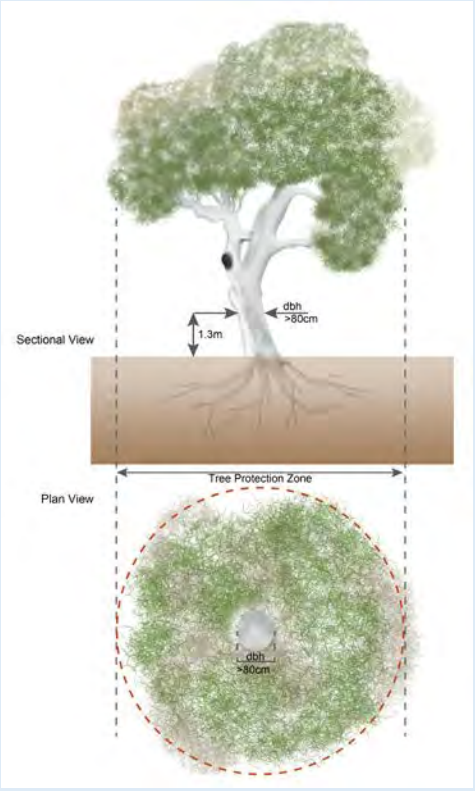
A habitat tree is defined as a native tree with a trunk diameter greater than **80cm** measured at 1.3m above the ground. It should be noted that trees not meeting this size may still contain multiple hollows and provide critical habitat for local wildlife.

Retaining habitat trees ensures ***viability*** of hollow-dependent native animals and maintains biodiversity to support ecological integrity.

Habitat and large trees should be incorporated into development at design stage. Developments should maintain and protect habitat trees and avoid disturbance to trees containing hollows. Removal of habitat trees should be a last resort and may necessitate installation of ***nest boxes*** to ensure lost habitat values are at least temporarily counterbalanced.

Retention of hollow bearing trees, or the installation of nest boxes can reduce the likelihood of native wildlife 'nesting' in residential buildings or infrastructure. Nest boxes are short-term habitat solutions and do not replace the broad ecological and aesthetic values provided by large habitat trees

Where nest boxes are required to be installed a nest box management plan will be required to be submitted - see section 1.11.



Example habitat tree

2.1.4 Priority and other native species

Moreton Bay is a Region of biological diversity with more than 3000 plant, animal and fungi species recorded. ***Priority Species*** are those which have been identified as being of significance to Moreton Bay Region.

Priority Species generally have one or more of the following traits:

a. listed as a threatened species (endangered, vulnerable, near threatened or special least concern) under State or Commonwealth legislation or international agreements;
b. of management concern within Moreton Bay region;
c. of scientific interest or at risk (e.g. because of specialised habitat requirements or a poorly known species / population);
d. are iconic and contribute to regional identity (e.g. Moreton Bay Fig, *Ficus macrophylla*).

A full list of Priority Species can be found on Council's website

Priority Species habitat is incorporated into the Environmental areas overlay to the extent it can be represented spatially. Scattered and diffuse native vegetation and habitat values may not be captured in this overlay and must be identified and valued at development application stage.

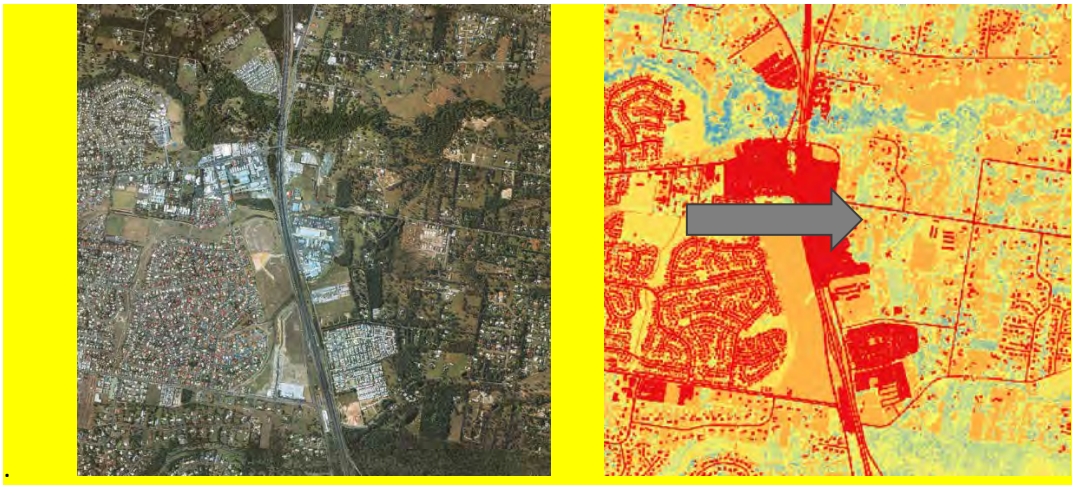
Note: *Proponents undertaking* ecological assessments *are expected to evaluate the likely presence of priority species and their habitats along with other wildlife, and appropriately address the potential impact of development activities. Wildlife information discovered during ecological assessment should inform a development design which maintains and protects biodiversity quality and integrity of habitats.*

2.1.5 Urban forest canopy and the heat island effect

Moreton Bay region's urban forest canopy comprises of all the trees and other vegetation in urban areas on public and private land. The urban forest includes vegetation in streets, parks, gardens, activity centres, waterways, wetlands and coastal areas, car parks and community gardens. The canopy may even extend to innovative ***green infrastructure*** such as green walls and roofs. Urban trees and other vegetation provide critical ecosystem services to people, improves air and water quality and offers shade to provide amenity and reduce the urban heat island effect.

The urban forest canopy is an important part of urban ecosystems. It helps to regulate local temperatures, provides habitat for wildlife, and its retention contributes to social enrichment.

Urban heat islands are where densely built urban areas become warmer than nearby suburban or rural areas. Changes in land-use patterns influence the urban heat island effect. This is especially true for the region's urban areas where hard, impermeable surfaces such as concrete and asphalt readily absorb solar radiation - reducing heat reflectivity. Moreton Bay region's urban forest canopy provides shade which reduces the urban heat island effect by providing shade in urban areas.



Remote sensing shows the potential for urban heat island effect
red = high/hot, blue = low/cool

3. Avoidance and Mitigation

This section outlines the avoidance and mitigation measures Council expects with relation to potential impacts on environmental areas, including MSES, MLES, priority species, habitat trees and the urban forest canopy.

3.1 Avoidance and Mitigation guidelines

Native wildlife inhabits and travels through urban, rural and natural landscapes to forage, socialise, breed and disperse to new territories. Poor development design can reduce the extent of habitat which is detrimental to the long-term viability of species. It can also fragment the remaining habitat and create barriers which limit animal movement and increase the risk of injury to wildlife moving across landscapes.

Urban green infrastructure also plays a key role in mitigating the urban heat island effect to create cool urban spaces, reduce demand for electricity, cool buildings, and control air movement.

The following guidelines can be used demonstrate avoidance and mitigation of impacts on wildlife and the urban forest canopy. Appendix 1 provides further guidance and advice on how developments can achieve high quality design outcomes while avoiding and mitigating impacts.

a) **Identify** - The natural values of the area, including MSES and MLES values as described in section 0, must be identified within the development site and adjacent areas to enable these to be considered in the design and concept phase. A combination of desktop and on-ground assessments may be used to:

- ✓ Identify the MLES and MSES values on the site.
- ✓ Identify if priority species, habitat trees, habitat areas and local movement pathways occur within the development site and adjacent areas.
- ✓ Identify multiple options to achieve landscape connectivity and consider the benefits of each within development design.
- ✓ Identify potential urban forest canopy.

b) **Avoid** - Development must avoid impacts on natural values. Native species and their habitats should be considered during the concept planning phase of a development to maximise avoidance of impacts. Council seeks documented evidence of how the proposed development is going to avoid impacts on natural values. The following design solutions should be considered:

- ✓ Locate development in areas which avoid impacts on native vegetation and species habitat.
- ✓ Avoid fragmenting or adversely impacting, koala habitat or ***habitat connectivity***.
- ✓ Retain bushland habitat in the largest patches possible.
- ✓ Relocate the road network away from drainage lines to avoid impacts on frog-breeding habitat and wildlife movement corridors.
- ✓ Maximise the area of native vegetation and habitat that remains after development is completed.
- ✓ Maximise habitat protection and safe wildlife movement and ***dispersal*** opportunities across the landscape by identifying and reducing potential threats and designing for connectivity, ***habitat integrity*** and ecologically functioning green spaces.
- ✓ Design roads and footpaths to wind around habitat trees and other significant trees.
- ✓ Ensure development and its operational activities are of a size, scale, type and design that avoids fragmenting or otherwise adversely impacting on habitat and habitat connectivity.
- ✓ Where proposed subterranean linear infrastructure intersects habitat trees or any native tree greater than 50cm diameter, tunnel boring, directional drilling or vacuum extraction are preferred solutions to maximise tree retention.

> Although koalas spend most of their time in trees they generally descend to the ground to move between trees. In urban areas where koala habitat trees are sparsely distributed, koalas spend more time travelling along the ground and are at increased risk of contact with cars and dogs. The retention of koala habitat trees and urban design incorporating design principles for large-at-maturity tree species are important for the long-term survival of the koala in the Moreton Bay Region.

c) **Mitigate** - Where a development is proposed that may impact on environmental areas, it must be demonstrated that the impacts are unavoidable. Where impacts are proposed, they will only be acceptable if there are commitments to appropriately mitigate those impacts. Design solutions are

to be incorporated into the concept planning phase of development design to ensure the quality and integrity of the biodiversity and ecological values inherent to MSES and MLES values are maintained and not lost or degraded and the urban forest canopy is maintained or enhanced.

The following are examples of mitigation measures that may be considered to address unavoidable impacts on natural values and the urban forest canopy.

Note: *any unavoidable clearing within Value Offset Areas will require offsets in addition to the mitigation measures below.*

Mitigation through design

- ✓ Ensure the design retains native habitat, including retention of koala habitat and food trees as features in the development design e.g. in car parks, open space areas, drainage reserves, corridors, street trees, road verges, road reserves and within residential lots larger than 750m^2.
- ✓ In waterway corridors, design development to protect ***riparian zones***, and retain and restore as much locally native vegetation within the riparian zone buffer to maximise provision of ecosystem services to the adjacent development whilst protecting waterway health.
- ✓ Consolidate development including through multiple storeys to reduce building perimeter area.
- ✓ Incorporate park and conservation land dedication within the design. Integrate the design of corridors, stormwater treatment and open space in the early development planning phases to maximise mutual benefits for each.
- ✓ Consider appropriate street designs to accommodate koala trees.
- ✓ Ensure sufficient buffers are maintained between infrastructure and ***koala habitat trees***. A minimum of 10m is required between koala habitat and any proposed building envelopes.
- ✓ Limit distances between habitat refuges such as parks, vegetated waterways, easements and road reserves to no greater than 50m to significantly reduce the risk of wildlife becoming stressed and/or encountering threats from dogs and vehicles.
- ✓ Where necessary in waterway corridors, provide soft engineering solutions e.g. vegetation, instead of hard e.g. concrete, to prevent erosion of the waterway.
- ✓ Maintain natural stream flow characteristics to support stream health and associated diverse vegetation communities.
- ✓ Landscape with densely planted native vegetation, ensuring an even spread of vegetation cover to cool local surroundings.
- ✓ Integrate existing native vegetation into design to maintain canopy coverage and reduce urban heat island effects.
- ✓ Integrate the urban water cycle into development design to improve storm water quality outcomes and help increase the urban forest canopy extent.
- ✓ Incorporate the use of porous paving (e.g. loose gravel, structural gravel, masonry pavers or engineered pavers) to encourage percolation and slow evaporation.
- ✓ Use urban design solutions such as green walls and rooftops to help cool hot surfaces.

Mitigation through restoration

- ✓ Identify opportunities to create additional ***ecological corridors*** and habitat linkages across the development site.
- ✓ Enhance existing ecological corridors by retaining, regenerating and rehabilitating native vegetation.
- ✓ Rehabilitate habitat to increase habitat extent and connectivity, and incorporate habitat values into development design.
- ✓ Reinstate understorey habitat within corridors for the safe movement of fauna.

Mitigation through wildlife movement infrastructure (see Appendix 1 for further detail)

- ✓ Use fauna crossing signs and speed limit variations.
- ✓ Ensure road design and placement avoids ***fragmentation*** and clearing of koala habitat, and instead increases visibility to provide safe road crossing opportunities for fauna.
- ✓ Design and install 'hard' infrastructure structures such as koala refuge poles and escape poles, street tree planting, '***stepping stone***' vegetation plantings, tunnels, appropriate wildlife fencing, culverts with ledges and movement 'furniture', fauna underpasses and overpasses, rope bridges and, glider poles.
- ✓ Use ***wildlife friendly fencing*** and ***wildlife friendly lighting***.
- ✓ Use koala food and habitat trees in urban landscaping, including as street trees to provide habitat linkages.
- ✓ Install wildlife movement infrastructure to connect habitats where linear infrastructure dissects environmental areas and corridors and especially between tracts of vegetation.

- ✓ Where habitat trees and native vegetation must be cleared, habitat features such as hollow logs should be harvested to preserve their values and used to enhance remaining and newly established habitat and landscaped areas.
- ✓ Plant native street trees to achieve connected canopies for continuous shade paths. Design must allow appropriate verge widths to ensure form at maturity is not compromised.

Further information is available in the Koala-sensitive Design Guideline (2012) and *Fauna Sensitive Road Design Manuals* (DTMR).

d) **Offset** - will only be considered where it can be demonstrated that avoidance is not possible and are only available in certain circumstances. Offsets are described in more detail in section 0.

3.2 Buffers and buffer widths

Buffers are separation areas between environmental values and incompatible or impacting land uses. Buffers can be used to gently transition between different place types and help to shield environmental values from deleterious ***edge effects*** of adjacent land uses.

Buffers widths are typically determined by the impacting land use and development activities and the significance and sensitivity of the environmental values they are protecting. Optimal buffer widths depend on many factors; and wider buffers are likely to function better than narrower buffers.

Buffer widths for streams and wetlands are provided in section 1.4. Refer also to the Queensland Wetland Buffer Planning Guideline.

Other recommended buffer widths include:

- **10 - 20m** for asset protection zone where vegetation is managed for safety around buildings and structures.
- **500m** Buffers to bat colonies.
- **>100** Recommended setback distance for wading bird roosts

4. Assessment and Reporting Requirements

Where a proposed development has the potential to impact on mapped environmental areas, Council may request an ecological assessment report and/or associated plan/s to inform the development assessment process.

All surveys, reports and/or associated plans must be prepared by persons with relevant tertiary qualifications in ecology, conservation biology, natural resource management, environmental science or other appropriate professional disciplines.

Where a specific Information Request is made by Council under the *Planning Act 2016* seeking more detailed or targeted information than outlined in this policy, the Information Request takes precedence.

4.1 When an ecological assessment report and/or associated plan/s may be required

<table>
<tr><th>TYPE OF REPORT / PLAN</th><th colspan="2">WHEN REQUIRED?</th></tr>
<tr><td>ECOLOGICAL ASSESSMENT REPORT
Includes below plans where relevant (these may also form conditions of development approval prior to Operational Works). Refer to section 1.8.</td><td>Where a proposed development has potential to impact on a mapped environmental area

AND

Depending on the scale of development and impact</td><td rowspan="2">Application or information request stage</td></tr>
<tr><td>ENVIRONMENTAL OFFSET DELIVERY PLAN
Refer to section 1.18.3.</td><td>Where a land-based environmental offset is proposed for a Value Offset mapped area.</td></tr>
<tr><td>VEGETATION MANAGEMENT PLAN
Refer to section 1.10.
Note: an Ecological Restoration Plan may be required where revegetation is planned.</td><td rowspan="4">As part of an Ecological Assessment Report

OR

Where an Ecological Assessment Report is not required

AND

Depending on the scale of development and impact</td><td rowspan="4">Information request or decision stage</td></tr>
<tr><td>HABITAT TREE / NEST BOX MANAGEMENT PLAN
Plan outlining procedures to protect habitat trees retained within the development site or, where habitat trees are to be removed, details of the replacement nest boxes. Refer to section 1.11.</td></tr>
<tr><td>FAUNA MANAGEMENT PLAN
Plan outlining procedures to reduce impacts on native fauna during site works. Refer to section 1.9.</td></tr>
<tr><td>ECOLOGICAL RESTORATION PLAN
Refer to section 1.12.</td></tr>
</table>

4.2 Ecological assessment report

Ecological assessment is an integral part of the development design and assessment process. The results and conclusions of an ecological assessment report allows Council to understand if the proposed development will achieve the performance outcomes required by the Environmental areas overlay assessment criteria.

Ecological Assessment Reports must clearly identify any environmental values within the development site and adjacent areas of influence.

Surveys must be completed in accordance with section 1.13.

Refer below for the content requested for Ecological Assessment Reports. Reports must include where necessary, images, detailed maps, figures, tables, plans and provide details relevant to the application and site to enable identification and location of on-ground features.

1. Describe the location and extent of the development site and surrounding ecological landscape features, including:
   a) Location.
   b) Size.
   c) Environmental and ecological features and values influential to the site.
   d) Previous and existing uses of the site

2. Provide an overview of the proposed development, including:
   a) Type of development.
   b) Primary use of development.
   c) All associated infrastructure required for the development.
   d) All associated on-site works i.e. earth works and vegetation removal likely to have environmental impact.

3. Show a current aerial photo highlighting existing environmental values overlaid with the plan of development.

4. Identify, evaluate and discuss:
   a) the likely presence of flora and fauna species including Priority Species other species of importance
   b) fauna habitat requirements, movement paths, breeding and dispersal behaviours.
   c) Specific habitat features available for fauna and indications of fauna presence.
   d) Wildlife movement - current and future opportunities.
   e) Regional Ecosystems (remnant and non-remnant plant community types) and discuss extent, location, structure, proportions and condition.
   f) Habitat function and ecological processes.
   g) Riparian zone and riparian buffer zone.
   h) Water quality and stream health indicators.
   i) Presence of weed and pest species.

   Note: *The above may include aquatic environmental values and water quality objectives as required, and BioCondition assessment.*
   Note: *Refer to section 1.13.2 for notes on assessing koala presence.*

5. Document field and desktop methodology and assumptions.

6. Identify and discuss the existing local natural values (green infrastructure) of the site, including.
   a) Environment areas.
   b) Managed forest (plantations, offset areas, revegetation).
   c) Ecological corridors.
   d) Urban forest canopy composition and coverage.
   e) Waterways, wetlands, water bodies (including dams) and drainage lines.
   f) Wildlife movement infrastructure (fences, culverts, rope bridges etc.)
   g) Vegetation providing ‘stepping stone’ habitat for wildlife.
   h) Habitat trees, heritage trees and street trees.

i) Residential gardens contributing green values.

7. Identify all threatening processes and potential impacts resulting from the development.

8. Detail the potential for the development to result in impacts that cannot be avoided, such as, edge effects, loss of biodiversity, introduction of invasive species, downstream effects, additional hazards to wildlife, etc.

9. Detail the proposed avoidance and mitigation actions as outlined in Section 2. Expand upon management strategies to reduce the duration, intensity and extent of potential impacts to an acceptable level.

10. List all references used in the information gathering and analysis process and include appendices for any additional supporting information including wildlife records and database extractions.
    a) Technical information or data.
    b) Authorities and agencies consulted – include any correspondence.
    c) Background reports and literature reviewed.

4.3 Fauna Management Plan

Where habitat is approved for clearing or a development is approved with potential impacts on fauna (including modification of farm dams to urban stormwater management devices) a Fauna Management Plan outlining initiatives to reduce impacts on native fauna may be required.

Any required surveys must be completed in accordance with section 1.13.

4.3.1 Fauna Management Plan Requirements

The plan must be prepared by a suitably qualified person and contain at least the following information:
a) Legislative context, licenses and permits;
b) Requirements for threatened and non-threatened species;
c) Procedures for dealing with fauna observed immediately prior to vegetation clearing or dam dewatering;
d) Inspection and assessment of potential fauna habitat and activity within tree canopies and understorey, tree limb hollows, and dams;
e) Procedures for dealing with fauna during vegetation clearing or dam dewatering;
f) Inspection and assessment of disturbed ground, logs, debris, leaf litter and felled vegetation;
g) Instructions for ***wildlife spotter/catchers***, contractors and machine operators on each clearing front including roles and responsibilities;
h) ***Sequential clearing*** plan to encourage sedentary fauna to leave the area via an established egress path;
i) Slow and controlled lowering of potential habitat trees to be felled for inspection within habitat bearing structures;
j) Procedures for the treatment / removal of captured or injured fauna from the site;
k) Details of fauna captured, health assessment and relocation, transportation and release.

The Fauna Management Plan must reference the scale of works with relation to ensuring wildlife safety and detail mitigation strategies in accordance with proposed operational works.

Fauna Management Plans will require approval from Council and all associated works must be carried out in accordance with the approval.

4.4 Vegetation Management Plan

Where habitat is nominated to be cleared within mapped environmental area a Vegetation Management Plan (VMP) may be required. A VMP describes the actions to be used to manage vegetation before, during and after operational works.

Any required surveys must be completed in accordance with section 1.13.

4.4.1 Vegetation Management Plan requirements:

The plan must be prepared by a suitably qualified person and contain at least the following information:

a) A scaled plan showing all vegetation intended to be removed; retained; and restored.
b) Where vegetation is proposed to be retained, outline the protection procedures to be installed during operational works.
c) The location of all habitat trees. If habitat trees are to be removed, the locations of installed nest boxes must be detailed.
d) Where a VMP is requested for proposed development within a MSES – Koala Offset area, the plan must provide the level of detail needed to address the Offset Delivery Plan requirements as outlined in section 1.18.3.
e) Details of vegetation clearing procedures (including weed removal).
f) Detail proposed maintenance and monitoring regime.
g) Where a fauna management plan is not required, include methods to avoid and mitigate impacts on fauna such as:
    i) Sequential clearing plan to encourage sedentary fauna to leave the area via an established egress path;
    ii) Inspection and assessment of disturbed ground, logs, debris, leaf litter and felled vegetation;
    iii) Instructions for wildlife spotter/catchers, contractors and machine operators on each clearing front including roles and responsibilities;
    iv) Slow and controlled lowering of potential habitat trees to be felled for inspection within habitat bearing structures.

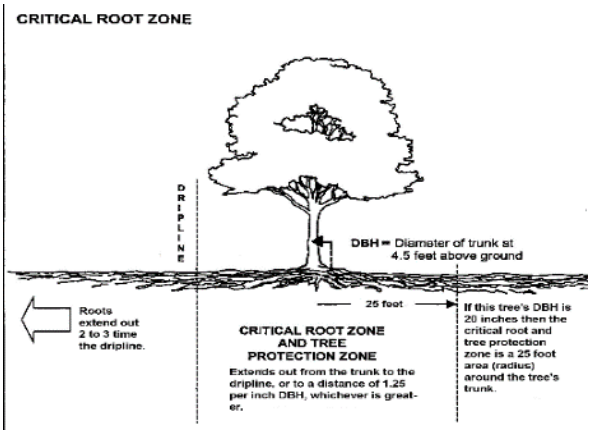
VMPs will require approval from Council and all associated works must be carried out in accordance with the approval prior to site works.

4.5 Habitat Trees & Nest Box Management Plan

4.5.1 Habitat tree management plan

An approved habitat tree management plan will be required to guide conservation management where habitat trees are retained within the development site. Consideration for the needs of large or hollow bearing trees must be given at the development design stage.

Minimum information required Habitat tree management plan
Tree species
Size (height, canopy spread)
Estimated age
Location on site
Hollow abundance and estimated sizes
Native species most likely to be using hollow
Vigour (canopy condition etc.)
Current risks to tree health
Location of utilities (above & below ground)
Immediate protective actions required
Maintenance and future management actions
Inspection program



4.5.2 Nest box management plan

Where it is demonstrated that impacts to habitat trees cannot be avoided, habitat tree offsets are to be calculated

Example 1

This habitat tree measures 80cm DBH and contains four hollows:

- 2 x small hollows (bats)
- 1 x medium sized (gliders)
- 1 x large hollow (owl)

The habitat tree offset requirement for the removal of this habitat tree is 8 x nest boxes of various sizes.

Example 2

This habitat tree measures 80cm DBH and contains no visible hollows.

The habitat tree offset requirement for the removal of this habitat tree is 1x nest box to compensate for the loss of hollow potential.

How to calculate how many nest boxes would be required when a habitat tree must be removed

Where a nest box management plans is required it must contain the following elements:

- Target species (from Fauna Management Plan)
- Next box types - design and sizes
- Installation technique
- Proposed location of installed nest box
- Maintenance regime details. Nest boxes must be maintained for a minimum of 12 months post installation.

Nest boxes installed on existing trees must account for tree trunk growth.

4.6 Ecological Restoration Plan

Ecological restoration assists the recovery of a degraded, damaged or destroyed ecosystem. The objective of ecological restoration is to create and/or re-instate a self-sustaining plant community that would occur naturally in that particular area and in doing so, establish and enhance wildlife habitat and improve connectivity. Restoration may also minimise the impacts of storm water run-off on water quality and help to buffer existing habitat values from edge effects.

Any required surveys must be completed in accordance with section1.13.

4.6.1 Ecological restoration plan requirements

In addition to the guidance material outlined in this policy, all revegetation and restoration works should be consistent with the South East Queensland Restoration Framework. An ecological restoration plan (ERP) will be prepared and approved before the commencement of any ecological restoration work.

The plan must be prepared by a suitably qualified person and contain at least the following information:

a) Scaled map with restoration area clearly defined.
b) Identification of the pre-existing / ***reference ecosystem*** to be recreated.
c) Site preparation. Prepare revegetation areas by clearing and/or appropriately treating weed species. A staged removal of weeds may be necessary to allow native fauna enough time to move into alternative habitat areas.
d) Nutrient requirement. Slow release fertiliser suitable for native plants and water saving devices such as water crystals may be required as determined by council.
e) Weed suppression. Blanket mulch restoration area with weed free mulch to a minimum settled depth of 100mm. Pre-emergent herbicides may be required to ensure mulching material remains weed free. Where riparian ecosystems are restored, mulching below top-of-bank is often impractical. Jute matting or other measures should be applied as appropriate to ensure water quality is maintained.
f) Natural Biodiversity. Where natural regeneration of plant species is occurring, mulch may be withheld or applied at to a depth < 100mm where appropriate weed control measures are in place.
g) Species selection. Select plant species consistent with the reference ecosystem for the site and source from local provenance plant stock where possible.
h) Tube stock is the minimum acceptable size of plant stock for ecological restoration; except where direct seed methods are applied or where otherwise approved by council.
i) Environmental processes that impact on restoration must be managed. Where appropriate treat erosion prone areas with Jute mat / geo-fabric and plant at higher densities to mitigate erosion potential. Earthwork may be required to assist planting and maintenance access and minimise erosion processes.
j) Position maintenance tracks to minimise edge effects and avoid fragmentation of the restoration site.
k) Site protection. Protect revegetation works from browsing by herbivores through appropriate measures such as exclusion fencing, tree guards, etc. Barbed wire is not acceptable. Signage may be necessary to ensure awareness of restoration activities.
l) Establishment Irrigation required until plantings are self-maintaining.
m) Maintenance schedule. Maintenance will continue for a minimum period of 3-5 years. In some circumstances, longer maintenance periods may be conditioned to ensure sustainable establishment of a project, e.g. recreation of complex rainforest habitat.

The following planning and design principles of ecological restoration are to be incorporated into the Ecological Restoration Plan.

	Principles of ecological restoration	Guidance comment
1	Restored ecosystems incorporate groups of plant species reflecting those in reference ecosystems (i.e. the pre-existing plant community which would naturally occur in the restoration area).	Regional Ecosystem technical descriptions provided by the Qld Herbarium can be used to determine the structure and floristic composition of a target plant community. Council can supply stratified plant lists for most plant communities in the region. Where technical descriptions or a council plant species list is not available, replication of a nearby intact 'reference ecosystem' of same or similar nature is acceptable.
2	Restored ecosystems support the same structure and function as reference ecosystems.	
3	Restored ecosystems consist of native species of local genetic origin to the greatest extent practicable.	Proponents are encouraged to use native species local to the area of impact. Proponents are encouraged to source plant material from nurseries which use locally collected seed material and / or propagate their own plants from material collected within the proposed development site.
4	Restoration area should have curved edges (i.e. no sharp corners).	Rounded margins reduce exposure to edge effects.
5	Restored ecosystems are self-sustaining and are resilient to normal periodic stress.	Species selected should be based upon local occurrence, appropriateness for the ecosystem being restored and be sufficiently established to withstand naturally variable environments.
6	Restored ecosystems interact with the surrounding landscape and contribute to ecosystem services.	Revegetation and restoration of ecosystems contributes to habitat connectivity, reduces edge effects, improves water quality outcomes, provides habitat for priority species and helps to mitigate urban heat island effects.
7	Restored ecosystems - particularly those which use reconstruction and fabrication techniques -must be maintained for the greatest length of time possible.	Adequate maintenance periods with regular maintenance activities helps to ensure projects are self-sustaining in the longer term. Some ecosystems may require a minimum of 3-5 years maintenance.

Example of habitat restoration design within and buffering an environmental corridor
Image source:www.melbournewater.com.au

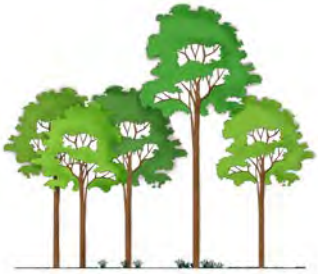
4.6.2 Planting densities

Planting densities for ecological restoration should be consistent with naturally occurring densities within the reference regional ecosystem. Ecological restoration planting densities are guided by ecosystem structure, species dominance, frequency, and relative coverage and differ from those applied to amenity landscaping. Where technical information for a reference ecosystem is not available the following densities will be the minimum used.

Strata		Planting density
(G)	Groundcover	2 per $1m^2$
(S1)	Sub-shrub	2 per $2m^2$
(S2)	Shrub	
(T3)	Low tree layer	1 per $3m^2$
(T2)	Sub-canopy	
(T1)	Canopy	1 per $5m^2$

Minimum planting densities for ecosystems lacking specific density detail.

Example of an ecological restoration incorporating full ecosystem structure



Example of an amenity landscaping incorporating only sub-canopy and canopy

Note that higher ground cover densities are required in waterways and areas with high erosion potential. Plant community structure will determine stratum number.

Named varieties or ***cultivars*** are not appropriate for ecological restoration purposes except where amenity outcomes are sought along the outer edges of a planting area and provided that such species have no parental history of invasive escape and are of local native origin.

4.7 Survey Requirements

Robust and repeatable survey methodologies are important as (a) they provide decision makers with a solid scientific basis to determine whether a development proposal complies with environmental objectives and visions, and; (b) provide a baseline event from which to repeat further surveys to determine change over time.

4.7.1 Fauna & Flora surveys

Fauna and flora surveys identify and evaluate the presence of native species and their habitats, movement and dispersal corridors and pathways. Comprehensive field surveys are required in addition to searches of ecological records databases.

Species that will need to be highlighted in any survey results include:

a) Priority species of Moreton Bay Region (see section 1.4.4)
b) Species of national or state importance (refer to the Nature Conservation (Wildlife) Regulation 2006 and *Environment Protection and Biodiversity Conservation Act 1999*) as well as migratory birds protected under international agreements.

Terrestrial vertebrate field surveys are to be consistent with the following accepted methodology:

> Eyre TJ, Ferguson DJ, Hourigan CL, Mathieson MT, Kelly, AL, Venz MF & Hogan, LD (2012) *Terrestrial Vertebrate Fauna Survey Assessment Guidelines for Queensland*; Department of Science, Information and the Arts, Queensland Government, Brisbane.

In addition to the methodology as outlined above, fauna assessment must:

a) If handling, capturing, trapping or taking animals, be undertaken with appropriate permits and clearances issued by State Government;
b) Describe the fauna habitat significance of the subject site or its sub-components within a local, bioregional, state and national context;
c) Identify any evidence of edge effects, invasive pest species and other disturbances (locations, causes and levels) which have potential to influence native fauna population viability;
d) Identify specific habitat features available for fauna and indications of fauna presence such as;
    i) potential habitat trees e.g. containing hollows;
    ii) trees with scratch marks;
    iii) location and identification of scats, tracks and other traces of fauna;
    iv) fruit and seed trails;
    v) fauna trails;
    vi) fallen logs;
    vii) termite mounds;
    viii) ground diggings;
    ix) rock outcrops;
    x) nests in banks;
    xi) roost /nest /den trees; and
    xii) dams, wetlands and water bodies.
e) A minimum of four days and nights is required for a survey period. Seasonal variation must be considered to obtain reliable data. In circumstances where less sampling effort is applied, appropriate justification must be provided.

4.7.2 Assessing local koala presence

Key considerations for assessing koala presence include:

a) A desktop and field assessment of koala data, sightings, habitat mapping, current onsite habitat values assessment including bushland and urban habitat values i.e. groups of koala food and habitat trees and individual trees across a site and adjacent to it.

b) Field assessment for evidence of use by koalas to identify scratches on tree trunks, scat or any other presence data.

Koala scratches on tree trunk

Koala scats

c) Where scattered gum trees and koala sightings data exist within urban areas, all koala habitat values will be considered important for local and transient koala population viability.

d) Assessment of movement pathways including existing and potential links between koala habitat areas, within and external to the site.

e) Using a proven scientific methodology for assessing koala presence and activity such as transects and the spot assessment technique (SAT) developed by Biolink Ecological Consultants. Methodology can be found in the following paper:

> Phillips, S. and Callaghan, J. (2000) *The Spot Assessment Technique: a tool for determining localised levels of habitat use by Koalas Phascolarctos cinereus*. Australian Zoologist Vol 35 (3) pg 774 - 780.

4.7.3 Vegetation survey methodologies

Vegetation surveys are to be consistent with the following acceptable methodology:

> Neldner, V.J., Wilson, B.A., Thompson, E.J. and Dillewaard, H.A. (2012) *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland*. Version 3.2; Updated August 2012; Queensland Herbarium, Queensland Department of Science, Information Technology, Innovation and the Arts, Brisbane

BioCondition assessments may be required as a remnant vegetation condition assessment tool to provide a measure of how well a terrestrial ecosystem is functioning for the maintenance of biodiversity values, and are to be consistent with:

> Eyre, T.J., Kelly, A.L., and Neldner, V.J. (2011). Method for the Establishment and Survey of Reference Sites for BioCondition. Version 2.0. Department of Environment and Resources Management (DERM), Biodiversity and Ecological Sciences Unit, Brisbane.

> Eyre, T.J., Kelly, A.L, Neldner, V.J., Wilson, B.A., Ferguson, D.J., Laidlaw, M.J and Franks, A.J. (2011). BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland. Assessment Manual. Version 2.1. Department of Environment and Resource Management (DERM), Biodiversity and Ecosystem Sciences, Brisbane.

Aquatic surveys for water quality and stream health monitoring is to be consistent with the following acceptable methodology:

> Nolte, U., (2011), *Method Manual for Stream Health Monitoring based on macro invertebrate communities*, Moreton Bay Regional Council, Queensland.

In addition to this resource, aquatic surveys will include fauna and flora survey of the waterway, wetland or water body and adjacent areas of influence. Of particular interest are priority species of Moreton Bay region.

5. Offsets

Under the Environmental areas overlay, an ***environmental offset*** may be required if a development proposal, despite taking all reasonable avoidance and mitigation measures, will cause an impact on any of the following matters:

- MSES
  - Value Offset Areas - Koala Offsets
- MLES
  - Value Offset Areas – Waterways Buffer
  - Value Offset Areas – Wetlands Buffer

Environmental offsets compensate for unavoidable impacts on Value Offset Areas environmental matters. Prior to environmental offsets being proposed, consideration must be given to avoiding impacts. Justification of any unavoidable impacts is required in the development application.

To determine whether a development will require either an MSES or MLES offset, a pre-lodgement meeting with Council's Development Service branch is highly recommended. More information on determining offset obligations can also be found on the State Government Department of Environment and Heritage Protection website, including information on staged offset delivery, advanced offsets or Direct Benefit Management Plans refer to the Queensland Environmental Offsets Policy.

5.1 MSES Koala offset requirements

Where it is demonstrated that there will be unavoidable impacts on non-juvenile koala habitat trees within an MSES Koala Offsets area, and the clearing is not exempt, an offset of any significant residual impacts will be required in accordance with the *Environmental Offsets Act 2014.*

For details regarding the significant residual impacts for MSES koala offsets, refer to section 6 of the Queensland Environmental Offset Policy - Significant Residual Impact Guideline.

5.2 MLES offset requirements

Where it is demonstrated that there will be unavoidable impacts on **native vegetation** is within a waterway buffer area or wetland buffer area, and the clearing is not exempt, an environmental offset of the significant residual impact will be required (see section 0 for details on avoidance and mitigation options).

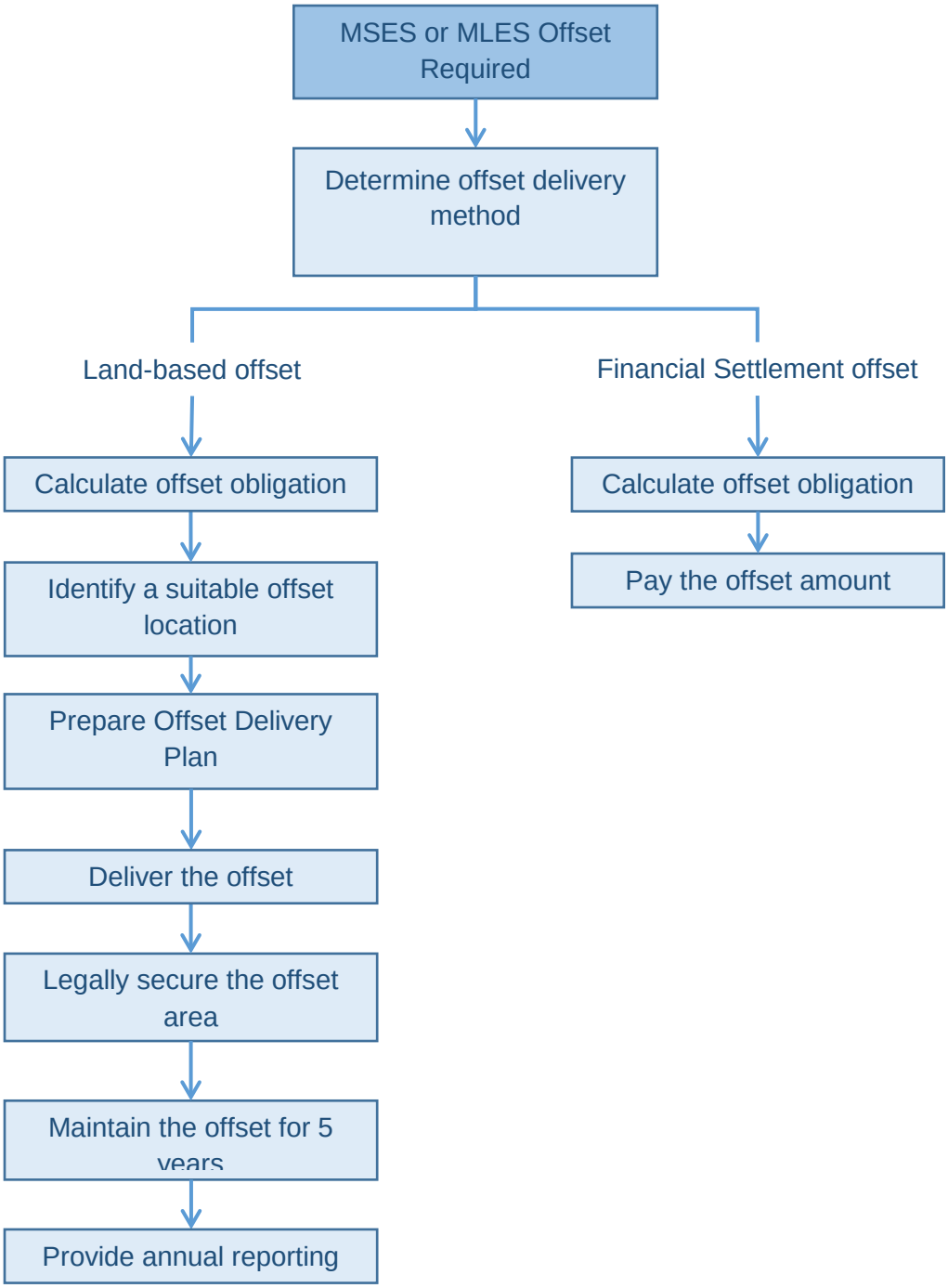
Significant Residual Impacts for MLES - Value Offset Areas

MLES	Significant Residual Impact	Offset Ratio
Waterways buffer area	Removal of any native vegetation within the buffer area	1:1
Wetland buffer area	Removal of any native vegetation within the buffer area	1:1

Note: *The Commonwealth and State governments may also require environmental offsets for matters of environmental significance under their jurisdiction.*

5.3 Delivery of Offsets

Proponents may meet their environmental offset obligation through either a financial settlement, land-based offsets, or combination of both. More information on financial and land-based offsets can be found in sections 1.17 and 1.18, Council must receive a Notice of Election and any other associated forms relevant to the offset delivery approach chosen prior to delivery of the offset. Refer to the Queensland Government's website for the location of all forms associated with environmental offsets.



5.4 Financial Settlement Offsets

The proponent meets their offset obligation by providing Council with a payment in accordance with the Queensland Environmental Offsets Policy. Once paid, the environmental offset obligation of the proponent ceases and responsibility is transferred to Council. Financial settlement amounts are calculated using the Financial Settlement Offset Calculator. Council will use the received funds to achieve conservation outcomes for impacted environmental matters through the delivery of environmental offsets.

5.4.1 MSES Financial Settlements

If choosing to make a financial settlement to meet the offset obligation, for MSES koala habitat values:

a) Use the Department of Environment and Heritage Protection's online offset calculator.
b) For the 'Distinct matter area (ha)' multiply the number of non-juvenile koala habitat trees to be removed by 0.004 to derive the distinct matter area in hectares.
c) For the 'Matter Group' choose 'SEQ Koala Habitat'.

5.4.2 MLES Financial Settlements

If choosing to make a financial settlement to meet the offset obligation, for MLES values:

a) Use the Department of Environment and Heritage Protection's online offset calculator.
b) For the 'Matter Group' choose 'Local Government Matter MLES 1'.

5.5 Land-based Offsets

The proponent delivers an environmental offset for either MSES or MLES offsets directly by setting aside land for the offset area and providing offset planting at the required rate.

Upon acceptance and agreement between Council and the proponent, Council will issue an Agreed Delivery Arrangement as per the Queensland Environmental Offsets Policy. This agreement forms a contract between the parties and details the delivery of the offset.

Land-based offset options must be maintained for **five** years and must be legally protected and managed in perpetuity. Methods for legally security must be permitted under the *Environmental Offsets Act 2014*.

5.5.1 Environmental offset planning and design principles

All environmental offsets must meet the offset principles contained within the Queensland Environmental Offsets Policy.

5.5.2 Environmental Offset Receiving Sites

Site location hierarchy

Environmental Offsets should be placed as close as possible to the development site to locally retain environmental values. However, it may not always be possible to locate offsets in the immediate vicinity of a development site. In these instances, the below hierarchy is to be followed.

a) Within 2km of the development site AND within or abutting an environmental offset receiving area or environmental area;
b) Within the same waterway catchment AND within or abutting an environmental offset receiving area or environmental area;
c) Within or abutting an environmental offset receiving area or environmental area;
d) Within the Moreton Bay region.

Note: MSES Koala Offsets originating from within the Priority Koala Assessable Development Area (PKADA) should be placed back into the PKADA in accordance with the Queensland Environmental Offsets Policy.

Environmental Offsets Receiving Areas

The Environmental Offset Receiving Areas Overlay map represents the region's key ecological corridors that are the major pathways for wildlife in our region. These areas are also Council's preferred locations for land-based and advanced offsets.
Many smaller ecological linkages may not be shown on the Environmental Offset Receiving Areas Overlay map; instead these local corridor values are better identified and valued at development stage. Smaller ecological linkages may also be planned through Council's MBRC Green Infrastructure Strategy.

Example of an environmental offset receiving site area as shown on the Environmental Offset Receiving Areas Overlay map.

5.5.3 Offset Delivery Plans for land-based offsets

If a land-based offset option is chosen, and Offset Delivery Plan is required.

The following table is designed to provide applicants with the mandatory components required in an Offset Delivery Plan as per section 18(4) of the *Environmental Offsets Act 2014* and Queensland Environmental Offsets Policy.

Before submitting an Offset Delivery Plan, the applicant must lodge the following forms required under the *Environmental Offsets Act 2014.* The forms are available from the Department of Environment and Heritage Protection's website:

a) Environmental Offsets Delivery Form 1 - Notice of Election (EOD1);
b) Environmental Offsets Delivery Form 2 - Offset Delivery Plan Details (EOD2); and
c) Environmental Offsets Delivery Form 3 - Offset Area Details (EOD3).

Offset Delivery Plan Requirements

Report Section	Requirements / Considerations
Describe the environmental matter being impacted by the development	• Provide details of the matter of environmental significance being impacted by the development works. • If the development is to be staged, the full consideration of the impacts on the environmental matter must be detailed and a breakdown of impacts per stage included. • Scaled map showing aerial photography of vegetation proposed for clearing (and retention if applicable) overlaid with the plan of development.
Determine offset obligation	Native vegetation, including koala habitat trees, proposed for clearing is to be individually counted or estimated using an accepted estimation technique. The determined methodology for the calculation is to be documented. All koala food and habitat trees must be accounted for in calculations. The species composition of an offset must be reflective of lost values and relevant to the receiving site.

Report Section	Requirements / Considerations
Demonstrate how a conservation outcome will be achieved	Describe how the proposed offset will be undertaken and how a conservation outcome will be achieved including how the plan will: a. Effectively account for and manage the risks of the offset failing to achieve a conservation outcome; b. Ensure the offset provides benefit in relation to the impacted matter in addition to any other benefits required by the planning scheme; c. Ensure the offset is of a size and scale proportionate to the significance residual impact on the impacted environmental matter.
Receiving site details	• Show offset receiving site boundaries and the calculated area capable of receiving the offset and planting densities. • Planting densities should be appropriate and consistent with regional ecosystem technical descriptions published by the State of Queensland for the relevant pre-clearing regional ecosystem. • State whether the offset will be delivered, wholly or partly, on the land on which the environmental offset will be undertaken. • Identify the details of any persons with an interest in the offset receiving site. • Describe the existing land use of the offset receiving site and any impact that land use may have on the delivery of the offset.
Legally securing the offset site	Provide details of the mechanism used for legally securing the offset as per *Environmental Offsets Act 2014* section 29.
Five-year implementation plan	a. Detail key actions to be undertaken across the whole of the site to achieve the outcomes stated in the management plan; b. Provide detail on the timing and prioritisation of offset delivery in accordance with on-ground stages of works; c. List resource requirements (including labour); and d. List any permits or licences required for implementation.
Monitoring	Outline the monitoring strategy for the offset receiving site including: a. monitoring methodology; b. monitoring performance indicators; c. timing and frequency of monitoring inspections; and d. the person responsible for both establishing baseline figures and conducting the ongoing monitoring (provide details of that person's qualifications and relevant experience).
Maintenance	Outline the maintenance strategy for the offset including: a. a minimum 5-year maintenance period by the proponent (to commence after Council's acceptance of completed establishment works "on maintenance"); b. maintenance occurring at intervals of no longer than 4 weeks in the first year, 8 weeks in the second year, and 12 weeks in the third to fifth years; c. watering events sufficient to ensure 100% floristic survival; d. weed treatment/removal (occurring before weed seed matures, to prevent a weed seed bank developing); e. replacement planting within 30 days of plant death, and other risk management measures.
Reporting	Detail a schedule for submitting offset progress and condition reports for the duration of the maintenance period. Reports are to be submitted to Council on an annual basis, and must demonstrate how the offset is progressing in terms of achieving the objectives and outcomes stated in the offset management plan, and provide specific details of: a. progress on the implementation plan; b. any changes to the implementation plan as a result of adaptive management; c. monitoring results and compliance with monitoring performance indicators;

Report Section	Requirements / Considerations
	d. progress of ongoing site management and any issues of concern; and e. progress of threatened flora and fauna species within the receiving site.

6. Glossary

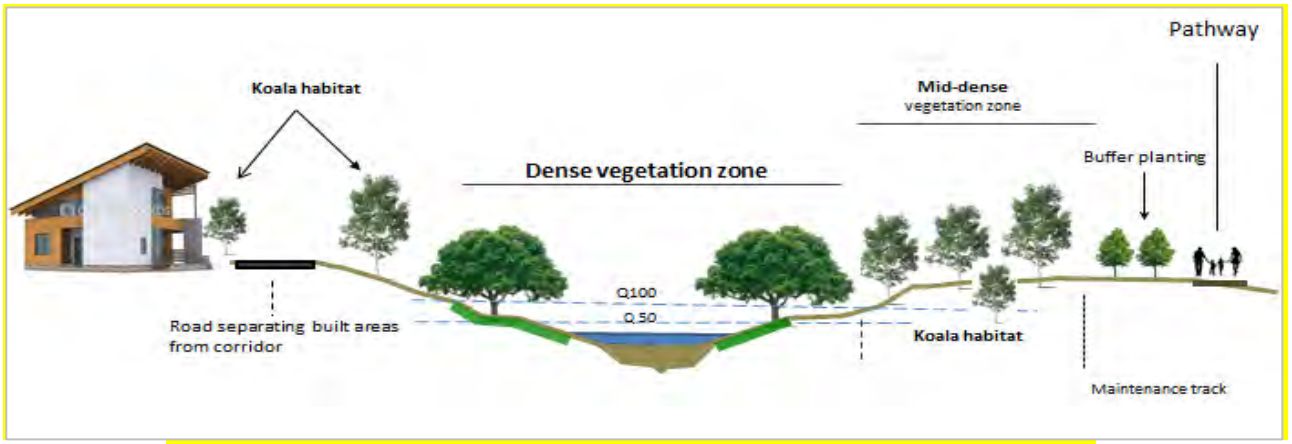
Biodiversity is the degree of variation in life, and can refer to individual variation, species variation or ecosystem variation within an area.
Cultivars are plants which differ sufficiently from their wild ancestors to be worthy of distinction and merit special names (e.g. cultivars may be ornamental, medicinal or edible).
Dispersal refers to the movement of animals or plants from their birth site to their breeding site, as well as movement from one breeding site to another.
An **Ecological assessment** is a component of the development design and assessment process that identifies environmental values (such as flora, fauna, geology and hydrology) of the development site and adjacent areas where relevant, and associated environmental impacts.
Ecological restoration is the reinstatement of a degraded, damaged or destroyed ecosystem to a plant community that would occur naturally in a particular regional ecosystem.
Ecosystem services are the goods and services that ecosystems provide (for example food, water, aesthetics and air quality).
Edge effects are changes in conditions at the boundaries of environmental areas, and include increased light and noise penetration, changes in soil moisture and increased access by pest plants and animals.
Ecological corridors are functionally connected areas supporting animal and plant movement, dispersal and refuge.
An **environmental offset** is an activity undertaken to counterbalance a significant residual impact of a prescribed activity on a matter of environmental significance. Environmental offsets are further defined by the *Environmental Offsets Act 2014*.
Fragmentation occurs where previously connected environmental areas become severed or reduced, resulting in isolation of wildlife populations and their habitat resources and reducing their long-term viability.
Green infrastructure refers to natural, semi-natural and engineered green assets that are connected across a landscape.
Habitat connectivity is a measure describing the permeability of an area for movement and dispersal of plants and animals.
Habitat fragmentation is when previously connected environmental areas and corridors become severed or reduced (e.g. through vegetation clearing, construction of barriers such as roads, and changes in land use).
Habitat integrity is the degree to which a habitat is self-sustaining, intact and functioning in a way necessary for the continuation of native species and the communities they form.
Habitat Tree refer to section 1.4.3
High Value Areas represent high value MLES or MSES. These matters are to be protected from development impacts and cannot be offset.
A **koala habitat tree** is a food tree of the *Corymbia, Melaleuca, Lophostemon* or *Eucalyptus* genera OR a preferred shelter species such as *Angophora*.
Native vegetation means a native tree or a native plant naturally occurring in South East Queensland, other than a grass except where the grass is a Priority Species of Moreton Bay Region. Note: The *Fisheries Act 1994* provides for the protection of marine plants. Note: A full list of Priority Species can be found on Council's website.
Nest boxes are manmade boxes for animals to nest and shelter in, and can be specially designed for different types of animals (e.g. parrots, possums, microbats).

Non-juvenile koala habitat tree is a koala habitat tree that has a height of more than four metres or a trunk with a circumference of more than 31.5 centimetres at 1.3 metres above the ground.
A **Priority Species** in the Moreton Bay Region is a species worthy of special attention and requiring priority conservation planning (e.g. because it is threatened, has iconic status, habitat values, or cultural significance).
Reference ecosystems are naturally occurring habitats used to model project design in ecological restoration (i.e. the reference ecosystem is the pre-existing plant community in a degraded ecosystem).
Regional ecosystems are vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil.
Resilience is the ability of the system, or components of it, to recover from damage and / or adapt to change.
A **Riparian zone** is the interface between land and a waterway.
Sequential/staged vegetation clearing is clearing which allows wildlife enough time to seek refuge elsewhere (e.g. by clearing limited numbers of trees at any one time and retaining tree linkages).
Stepping stones are habitat refuges for wildlife and include parks, vegetated waterways and street trees/road reserves.
Value Offset Areas represent valued MLES and MSES where offsets may be allowed if values cannot be avoided or mitigated.
Vegetation clearing means the damaging or destroying of vegetation by ring bark, topping, lopping, poisoning, burning, flooding, draining, or otherwise injuring vegetation including cutting down, pushing over, and damaging root zone by compaction, excavation or filling within the drip zone of vegetation that may destroy or seriously affect vegetation. Partial clearing such as removal of understorey or thinning of native vegetation or the removal of dead habitat trees is classed as clearing. This does not include maintaining existing open pastures, lawns or created gardens; and grazing of native pasture by stock.
Viability is the ability of a plant or animal to maintain itself and successfully reproduce.
Wildlife friendly fencing is fencing that avoids the use of barbed and does not entangle or harm wildlife, and allows the appropriate free movement of wildlife across landscapes.
Wildlife friendly lighting is lighting that reduces disorientation and exposure to higher predation levels for native wildlife.
A **Wildlife spotter/catcher** is an independent and appropriately qualified person who checks areas of vegetation prior to clearing and is present through the duration of works. Responsibilities also include arranging for relocation of fauna and recording release sites, and recording numbers of injured animals, arranging treatment and recording the outcomes of treatments. A wildlife spotter/catcher must be present at each clearing front, if multiple clearing fronts are utilised simultaneously.

7. APPENDIX 1 - DESIGN GUIDELINE

This section provides additional information to guide the design of development with respect to ecological corridors, wildlife corridors, wildlife movement infrastructure and landscaping.

7.1 Ecological corridors



Example of a corridor interface showing both a waterway and ecological corridor.

It is generally accepted that biodiversity and ecological function increases with corridor width and integrity. The following principles can be used to build healthy corridors and contribute to biodiversity quality, habitat connectivity and safe wildlife movement options:

Ecological corridors exist in the Environmental areas overlay map as MLES local green networks, biodiversity planning assessment areas and waterway and wetland corridors. The following guidelines should be used where development contains or is adjacent to these values.

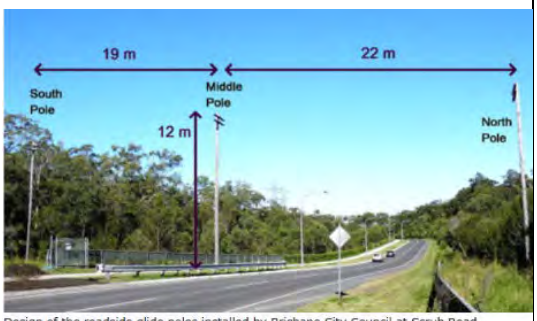
a) Corridors should be as broad as possible, and should ideally contain multi-layered vegetation to cater for wide assemblages of species.
b) It is preferable to have recreational spaces, roadways or pathways adjacent to the corridor to minimise environmental impacts.
c) It is preferable to have low intensity land uses adjacent to the corridor to minimise environmental impacts. Design of corridor interface should be appropriate and compatible with adjacent land use.
d) Housing or other impacts should avoid projecting into the corridor, form impediments to movement, or produce harmful effects.
e) Where buildings are permitted next to a corridor, a building setback appropriate to the mature height of the tallest vegetation must be integrated into the design and if possible place an easement over the area.
f) Locating environmental offsets and revegetation in and adjacent to corridors is a useful way for development to minimise edge effects and to protect the integrity of habitats.
g) Maintain as much natural open space as possible next to culverts and bridges to encourage their use by wildlife.
h) Street trees should enhance the function of corridors allowing genetic mixing for increased biodiversity resilience. Select local tree species and ensure enough space is provided to achieve canopy connection at early maturity. Wildlife movement infrastructure may be appropriate to reduce potential wildlife and vehicle interaction on highly trafficked roads.
i) Wildlife friendly lighting must be used where required in and adjacent to corridors.
j) Urban tree planting improves habitat for urban dwelling native animals and can improve connectivity for their movement through city landscapes and between urban and rural areas.
k) Incorporate water sensitive urban design solutions into the development concept planning phase to maximise multipurpose outcomes e.g. water quality, visual amenity and green infrastructure.

7.2 Wildlife movement infrastructure

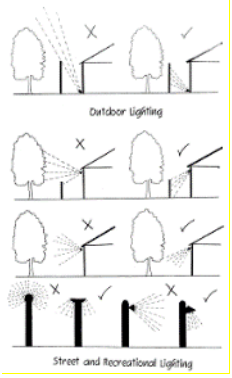
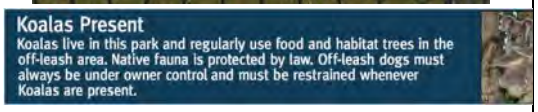
The following table of information is provided to assist development to determine when and what type of green infrastructure is appropriate to ensure safe, convenient and ongoing wildlife movement.

Green Infrastructure type	Benefit	Examples	When to apply
Inclusion Fencing - no barbed wire - Increase visibility	Allows animals to pass through and improves opportunities for animals to access habitat and food resources and each other.		✓ Where safe, convenient and ongoing wildlife movement is to be provided. ✓ Where avoidance and reduction of barrier-related fragmentation is sought. ✓ To assist in the provision of contiguous habitat connectivity. ✓ Where development requires a fence for property delineation and native animals do not need to be excluded from the site.
Exclusion Fencing (funnel)	Prevents animals from entering hazardous landscape and is often used to direct wildlife to move to safe crossing points.		✓ Where development poses an unacceptable hazard to fauna movement and where safe wildlife movement is to be provided. ✓ Where installation of fencing does not have detrimental effect on dispersal of wildlife across the landscape. ✓ Where wildlife movement can be directed to a safe and convenient crossing point. ✓ Where a road fragments two intact vegetation patches, posing a risk to safe wildlife movement. ✓ Works best when in conjunction with wildlife sensitive road design e.g. appropriate speed limits, traffic islands and escape poles
Exclusion Fencing - temporary (during construction)	A temporary measure to assist preventing animals from venturing onto roads/linear infrastructure during construction Purpose is to limit death and injury to fauna		✓ Where authorised clearing activities take place in habitat areas adjacent to infrastructure that poses a safety risk to fauna dispersing from the development site. ✓ This fencing will be temporary and remain in place for the duration of clearing activities.

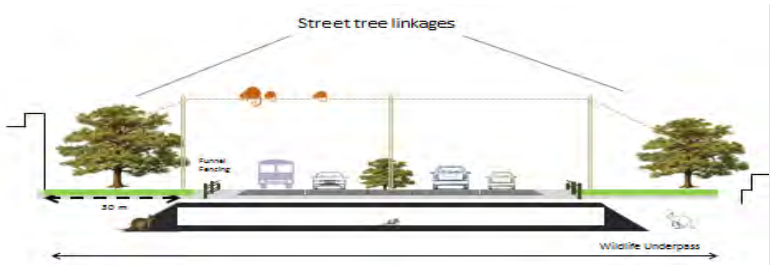
	during clearing activities.		
Fauna underpasses - Culverts - Under bridges - Tunnels - Frog culverts (in conjunction with exclusion fencing).	Connectivity infrastructure providing safe passage between habitat areas. Reduces stress caused by barriers and interbreeding which subsequently undermines genetics. Reduced impacts resulting from light, traffic noise and vehicle impact.		✓ Where safe, convenient and ongoing wildlife movement is to be provided. ✓ Where the underpass can facilitate or be retrofitted to encourage use by target species. ✓ Where fauna must traverse development (roads, railway lines etc.) to access habitat. ✓ Works best when designed in conjunction with exclusion / funnel fencing and is appropriately large.
Underpass 'furniture' - Ledges - Horizontal Poles - Ropes	Reduces risks associated with multi-use underpasses such as wildlife drowning and entrapment. Re-use of removed stags/mature hollows provides additional refuge from predators. Retrofitting existing underpasses is cost efficient.		✓ Where retrofitting is appropriate. ✓ Where safe wildlife movement opportunities are to be provided and where multiple fauna species are affected e.g. arboreal and terrestrial animals. ✓ Where the underpass is open and lacks refuge areas. ✓ Works best when underpass is appropriately sized to provide a combination of dry ledges, poles and rope connections to accommodate a wide assemblage of fauna.
Rope bridges	Increases connectivity between otherwise intact vegetation corridors, reducing ground predation and road fatalities. Aids safe passage of arboreal wildlife and helps to		✓ To provide continuity of habitat and to facilitate movement where development has severed habitat. ✓ Where suitable habitat exists and development is placed within the natural paths of the target species (e.g. gliders). ✓ Works best in conjunction with overpasses, land bridges, glide poles and funnel fencing. Particularly useful across wide roads with high vehicle speeds.

	prevent vehicle strike.		
Glide poles	Increases connectivity of roadsides and along median strips with existing canopy gaps. Preferred option by gliders even in sections of established regrowth vegetation.	 Design of the roadside glide poles installed by Brisbane City Council at Scrub Road. Credit: B Taylor/R Goldingay	✓ To avoid the creation of fragmented habitats. ✓ To provide safe, convenient and ongoing wildlife movement opportunity and link habitat corridors separated development including for example, open space and recreational facilities and linear infrastructure. ✓ Where habitat patches are separated by a distance greater than the gliding capabilities of species concerned. ✓ In areas of immature vegetation lacking intact canopy and or to provide linkages between street trees and landscape vegetation. ✓ Where a functional corridor 'stepping stone' linkage tree is removed e.g. old growth and stag trees.
Koala refuge poles	Provides fauna with a means of escaping a threatening situation. Provides a refuge point for Koalas to effectively rest/hide from predators in open areas.	 	✓ Where the provision of safe wildlife movement opportunities are sought ✓ In areas clear of vegetation where risk of predation is high. ✓ Where barriers to wildlife movement may exist between koala habitats. ✓ In situations where the planting of Koala habitat trees would not be suited e.g. high density residential areas. ✓ In areas of immature vegetation that would otherwise provide linkage for smaller terrestrial species.
'Stepping Stone' vegetation or other habitat features	Provides habitat and refuge to animals and assists in the movement of individuals between larger habitat patches. Enables wildlife to disperse, acquire resources and		✓ Where biodiversity and integrity of habitats are required to be protected and maintained. ✓ Where safe, convenient and ongoing wildlife movement opportunities are required. ✓ To maintain biodiversity values within the environment. ✓ To provide continuity of habitat and to maintain connectivity values. ✓ To reduce habitat fragmentation.

	fulfil life cycle requirements. Maintains population and genetic exchange. Reducing in-breeding and disease susceptibility.		
Nest boxes	Increases potential nesting and roosting sites and supports breeding populations. Provides safe refuge in immature vegetation lacking existing hollows.		✓ Where biodiversity and integrity of habitats are required to be protected and maintained. ✓ Where hollow bearing trees has been are or have been removed and or priority species habitat is removed. ✓ To conserve particular hollow-dwelling fauna. ✓ Where offset planting lacks mature hollow bearing trees. ✓ In conjunction with landscaping for improved food resource availability in urban areas.
Habitat trees, street trees, and landscaping for wildlife	Provides safe refuge points with the benefit of supplementary feeding habitat. Street tree installations function as environmental corridors linking habitat features across the landscape. See 'stepping stone' plantings above.		✓ Where biodiversity and integrity of habitats are required to be protected and maintained. ✓ Where safe, convenient and ongoing wildlife movement is to be provide. ✓ In conjunction with water sensitive urban design, and dedicated open space corridors. ✓ Where development reduces or delineates habitat patches. ✓ Works best in urban areas where civic design supports habitat integration and where there is greater competition for wildlife habitat.

Wildlife friendly lighting	Reduces disorientation and attraction of wildlife to artificial light and reduces development infrastructure related mortality. Reduces exposure to higher predation levels. Reduces effect on the light sensitive cycles of many species (turtles, predatory birds, reptiles).	 	✓ Where safe and convenient wildlife movement opportunities are to be provided. ✓ Where biodiversity and integrity of habitats are required to be protected and maintained. ✓ Where outdoor lighting may spill or reflect into the habitats of susceptible wildlife (e.g. turtles, shorebirds). ✓ Adjacent to wildlife habitat corridors, fauna underpasses, rope bridges and glider poles. ✓ Where pedestrian and wildlife are likely to share space.
Signage	Increases awareness of species presence and habitat importance. Educates the public on interest and risk factors. Reduces risk to wildlife resulting from artificial food resources, entrapment, vehicle strike. Alerts motorists to modify driving behaviour for reduced risk of collision with wildlife. Decreases response time for emergency wildlife care.	 	✓ Where wildlife habitat clearing is in progress and for the duration displaced wildlife is likely to be at increased risk of harm (i.e. moving to new habitat areas). ✓ Where safe wildlife movement opportunities are to be provided. ✓ In areas of public interest including adjacent to sensitive habitat areas. ✓ In areas of recorded wildlife and human conflict e.g. vehicle collision, domestic pet attacks, where feeding of native wildlife occurs. ✓ All developments where remaining wildlife habitat occurs, is adjoining or adjacent.

Ecological and habitat restoration	The broad range of benefits includes reducing fragmentation, increasing connectivity, providing food and habitat for wildlife. Tree planting buffers environmental areas and corridors, improves water quality and reduces risk of local wildlife extinction from lack of food/habitat sources. Mitigation of urban heat island effects.		✓ Where biodiversity and integrity of habitats are required to be protected and maintained. ✓ Where safe, convenient and ongoing wildlife movement is to be provided. ✓ Within or as near as possible to the development site. ✓ Where priority species habitats are impacted by development. ✓ Where environmental areas and corridors are impacted by poor water quality, weed incursion, ecological degradation and habitat loss through clearing. ✓ Adjacent or adjoining existing wildlife habitat corridors.
Integrating multiple green infrastructure values in design	Promotes shared use and multi-purpose values i.e. provision of habitat, micro-climate regulation and necessary infrastructure. Reduces wildlife and development conflict. Economically advantageous.		✓ Where space and financial constraints exist. ✓ Where urban design needs to achieve shared use of space (pedestrian / wildlife). ✓ Where multiple target species are concerned.



Example road cross section incorporating wildlife movement infrastructure

7.3 Landscaping as habitat

Vegetation makes an important contribution to the urban environment. The Moreton Bay Region's green infrastructure network recognises that urban landscapes can provide important refuge habitat for wildlife and ecosystem services to people.

Melaleucas incorporated into the streetscape at Scarborough.

Moreton Bay fig incorporated into development design at Eatons Crossing Hotel, Albany Creek.

7.3.1 Guidelines for landscaping as habitat

Place types can be enhanced with quality landscape design acknowledging the environmental values of an area. High functioning green infrastructure landscape design will:

a) Maximise retention of existing habitat trees and other native vegetation, and integrate these with built and urban form.
b) Enhance urban wildlife habitats by using local native plant species.
c) Space street trees to encourage canopy connection and tree success.
d) Rehabilitate areas of poor environmental quality.
e) Maximise wildlife connectivity and reduce habitat fragmentation, including the use of artificial habitat such as nest boxes.
f) Buffer sensitive areas and separate conflicting land uses with deep landscaping.
g) Design landscaping to deliver maximum shade and support ecosystem services and function.
h) Innovatively use of rainwater and overland flow.
i) Match form with social exchange.
j) Create visual diversity and interest in the landscape palette.

Concept design showing green infrastructure solutions in an urban setting (image credit: Stockland)

Planning Scheme Policy
Flood Hazard, Coastal Hazard and Overland Flow

For State Approval - Major Amendment 1 - December 2017

Table of amendments

Date of adoption and effective date	Planning scheme policy version number	Amendment type	Summary of amendments

Planning scheme policy – Flood Hazard, Coastal Hazard and Overland Flow

Adoption

Moreton Bay Regional Council adopted this planning scheme policy on 24 November 2015.

Commencement

This planning scheme policy will take effect from 1 February 2016. Amendments to this planning scheme are included at **Table of Amendments** (inside front cover).

1. Introduction

1.1 Preliminary

This planning scheme policy supports the Moreton Bay Regional Council planning scheme and has been made by Council in accordance with Chapter 3, Part 4, Division 2 and Part 5, Division 1 of the *Sustainable Planning Act 2009*.

1.2 Purpose

The purpose of this planning scheme policy is to provide for the following:

a) guidance for the preparation of technical reports required to assist in the assessment of proposed development on land in the Flood hazard overlay, Coastal hazard overlay and Overland flow path overlay for natural hazards which include the following:
   i) Structural Engineering Design Report;
   ii) Site Based (Localised) Coastal Engineering Report;
   iii) Site Based (Localised) Flood Report;
   iv) Site Based (Localised) Overland Flow Report;
   v) Drainage Master Plan; and

b) advice on filling requirements when the premises is in both the Flood hazard overlay and the Coastal hazard overlay;

c) the Drainage Master Plan adopted by the Council for a Drainage investigation area identified on Figure 8.2.2.1 – 8.2.2.10 of the Flood hazard overlay code which state design standards for the development of premises included in the General residential zone – Next generation neighbourhood precinct, General residential zone – Urban neighbourhood or Emerging community zone provided in the Drainage investigation area.

1.3 Application

This planning scheme policy applies to assessable development where subject to the Flood hazard overlay code, Coastal hazard overlay code and Overland flow path overlay code assessment criteria.

1.4 Interpretation

Terms used in this planning scheme policy are defined in Schedule 1 – Definitions of the planning scheme. Where a term is not defined in Schedule 1, section 1.3 Interpretation of the planning scheme applies.

2. Risk Management Approach

Council has adopted a risk-based approach to managing flooding and coastal related risks that accords with the international standard AS/NZS ISO 31000:2009. This approach establishes a four (4) step process to risk assessment, as follows:

1. Risk identification;
2. Risk analysis;
3. Risk evaluation; and
4. Risk treatment.

Stage 1 involved the identification of the nature and extent of flood and coastal hazards by undertaking an extensive suite of technical investigations, covering both catchment flooding and storm tide inundation. The entire local government area is captured by these investigations.

Stage 2 involved the preparation of Risk Management Studies for both riverine/creek flooding and storm tide inundation which have analysed the risk associated with a range of events. In accordance with AS/NZS ISO 31000:2009, risk is defined as the combination of likelihood of occurrence of an event and the consequence if the event occurs. For these studies, likelihood is interpreted as the frequency of the flood or storm tide event, while hydraulic hazard categories were used to define the flood behaviour characteristics, which provide an indicative measure of the consequences of flooding and inundation.

Stage 3 involved the determination of acceptable, tolerable and intolerable risks, while Stage 4 involved the implementation of risk treatment measures that will reduce risks from a tolerable or intolerable level down to a level considered acceptable to Council and the community.

Council has adopted the following risk categorisation consistent with the State Planning Policy – State Interest Guideline: Natural Hazards Risk and Resilience (August 2014) –

a) **Acceptable risk** – A risk that, following an understanding of the likelihood and consequences, is sufficiently low to require no new treatments or actions to reduce risk further. Individuals and society can live with this risk without feeling the necessity to reduce the risks any further.
b) **Tolerable risk** – A risk that, following an understanding of the likelihood and consequences, is low enough to allow the exposure to continue, and at the same time high enough to require new treatments or actions to reduce risk. Society can live with this risk but believe that as much as is reasonably practical should be done to reduce the risks further.
c) **Intolerable risk** – A risk that, following an understanding of the likelihood and consequences, is so high that it requires actions to avoid or reduce the risk. Individuals and society will not accept this risk and measures must be put in place to reduce risks to at least a tolerable level.

   For the purpose of this document and alignment with State Government terminology, unacceptable risk is considered to also be intolerable risk.

Figures 1 and 2 demonstrate the derivation of hydraulic hazard categories, which relate to the depth and velocity of flood waters for flood (river and creek) and storm tide events, respectively. The river and creek hydraulic hazard categories H1-H5 were derived from the Newcastle Concept Flood Planning Report (BMT WBM, 2009), which is modified from Floodplain Management in Australia (CSIRO, 2000) and the NSW Floodplain Development Manual (NSW Government, 2005). The storm tide hydraulic categories H1-H5 were derived by GHD (2012) based on the potential impacts of combined wave action and storm surge.

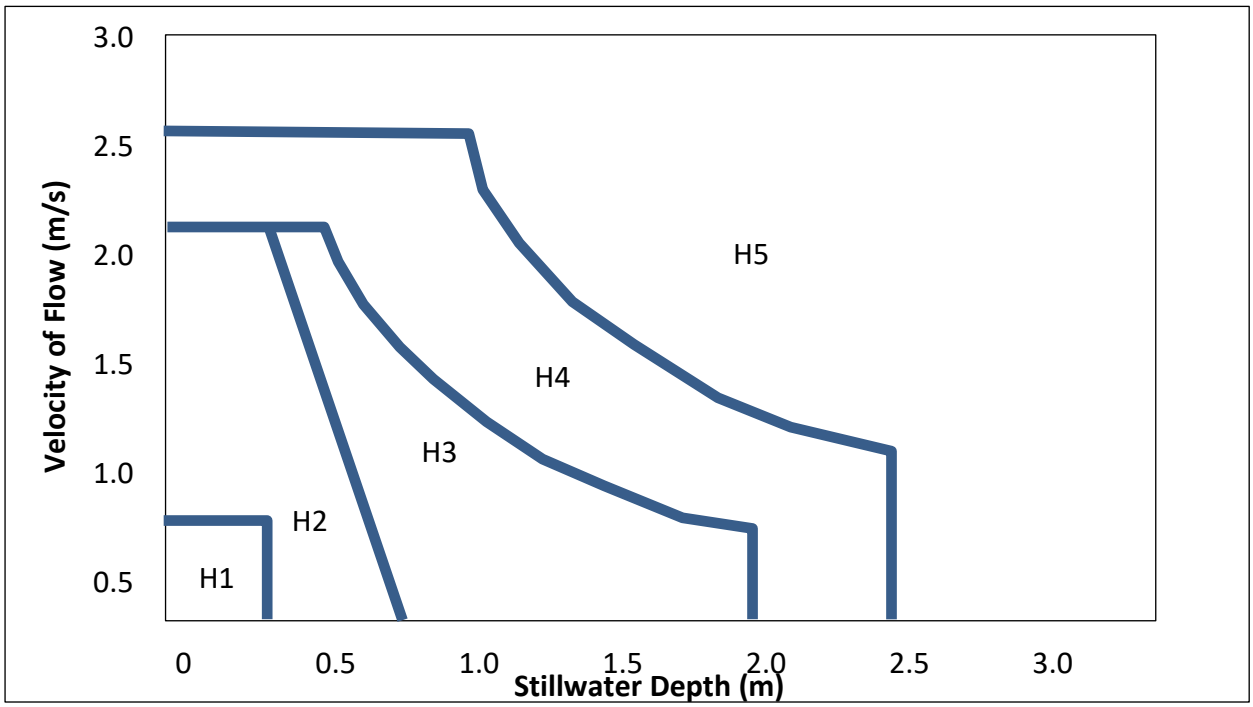


Figure 1 Hydraulic Hazard Categorisation (Flood)

Source: BMTWBM "Newcastle Concept Flood Planning Report 2009" and Molino Stewart, 2013

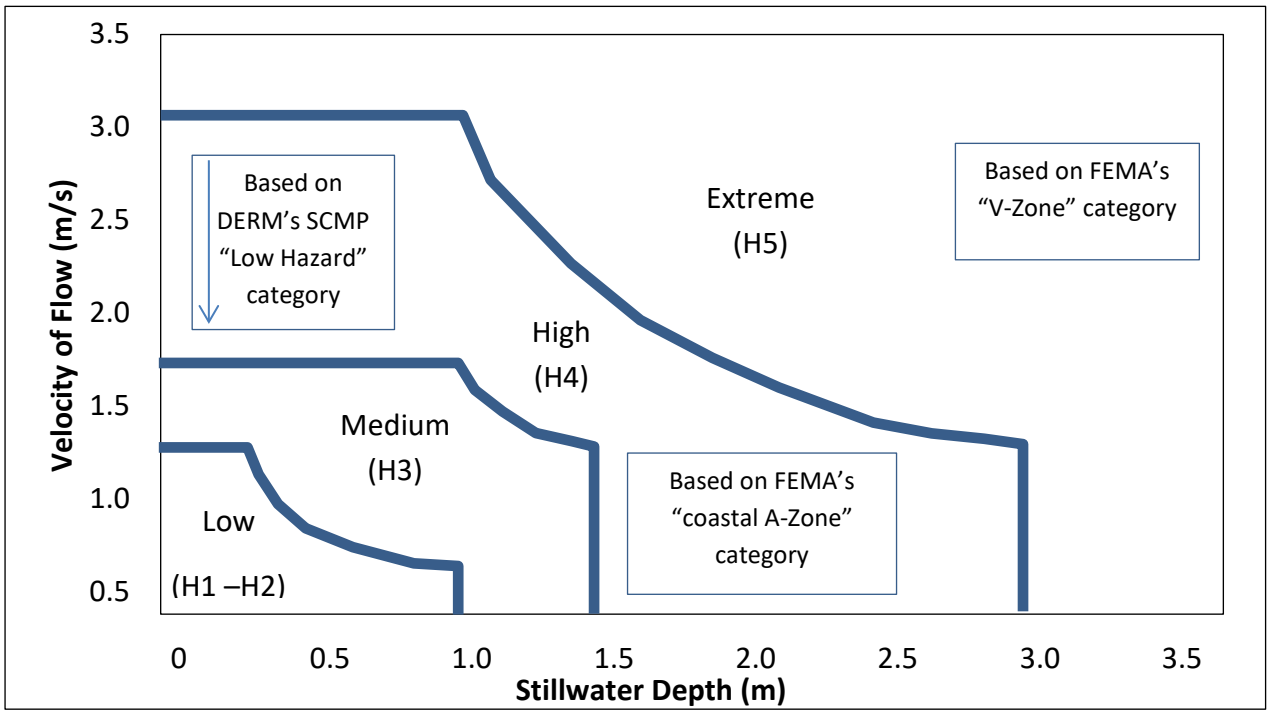


Figure 2 Hydraulic Hazard Categorisation (Coastal – Storm tide)

Source: GHD, 2012

The storm tide hazard approach presented in Figure 2 is considered by Council to be more detailed and locally focused than the standard State Government method for determining high and medium hazard zones for storm tide inundation.

The general consequences associated with each of these hydraulic behaviour categories are described in Table 1.

Table 1 Hydraulic behaviour categories and their respective consequences

Low Risk to life and property		*High Risk to life and property*		
H1	***H2***	***H3***	***H4***	***H5***
Insignificant [1]	***Minor*** [1]	***Moderate*** [1]	***Major*** [1]	***Catastrophic*** [1]
No significant life risk *Property risk only to items which come in direct contact with floodwaters such as building contents*	*Low life risk. Able bodied adults can walk safely.* *Cars can float and precautions must be followed to keep them out of floodwaters*	*Moderate life risk.* *Able bodied adults cannot safely walk* *Only large vehicles (trucks) can safely travel.*	*Major life risk* *Light frame buildings (e.g. houses) can fail structurally*	*Extreme life risk* *Majority of buildings could fail*

1. Equivalent from National Emergency Risk Assessment Guidelines October 2010 (NERAG 2010)

Using the data derived from the Stage 1 investigations, the flood frequencies were combined with the hydraulic hazard categorisation (H1-H5) in accordance with a risk matrix for river and creek flooding as well as storm tide inundation, as discussed further below.

The risk was defined based primarily on the hydraulic hazard category, but also gives some consideration to specific risk elements, such as the risk of isolation and risk to life elements.

A risk matrix (Figure 3) was developed by Council that describes the level of risk based on likelihood (i.e. the frequency of an event occurring) and consequence (i.e. the hydraulic hazard category). Development of the matrix involved specialist engineering and planning input, and has included feedback from community consultation regarding the tolerable and intolerable levels of risk.

Figure 3 Combined flood risk matrix

Likelihood level		*NERAG 2010*[1]	**Consequence level**				
Current MBRC flood mapping (Flood Check)			*Insign-ificant*	*Minor*	*Moderate*	*Major*	*Catastr-ophic*
Coastal hazard (storm tide inundation)	*Flood hazard*						
0.01% AEP 2014 (1:10,000 ARI)	River and Creek Floodplain Extent (PMF)	*Rare*	T-VL	T-VL	T-L	T-L	T-L
0.1% AEP 2014 (1:1,000 ARI)	0.1% AEP 2014 (1:1,000 ARI)	*Unlikely*	T-L	T-L	T-M	I-H	EI-H
1% AEP 2014 (1:100 ARI)	1% AEP 2014 (1:100 ARI)	*Possible*	T-M	T-M	T-M	EI-H	EI-H
5% AEP 2014 (1:20 ARI)	5% AEP 2014 (1:20 ARI)	*Likely*	T-M	T-M	T-M	EI-H	EI-H
Hydraulic Hazard category			*H1*	*H2*	*H3*	*H4*	*H5*
Risk to Life and Property			*Low*		*High*		
Approximate floodplain hydraulic category			*Flood fringe*	*Flood storage*		*Floodway / flood conveyance*	

EI-H	Extremely Intolerable High Risk
I-H	Intolerable High Risk
T-M	Tolerable Medium Risk
T-L	Tolerable Low Risk
T-VL	Tolerable Very Low Risk

1. National Emergency Risk Assessment Guidelines October 2010 (NERAG 2010)

Consistent with the categorisation of risk in the State Planning Policy – State Interest Guideline: Natural Hazards, Risks and Resilience (August 2014), there are no 'acceptable' risk areas within the Flood planning area or Coastal planning area (thus allowing some degree of risk treatment, such as planning controls) within the full extent of the Flood hazard overlay and Coastal hazard overlay. As such, Tolerable and Intolerable categories were sub-divided to provide additional levels of risk for interpretation and management response.

High risk areas defined on the Flood hazard overlay and Coastal hazard overlay approximately accords with areas that are categorised as Intolerable (I-H) risk and Extremely Intolerable (EI-H) risk, while Medium risk areas on the overlays mostly accords with areas of Tolerable-Medium (T-M) risk.

The Flood hazard overlay code and Coastal hazard overlay code outline provisions and development controls that relate to the level of risk for premises.

3. Technical reports

3.1 Summary of requirements

The technical reports which are required to be prepared by the assessment criteria of the Coastal hazard overlay code, Flood hazard overlay code and Overland Flow Path overlay code are summarised in Table 2.

Table 2 Technical reports

Development	Coastal hazard overlay	Flood hazard overlay	Overland flow path overlay
New development (Material Change of Use and Reconfiguring a Lot)	Structural Engineering Design Report: a) High risk storm tide inundation area b) Medium risk storm tide inundation area c) Erosion prone area Site Based (Localised) Coastal Engineering Report: a) High risk storm tide inundation area b) Erosion prone area	Structural Engineering Design Report: a) High risk area* b) Medium risk area* * Where maximum flow velocity exceeds 1.5m/s	Site Based (Localised) Overland Flow Report
Redevelopment (Erosion Prone Area only)	Structural Engineering Design Report Site Based (Localised) Coastal Engineering Report	Not applicable	Not applicable
Minor works (extensions)	Structural Engineering Design Report: c) High risk storm tide inundation area d) Medium risk storm tide inundation area e) Erosion prone area	Structural Engineering Design Report: a) High risk area b) Medium risk area	Site Based (Localised) Overland Flow Report
Filling	Site Based (Localised) Flood Report: Within all parts of the Coastal planning area	Site Based (Localised) Flood Report: Within all parts of the Flood planning area	Site Based (Localised) Overland Flow Report
Development within a Drainage investigation area	Not applicable	Structural Engineering Design Report where in a High or Medium risk areas Drainage Master Plan	Not applicable

3.2 Structural Engineering Design Report (coastal and flooding hazards)

A Structural Engineering Design Report is a requirement for development which is at a High or Medium risk of impact from flood or coastal hazards. Specifically, a Structural Engineering Design Report is required to accompany a development application for the following activities:

a) development of a new building in a High or Medium risk area, as defined in the Flood hazard overlay or Coastal hazard overlay;
b) redevelopment of a building in the erosion prone area, as defined in the Coastal hazard overlay;
c) minor building works (extensions) in a High or Medium risk area, as defined in the Flood hazard overlay or Coastal hazard overlay.

The structural engineering design of the proposed new building, redevelopment or extension is to ensure the building or structure is capable of withstanding the nature of the hazards to which it will be subject. In this regard, the Structural Engineering Design Report is to identify and document the following:

a) the flood or coastal hazards that can potentially occur at the development site;
b) the structural design approach utilised to accommodate the flood or coastal hazards;
c) how the structural design satisfies the relevant overall outcomes and performance outcomes outlined in the Flood hazard overlay code and in the Coastal hazard overlay code.

The consideration of the impact of the flood or coastal hazards on the development is to include, but not be limited to the following:

a) hydrostatic loading due to water depth;
b) hydrodynamic loading associated with both depth and water velocity;
c) potential debris impact loading;
d) potential wave impact loading (wind waves, storm wave overtopping);
e) erosion and scour around the development;
f) any combination of the above.

The Structural Engineering Design Report is to demonstrate appropriate design of the following:

a) structural members to accommodate building loads;
b) floor levels relative to design flood conditions as specified in the relevant overlay code;
c) footings to maintain foundation requirements including allowance for scour;
d) flood resistant building materials;
e) integration of utilities; and
f) emergency egress from the building.

The design intent is for new development to remain structurally sound for all events up to and including the most extreme events (PMF; 0.01% storm tide). For locations where this is considered not possible, land has been included in the Limited Development (Constrained Land) Zone, and no new development or minor building work is intended to occur.

Reference is made to the following standards and guidelines:

a) Australian Building Construction Board standard for *Construction of Buildings in Flood Hazard Areas*, (see http://www.abcb.gov.au/Resources/Publications/Education-Training/Construction-of-Buildings-in-Flood-Hazard-Areas-Standard);
b) Mandatory Part 3.5 of the Queensland Development Code (QDC) *Construction of buildings in flood hazard areas* (see http://www.hpw.qld.gov.au/SiteCollectionDocuments/Mandatory3.5ConstructionOfBuildingsInFloodHazardAreas.pdf); and
c) Fact Sheet: Water Resilient Products and Building Techniques for Rebuilding After a Flood (see http://www.hpw.qld.gov.au/SiteCollectionDocuments/WaterResilientProductsAndBuildingTechniquesForRebuildingAfterAFlood.pdf).

The Structural Engineering Design Report is to be prepared by a Registered Professional Engineer of Queensland (RPEQ) with appropriate expertise in structural engineering and design.

3.3 Site Based (Localised) Coastal Engineering Report

A Site Based (Localised) Coastal Engineering Report is a requirement for development which is at a High risk of impact from coastal hazards. Specifically, a Site Based (Localised) Coastal Engineering Report is required to accompany a development application for the following activities:

a) development of a new building in a High risk area, as defined in the Coastal hazard overlay;
b) redevelopment of a building in the Erosion Prone Area, as defined in the Coastal hazard overlay.

The Site Based (Localised) Coastal Engineering Report is to demonstrate that the proposed development:

a) is risk-appropriate for the full design life of the development, taking into consideration the expected future increase in coastal hazards due to sea level rise and changed storm conditions;
b) will not increase risk to life;
c) is supported by an effective evacuation plan;
d) will not significantly increase potential for damage to buildings or infrastructure;
e) will not lead to community hardship or loss of essential amenity, including after significant coastal storms and storm tide events;
f) will not cause detrimental impacts on adjacent properties or other areas within the coastal zone;
g) will protect biodiversity, environmental values, coastal resources and public amenity; and
h) satisfies the relevant overall outcomes and performance outcomes outlined in the Coastal hazard overlay code.

The Site Based (Localised) Coastal Engineering Report is to be prepared following a risk-based framework, as outlined in AS/NZS ISO 31000:2009. The Site Based (Localised) Coastal Engineering Report is also to be prepared giving consideration to the following:

a) State Planning Policy – State Interest Guideline: Coastal Environment (July 2014);
b) State Planning Policy – State Interest Guideline: Natural Hazards, Risk and Resilience (August 2014);
c) State Planning Policy – State Interest Technical Manual: Natural Hazards, Risk and Resilience – Technical Manual, A 'fit for purpose' approach in undertaking natural hazard studies and risk assessments (August 2014);
d) Moreton Bay Regional Council Storm Tide Hazard Study, Cardno (2009).

The Site Based (Localised) Coastal Engineering Report is to consider all relevant coastal hazards, including the following:

a) Storm tide inundation (including depth and velocities on inundation);
b) storm wave overtopping of coastal foreshores (for areas potentially affected);
c) sustained storm erosion of soft sediment foreshores (for areas potentially affected);
d) long-term recession of foreshores due to longshore sediment transport differentials, migration and geomorphologic changes to estuaries and tidal inlets, and impacts of other works and structures along the shoreline (for areas potentially affected);
e) gradual increase of area affected by permanent tidal inundation due to future climate change (for areas potentially affected).

As well as present day coastal hazards, the Site Based (Localised) Coastal Engineering Report is to establish and consider future coastal hazards. This will require the assessment of the expected response of the coastline and low-lying coastal floodplains to future climate change conditions, including sea level rise.

If necessary, the Site Based (Localised) Coastal Engineering Report is to detail mitigation measures required to manage coastal hazards in order to achieve the development outcomes listed above. The mitigation measures are to:

a) consider the full range (5%, 1%, 0.1% and 0.01% AEP) of potential coastal storm events and storm tide events;
b) ensure that the structural integrity of the development is maintained, in accordance with the requirements of the Structural Engineering Design Report;
c) be wholly located on the site;
d) not cause any off-site impacts including exacerbating coastal risks on adjacent properties or elsewhere in the coastal zone;
e) ensure the relevant overall outcomes and performance outcomes of the Coastal hazard overlay code are achieved.

The Site Based (Localised) Coastal Engineering Report is to be prepared and certified by a Registered Professional Engineer of Queensland (RPEQ) with appropriate expertise in coastal engineering and management.

3.4 Site Based (Localised) Flood Report

A Site Based (Localised) Flood Report is a requirement for development involving filling and excavation on land affected by the Flood hazard overlay or Coastal hazard overlay. Specifically, a Site Based (Localised) Flood Report is required to accompany a development application for the following activities:

a) development involving filling in any part of the Coastal planning area, as defined in the Coastal hazard overlay;
b) development involving filling in the Medium or Balance flood planning area , as defined in the Flood hazard overlay.

Note that filling in a High risk area defined in the Flood hazard overlay is not intended, while filling in a Medium risk area in the Flood hazard overlay is only intended where the site is also located in the Coastal hazard overlay and the filling of the site is permissible under the Coastal hazard overlay code.

The level of filling is defined in the Flood hazard overlay code and in the Coastal hazard overlay code and depends on the location of the site within the hazard subcategories within the overlay.

Where a Site Based (Localised) Flood Report is required, it is to be included as part of an application for a development permit under the Planning scheme. The report may be a standalone document or incorporated into a broader flood planning study conducted for the development.

The Site Based (Localised) Flood Report is to be prepared in accordance with the current industry practice for flood impact assessments, as outlined in the following:

a) Australian Rainfall and Runoff – updates and revisions being released periodically;
b) Moreton Bay Regional Council Floodplain Risk Management Framework (2015) including Practice Notes (where available);
c) State Planning Policy – state interest guideline: Natural hazards, risk and resilience;
d) State Planning Policy – state interest guidance: Natural hazards, risk and resilience – Technical Manual, An example: Terms of reference for undertaking a flood hazard investigation;
e) State Planning Policy – state interest technical manual: Natural hazards, risk and resilience – Technical Manual, A 'fit for purpose' approach in undertaking natural hazard studies and risk assessments;
f) Queensland Urban Drainage Manual.

The Site Based (Localised) Flood Report is to be prepared and certified by a Registered Professional Engineer of Queensland (RPEQ) with appropriate expertise in flood impact assessments.

The Site Based (Localised) Flood Report is to document the outcomes of a localised flood investigation, which has been carried out in support of the development. For consideration by the Council, the Site Based (Localised) Flood Report is to demonstrate that the proposed development, including filling (and excavation if included) of the site does not:

a) cause an increase in flooding or drainage risks to surrounding properties or elsewhere on the floodplain;
b) does not impede the flow of floodwaters across the site and/or cause any worsening of flood or coastal hazards (levels, velocities, hazard categories) on neighbouring properties; and
c) does not change the timing of the flood wave or impact on flood warning times.

The scope of the localised flood investigation is to generally accord with the following:

a) investigate the hydraulic characteristics of the waterway for the pre- and post-development scenarios;
b) determine whether the development is likely to cause any adverse impacts to upstream or downstream properties;
c) determine whether the cumulative impact of development is likely to cause an adverse impact on other properties elsewhere in the floodplain;
d) Determine the flood mitigation requirements and demonstrate that they can be implemented through on-site works.

An adverse off-site impact is defined by the following conditions:

a) Flood or Storm Tide levels increase on Department of Transport and Main Roads infrastructure; or
b) Flood or Storm Tide levels increase by more than 0.02m; or
c) Flow velocities increase by more than 0.1m/s; or
d) Any increase to the Flood or Coastal Hazard categories.

Flood and storm tide information on a lot-by-lot basis is available from Council's Flood Check Property and Development Reports. Council has prepared detailed flood models for all fourteen minor basins across the local government area, as well as a storm tide study, which have been integrated into a consolidated Regional Floodplain Database. The localised flood investigation is to utilise appropriate information from Council's Regional Floodplain Database as relevant inputs into this assessment. For larger developments the use of Council's flood models for assessment purposes is recommended (refer Section 3.7.3 for further details regarding Council's model packages).

The Site Based (Localised) Flood Report is to contain, as a minimum, the following:

a) a site survey plan showing drainage easements, waterway corridors, cadastral boundaries, ground levels, structures, trees, fences, kerb and road levels, pipe invert levels and pit surface levels for the existing and proposed conditions;
b) the modelling information detailed in Section 3.7 below;
c) a flood model layout, including ground elevations, adopted surface roughness and structures;
d) a catchment plan showing sub-catchments, flowpaths and inundation extents and levels for the existing and proposed conditions;
e) the proposed site layout, including an earthworks plan, the proposed development levels and mitigation measures etc;
f) the model results for flood behaviour (levels, velocities, hazards) including difference plots between existing and proposed conditions across the site and in surrounding properties, for the 5%, 1% and 0.1% Annual Exceedance Probability (AEP) events and the DFE for Flood and Storm Tide, where applicable;
g) discussion and assessment of impacts of flooding on the proposed development;
h) discussion and assessment of the impacts of the proposed development on flooding elsewhere, including confirmation that there are no adverse off-site impacts as a result of the proposed development;
i) a statement of compliance with relevant requirements in the overall outcomes and performance outcomes outlined in the Flood hazard overlay code and in the Coastal hazard overlay code.

Where compensatory earthworks are required as part of the solution identified in the Site Based (Localised) Flood Report, these are to be undertaken in accordance with Section 4.2 of this policy.

Where the proponent chooses to make use of Council's Regional Flood Database (RFD) model, additional requirements and guidance may be provided as part of the licence arrangements.

3.5 Site Based (Localised) Overland Flow Report

A Site Based (Localised) Overland Flow Report is a requirement for development that is located in a designated overland flow path as defined by the Overland flow path overlay.

The purpose of the Site Based (Localised) Overland Flow Report is to demonstrate that the development:

a) will not result in a material increase in flood level or flood hazard on upstream, downstream or surrounding properties; and
b) will provide acceptable management of flood risk with appropriate development levels to ensure the safety of people.

The Site Based (Localised) Overland Flow Report differs from a flood report in that overland flows are essentially shallow surface flows that discharge to the piped drainage system or a natural waterway. Overland flows are difficult to establish through computer models, given the fine resolution of the flow paths and controlling structures and topographic features. Rather, flowpaths are defined based on general landform characteristics, built structures (including fences, retaining walls and landscaping) and the existing stormwater network. In contrast, the site based flood report (Site Based (Localised) Flood Report) is more targeted at defined watercourses that can have significant increase in water levels in response to catchment rainfall and runoff.

In preparing the Site Based (Localised) Overland Flow Report, the following considerations are required:

a) proposed development is to take account of existing or created overland flow paths and make due provision in the design of the site stormwater system;
b) maximum overland flow velocity should not exceed 2m/s with a depth not exceeding 300mm;
c) overland flow paths should be located along roads and reserves rather than across private property;
d) development of the site should preserve existing overland flow paths as far as practical;
e) design is to be in accordance with QUDM.

The Site Based (Localised) Overland Flow Report is to provide calculations and other necessary evidence to demonstrate the following:

a) impacts of the proposed development on localised flooding are mitigated and surrounding properties (upstream and downstream) are not adversely affected;
b) relevant overall outcomes and performance outcomes of the Values and Constraints - Overland flow path of the applicable code have been achieved.

The Site Based (Localised) Overland Flow Report is to be included as part of an application for a development permit under the Planning scheme and may be a standalone document or incorporated into a broader flood planning study conducted for the development.

The Site Based (Localised) Overland Flow Report is to be prepared in accordance with the current industry practice for overland flow impact assessments.

The Site Based (Localised) Overland Flow Report is to be prepared and certified by a Registered Professional Engineer of Queensland (RPEQ) with appropriate expertise such as hydrology, hydraulic modelling and stormwater engineering.

3.6 Drainage Master Plan

Development within a Drainage investigation area is to be in accordance with a Council approved Drainage Master Plan.

The Drainage Master Plan will be prepared by the following:

a) the Council in which case it will be adopted by the Council and included in Appendix 1 of the planning scheme policy; or
b) the applicant for a development approval and approved by the Council as part of the development approval for the development.

The Drainage Master Plan prepared by the applicant is to identify all planning and design standards and outcomes, regulatory provisions, works and land transfers necessary to implement a stormwater management solution which will mitigate flood hazard on the site and within the Drainage investigation area sufficient to support the proposed development and meet the relevant provisions and outcomes of the Flood hazard overlay code.

The intent of the Drainage Master Plan is to provide an overarching plan which coordinates land use, built form and infrastructure in a manner that provides clear direction on the development capability of the Drainage investigation area, sets out infrastructure (including mitigation infrastructure) requirements and responsibilities, and addresses the risk to which the area is subject.

The Drainage Master Plan is to be prepared for the whole Drainage investigation area within which the development site is located, unless otherwise agreed with the Council.

The Drainage Master Plan is to be prepared in accordance with the requirements for a Master Drainage Plan, as outlined in Section 2.5 of QUDM, as well as the following additional criteria:

a) completion of detailed master planning, preparation of appropriate development controls and identification of suitable works which:
    i) identify opportunities to support development of the area consistent with the underlying zone or local plan, including preparation of any area-specific development standards necessary to bring effect to any works or make further improvements to flood risk reduction;

ii) provide for dedication of land or acquisition of strategically selected properties to provide surface flow paths; and
iii) address the purpose and relevant provisions of the Flood hazard overlay code;

b) an assessment of possible interim impacts of the Drainage Master Plan where delivery is likely to span long term periods;
c) an assessment of the effectiveness of the overall scheme in reducing flood risk.

Where the area subject to a Drainage Master Plan is also located within the Coastal planning area, consideration is also to be given to:

a) storm tide inundation including depth and velocities on inundation;
b) storm wave overtopping of coastal foreshores;
c) sustained storm erosion of soft sediment foreshores;
d) long-term recession of foreshores due to longshore sediment transport differentials, migration and geomorphologic changes to estuaries and tidal inlets, and impacts of other works and structures along the shoreline (where appropriate); and
e) gradual increase of area affected by permanent tidal inundation due to future climate change (where appropriate).

A timeframe of 2100 is considered appropriate for identifying and managing future coastal hazards affecting the Drainage Investigation Area. Changes to sea level rise, storm frequency and wave climate will need to be considered and accommodated.

The Drainage Master Plan is to document a detailed hydraulic analysis of the proposed stormwater drainage system which is required to support the development and is to be prepared in conjunction with the requirements of *PSP - Stormwater Management* and *PSP - Integrated Design*.

The Drainage Master Plan is to be provided as part of a development application for development which is subject to a Drainage Master Plan. Where a Drainage Master Plan has not been adopted by the Council, the applicant for the development approval is to submit a Drainage Master Plan for approval by the Council as part of the development application.

The Drainage Master Plan is to be prepared and certified by a Registered Professional Engineer of Queensland (RPEQ) with appropriate expertise such as civil or stormwater engineering.

Where the Drainage Master Plan includes coastal hazard considerations, the Drainage Master Plan is to be prepared and certified by a Registered Professional Engineer of Queensland (RPEQ) with appropriate expertise such as coastal engineering.

3.6.1 Future Drainage Investigation Area - Male Road

Further investigations will occur to determine if there is potential for infrastructure solutions to help reduce the extent and degree of flood risk currently present in the Rural residential zoned area adjoining Male Road, Caboolture (see Appendix 2).

3.7 Computer Modelling

Good modelling practice is required to ensure accurate and reliable outcomes. Modellers must understand the limits and sensitivities of their models and the accuracy of the predicted outcomes. Models must be acknowledged as a coarse simplification of complex processes with their accuracy limited by terrain data and uncertainty in key parameters that can vary such as rainfall, roughness and blockage. Models must be calibrated or validated against a number of varying storms where data is available to provide confidence in the results. Although absolute flows and water levels can be subject to varying degrees of uncertainty, the difference or afflux between the model outputs for the before and after scenarios is expected to be reasonably accurate as any assumptions or inaccuracies will be present in both scenarios.

Each technical report will also need to include the following details with regards to the computer modelling undertaken:

a) modelling software utilised, including the version/revision number;
b) design/data inputs, including their source;
c) modelling methodology;

d) modelling parameters, assumptions and limitations;
e) results of any sensitivity testing of key parameters;
f) calibration/verification results;
g) model modifications undertaken if using Council's model packages (refer to Section 1.12.3);
h) quality checks including model log and error reporting (message and check) files,
i) results including relevant mapping
j) interpretation and recommendations

Council is to receive the final models with all associated input data files and results. A model log describing the relevant model names, scenarios and key differences is to be included with the model.

Additional guidance on best practice computer modelling can be referenced in Australian Rainfall and Runoff (AR&R) and Australian Runoff Quality (ARQ).

Council has internal modelling expertise and prefers the use of runoff routing and hydraulic models as described below. Alternative models will be considered but it is recommended to receive Council's acceptance of the use of these alternative models prior to their adoption.

3.7.1 Hydrological modelling

Hydrological modelling is used to predict peak flow rates, flow volumes and hydrograph shapes for varying storm events and durations. Models can be based on individual rainfall events or continuous, long term simulations. Continuous models are usually used for assessing the impact to the hydrological cycle. Individual rainfall event simulations are typically used for the design of major stormwater systems. Dynamic or unsteady modelling is required to assess peak flow and storm volumes to understand the impact of changing floodplain storage and the time for flows to peak.

Hydrological modelling is to be completed based on the recommendations provided in AR&R.

Council's preferred hydrologic model is the Watershed Bounded Network Model (WBNM) developed by Michael Boyd, Ted Rigby & Rudi van Drie.

3.7.2 Hydraulic modelling

Hydraulic models are used to determine the area of inundation, flood level and flow velocity to assist with identifying flood hazards. Models can be either one dimensional with a defined flow path (either a pipe or surface/overland flow), two dimensional with an undefined flow path, or a combined one/two dimensional model. Specialist three dimensional models may be applicable for complex hydraulic structures or water quality modelling.

It is recommended that all hydraulic modelling should be undertaken in accordance with the Regional Floodplain Database methodology. Relevant reports describing this methodology are downloadable from Council's website.

The DFE for Flood comprises the upper envelope of a number of storm/catchment scenarios as follows:

a) 1% AEP flood event using ARR design rainfalls
b) 1% Moreton Bay Design Storm (MDS) event which is a 15 minute in 270 minute embedded design storm (15min burst inside a 270 minute burst with storm 'wings' scaled down to preserve overall volume of an ARR design burst)
c) 1% MDS event with Moderate structure blockage – refer to report *Regional Floodplain Database - Floodplain Parameterisation* (SKM, 2012) report downloadable from the Council website.
d) 1% MDS event with 20% Increase in rainfall
e) 1% MDS event with 20% Increase in rainfall and increased downstream boundary (0.8m sea level rise for coastal models and 0.02% AEP event for inland models)

f) 1% MDS event with Medium Dense Vegetation changed to High Dense Vegetation and Low grass/grazing changed to Medium Dense Vegetation within the 1% AEP floodplain to reflect future revegetation.
g) 1% MDS event with Medium Dense Vegetation changed to High Dense Vegetation and Low grass/grazing changed to Medium Dense Vegetation within the 1% AEP floodplain and impact of increased residential development (Change in minor catchment fraction impervious) (this applies only to selected minor basins where urban development is a feature).

Council's preferred hydraulic model is TUFLOW developed by Bill Syme. However in some cases alternate software may be justified depending on the nature of the hydraulic behaviour being assessed. The model complexity must match the complexity of the floodplain and catchment.

3.7.3 Regional Floodplain Database Model Packages

The Regional Floodplain Database model library includes fourteen coupled hydrologic and hydraulic models, one for each of the fourteen 'minor basins' within the Moreton Bay Regional Council area. These model packages are available for purchase and can be requested online via Council's Flood Check website https://www.moretonbay.qld.gov.au/floodcheck/

The following is provided when purchasing a model package for a chosen minor basin:

Hydrologic model - WBNM.

a) GIS files - Minor Catchments, Stream Reaches and Stream Junctions
b) Model run files
c) Model result files
    i) 14 ARI's for 10 storm durations;
    ii) 3 Moreton Bay Design Storm (MDS) simulations.

Hydraulic model - TUFLOW.

a) GIS Files - MapInfo MID/MIF input files
b) Model input files, run files
c) Model results files
    i) 14 ARI's for 3-4 durations (varies depending on the minor basin)
    ii) 10 scenarios using the MDS (including DFE scenarios)
d) Result file formats
    i) flt max grids for h, d, V, Z0, ZQRA, ZMBRC (Flood modelling) and Z9 (Storm Tide modelling)
    ii) xmdf - Time series data for h, d, V, q, SP, Z0, ZQRA, ZMBRC (Flood modelling), Z9 (Storm Tide modelling) and any standard TUFLOW outputs
    iii) WRB - WaterRIDE file containing information regarding DEM, velocity and water level
e) Landuse input files based on 2013 Aerial photography
f) Latest LiDAR (2014) (within the model code boundary) as well as modifiers for post LiDAR developments where applicable and available. One or more of the following formats can be used for the modifiers: txt, 12da, asc, MID/MIF, grd and tin.

MBRC does not provide models for the estimation of Overland Flow.

4. Filling requirement

4.1 Concurrent Fill Requirements

Fill requirements for sites located within the Flood planning area or the Coastal planning area are detailed in the Flood hazard overlay code and in the Coastal hazard overlay code respectively. For sites that are within both overlays, the requirements of the higher risk area prevail. Filling requirements for sites within both overlays are summarised in Table 3.

Table 3 Concurrent fill level requirements

		Flood Overlay Code						
		High LDZ	High Non LDZ	Medium	Balance flood planning area	Drainage investigation area		
						High Risk	Med Risk	Balance flood planning area
COASTAL OVERLAY CODE	Erosion Prone Area (EPA)	No filling	No filling	No filling	No filling	As per DMP		
	High LDZ	No filling	No filling	No filling	No filling			
	High Non LDZ	No filling	No filling	No filling	HAT2100 (max)			
	Medium	No filling	No filling	Minimum HAT2100	Minimum flood planning level			
	Balance coastal planning area	No filling	No filling	Minimum flood planning level	Minimum flood planning level			

Notes:

DFE	Level of the Defined Flood Event relevant for the subject site.
HAT2100	Year 2100 Highest Astronomical Tide level
LDZ	Limited Development (Constrained Land) Zone
DMP	Drainage Master Plan

4.2 Compensatory Earthworks

4.2.1 Works within a Defined Flood Event area of inundation

Works within the area of inundation for the Defined Flood Event do not involve any of the following:

a) any physical alteration to a watercourse or floodway affecting its flow capacity;
b) any native vegetation clearing;
c) any increase in the rate of release of stormwater runoff from the premises to the area of inundation for the Defined Flood Event;
d) altering the existing surface levels to adversely impact flood immunity of surrounding properties;
e) filling or excavation below the Defined Flood Event inundation level inclusive of any previous occurrences of filling or excavation on the site that reduces the flood storage volume or increases flow velocities resulting in erosion, except for compensatory earthworks which are permitted to occur within a Defined Flood Event area of inundation but only under limited circumstances; or
f) any physical alteration of the watercourse or floodway within 30m landward of its top of bank.

4.2.2 Compensatory earthworks impact within a Defined Flood Event area of inundation

Compensatory earthworks seek to allow for limited cut and fill to occur, at the same incremental level, within the Defined Flood Event and achieving a nil impact on the hydraulic characteristics of the waterway or floodway. The purpose for allowing limited compensatory earthworks is to allow for the regularisation of development parcels subject to a Defined Flood Event constraint.

Where compensatory earthworks occur within the Defined Flood Event, such earthworks are only acceptable where they do not adversely impact upon the hydraulic characteristics of a waterway or floodway. Adverse impacts can be actual, potential or cumulative, and can result in adverse impacts downstream from where the earthworks occur. Earthworks which are not compensatory can result in:

a) a reduction in the flood-capacity of a waterway or floodway;
b) a reduction in flood storage;
c) altering of the hydraulic control (flow, velocity and direction) of a watercourse;

d) an increased or new scouring and sedimentation.

Compensatory earthworks are acceptable if:

a) the total area of cut or fill does not exceed 20% of the site below the Defined Flood Event;
b) the total volume of "cut to fill" plus any imported fill (in m^3) does not exceed the volume (in m^3) calculated by multiplying the site area below the Defined Flood Event (in hectares) by 250;
c) any physical alteration of the waterway or floodway occurs no closer than 30m from the top of the bank;
d) the fill area is free draining.

4.2.3 Typical compensatory earthworks

Figure 4 identifies an acceptable layout for compensatory earthworks where cut and fill within the Defined Flood Event are effectively undertaken at the same level and in excess of 30m from the top of the bank of the watercourse. Figures 5 and 6 identify unacceptable layout for compensatory earthworks as cut and fill within the Defined Flood Event are not undertaken at the same level and are within 30m from the top of the bank of the watercourse.

Figure 4 Acceptable compensatory earthworks

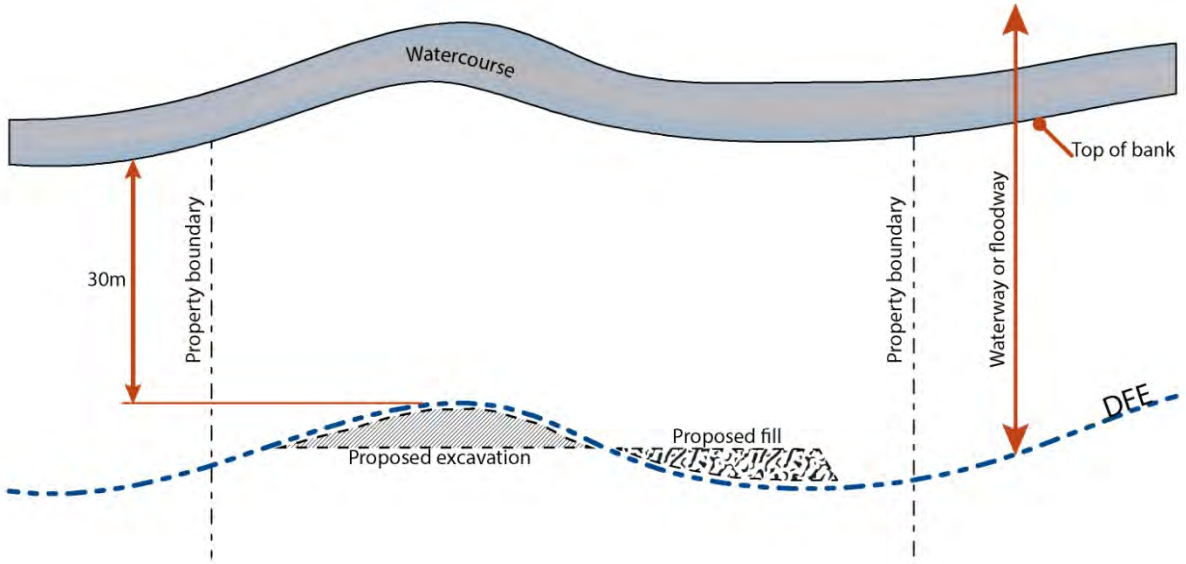


Figure 5 Unacceptable compensatory earthworks

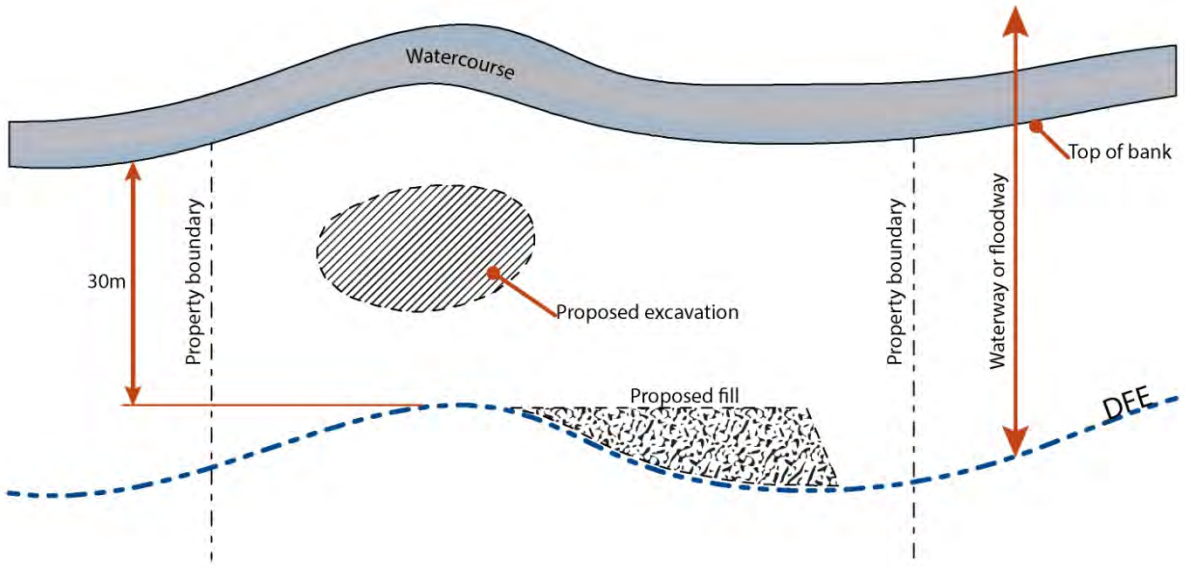
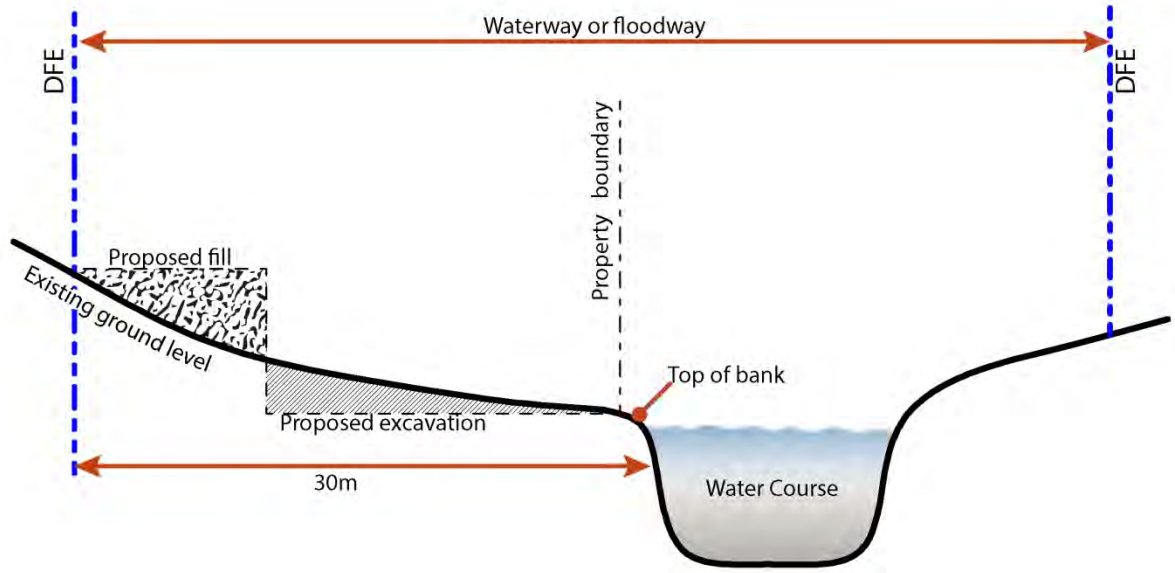


Figure 6 Unacceptable compensatory earthworks



Appendix 1

Drainage Investigation Areas having a Council adopted Drainage Master Plans

Item	Council Adopted Drainage Master Plans	
1	Drainage Investigation Area 4, Woody Point (Figure 8.2.2.3 in the Flood hazard overlay code)	
2	Drainage Investigation Area 6, Margate (Figure 8.2.2.4 in the Flood hazard overlay code)	
3	Drainage Investigation Area 11b, Scarborough (Figure 8.2.2.6 in the Flood hazard overlay code)	
4	Drainage Investigation Area 12, Scarborough (Figure 8.2.2.6 in the Flood hazard overlay code)	
5	Drainage Investigation Area 16, Burpengary (Figure 8.2.2.9 in the Flood hazard overlay code)	

DRAINAGE MASTER PLAN

DRAINAGE INVESTIGATION AREA 4, WOODY POINT

DRAINAGE MASTER PLAN FOR DRAINAGE INVESTIGATION AREA 4

1 INTRODUCTION

1.1 Introduction and Purpose of Drainage Master Plan

This Drainage Master Plan (DMP) applies to Drainage Investigation Area (DIA) 4 identified in Figure 8.2.2.3 of the Flood Hazard Overlay Code. This DMP has been prepared by the Moreton Bay Regional Council in accordance with section 3.6 of the Planning Scheme Policy – Flood Hazard, Coastal Hazard and Overland Flow.

The purpose of the DMP is to identify:

(a) the flood and drainage constraints affecting DIA 4;
(b) the flood mitigation strategy for DIA 4 that achieves overall outcome d. of the Flood Hazard Overlay Code in a way intended to facilitate development outcomes in the DIA consistent with the Urban Neighbourhood Precinct of the General Residential Zone;
(c) the particular components of the flood mitigation strategy that will be undertaken by the Council; and
(d) the particular components and applicable standards of the flood mitigation strategy that are required to be undertaken by applicants as part of carrying out assessable development.

The DMP contains the following sections:

- Section 1 (this section) – providing an introduction and confirming when the DMP applies to assessable development;
- Section 2 – Providing an overview and description of the DIA, a summary of the flood issues relevant to the DIA and summary of the planning context/intent;
- Section 3 – Providing a description of the flood risk mitigation strategy and the different components of the strategy;
- Section 4 – Identifying the preferred implementation and sequencing of the flood mitigation strategy; and
- Section 5 – The design standards and requirements for works for all aspects of development (i.e. material change of use, reconfiguring a lot, building work and operational work) in addition to the requirements otherwise required by the MBRC Planning Scheme.

1.2 Application of DMP

This DMP applies to development carried out in DIA 4 where required in accordance with the Flood Hazard Overlay Code.

This DMP identifies standards for carrying out development in addition to the applicable planning scheme codes.

This DMP does not apply to development identified as exempt in Part 5.10.2 Levels of Assessment for the Flood Hazard Overlay.

2 DIA DESCRIPTION

2.1 Overview/Description of DIA

DIA 4 is located in the suburb of Woody Point, located in the southern area of the Redcliffe Peninsula of the Moreton Bay Region. Refer to Figure 1 identifying the location of DIA 4 in Woody Point.

Figure 1: DIA 4 Location Map

Source: MBRC Aerial Photography, 2015

DIA 4 comprises an area of approximately 60,000m^2 and includes properties located at the western end of Alfred Street, Lilla Street and Woodcliffe Crescent. DIA 4 also includes properties along Oxley Avenue extending towards the southern coastline of the peninsula. Refer to Figure 2 for a map of the DIA 4.

Figure 1: DIA 4

Source: MBRC Interactive Mapping, 2016

DIA 4 contains a variety of housing types including detached residential housing, low-scale multiple dwellings to high rise residential developments. DIA 4 also includes a number of restaurants, cafes and other small-scale non-residential activities to support the locality. DIA 4 is located a short distance from the Margate district centre and is accessible to a number of open space areas, beaches and local parks, including Crockatt Park and Woody Point Park (South) which is located opposite DIA 4.

The DIA 4 contains areas with sloping terrain with the highest point located in the north-eastern area of DIA 4 and sloping downwards towards the peninsula shoreline to the south. Refer to Figure 3 below for a contour map of the area.

Figure 2: Contour Map

Source: MBRC Contours, 2016

2.2 Summary of Flood Issues affecting the DIA

The flooding issues affecting DIA 4 are characterised by surface flow flooding through a natural gully that runs roughly perpendicular to roads in the area cause by:

- variations in the topography of the land that slope towards the rear of a large number of affected lots;
- private properties that are similar in elevation to the surrounding road network which has created natural gullies along common rear boundaries; and
- the limited capacity of the existing drainage system to cater for minor storm events.

In the 1% AEP flood event it is estimated the majority of properties within the DIA are inundated to some degree (i.e. prior to the implementation of the flood risk mitigation strategy contained in this DMP).

Refer to Figure 4 identifying the 1% AEP flood map for DIA 4.

Figure 4: 1% AEP Flood Map

Source: MBRC Flood Explorer, 2016

2.3 Planning Context and Intent

DIA 4 is mostly included in the Urban Neighbourhood Precinct of the General Residential Zone supported by parks around Woodcliffe Street included in the Recreation and Open Space Zone. Accordingly development outcomes expected by the DMP are those identified in the purpose and overall outcomes of the General Residential Zone Code and the Recreation and Open Space Zone. In summary this includes a diverse mix of residential uses at a scale and density that facilitates efficient land use patterns and supports compact, walkable and sustainable communities that are well connected.

Outcomes for other aspects of development not addressed by the zone codes (e.g. reconfiguring a lot, operational work etc) are expressed in the relevant planning scheme codes and continue to apply to development in the DIA.

Development outcomes in DIA 4 prior to the implementation of the flood risk mitigation strategy in this DMP are constrained due to the flood impacts affecting the area. The implementation of the DMP and development standards supports the intended high dwelling density at this location (consistent with the zone outcomes) in conjunction with the implementation of the DMP.

Refer to Figure 5 identifying the planning scheme zone applying to DIA 4.

Figure 5: Planning Scheme Zone

Source: MBRC Interactive Mapping, 2016

3 FLOOD RISK MITIGATION STRATEGY

3.1 Overview/Summary

The general approach to the flood risk mitigation strategy in DIA 4 is to increase the capacity of the drainage system to allow for filling of allotments to achieve appropriate flood immunity levels. Increasing the drainage capacity has the effect of reducing the known flood risk determined at the date of adoption of the planning scheme. In turn this allows the filling of all allotments in the DIA to flood immunity levels over time without exacerbating flood risks (as determined at the date of adoption of the planning scheme).

The flood risk mitigation strategy for DIA 4 therefore comprise:

(a) The flood risk mitigation to be undertaken by Council - Drainage upgrade works to part of the drainage network; and
(b) The flood risk mitigation to be undertaken by applicants - Filling of allotments within the DIA to the required flood immunity level.

Each of these components of the flood risk mitigation strategy are described in sections 3.2 and 3.3.

The flood risk mitigation strategy will reduce flood inundation across private properties within the DIA thereby substantially improving the development potential of the area. The implementation of the flood risk mitigation strategy will ensure that in the post-mitigation case for the 1% AEP flood event no properties are inundated.

3.2 Flood Risk Mitigation to be undertaken by Council

The flood risk mitigation measures to be undertaken by the Moreton Bay Regional Council are summarised below:

- Increase the drainage capacity of the stormwater network along Oxley Avenue between Alfred Street and Annie Street;
- Extend the drainage network further along Oxley Avenue from Alfred Street to Woody Point Park and a new outfall to Bramble Bay;
- Decommission the following existing drainage lines:
  - from the Alfred Street/Oxley Avenue intersection to Woody Point Memorial School of Arts;
  - from Oxley Avenue to Crockatt Park and the existing outfall to Bramble Bay;

- Retain existing parks in the southern area around Woodcliffe Street for their overland flow carrying function.

Details of the proposed work are included in *Appendix A - Flood Risk Mitigation to be undertaken by Council - Detailed Design DIA 4*.

The Council can be contacted to confirm the expected timing for commencement/completion of the drainage works to be undertaken by Council.

3.3 Flood Risk Mitigation to be undertaken by Applicants

The flood risk mitigation to be undertaken by applicants is to fill all allotments in the DIA to the Flood Planning Level (Defined Flood Event + required freeboard for the flood planning area).

Filling required in accordance with the standards identified in Section 5 is required not only to achieve flood immunity for individual properties but to specifically direct flood waters to the street and drainage network away from surrounding properties. Filling is a fundamental part of the flood mitigation strategy for the DIA as a whole and accordingly will be a mandatory condition of development across the entire development site.

The general approach to allotment filling is to provide a uniform grade with a minimum 1:100 crossfall to the street for the whole allotment/development site. Section 5 and Table 1 of the DMP identifies the detailed standards and circumstances where filling is required for all aspects of development (i.e. material change of use, reconfiguring a lot etc). Filling is required where carrying out a material change of use and/or reconfiguring a lot (other than a boundary realignment). Filling is permitted but not mandatory in other circumstances.

4 FLOOD RISK MITIGATION IMPLEMENTATION AND SEQUENCING

The drainage upgrade works to be carried out by Council as detailed in Section 3.2 must be completed before filling of allotments in accordance with the standards in Section 5 is permitted.

Filling proposed prior to the implementation of the drainage works to be carried out by Council is not in accordance with this DMP and subject to the respective performance outcomes of the Flood hazard overlay code.

5 REQUIREMENTS FOR WORKS AND DESIGN STANDARDS

The flood risk mitigation to be undertaken by applicants includes filling where required in accordance with Table 1.

Alternative approaches to the standards in this section are subject to assessment against the applicable performance outcomes of the Flood hazard overlay code.

Table 1 - Fill Requirements

Note: The drainage upgrade works to be carried out by Council as detailed in Section 3.2 must be completed before filling of allotments in accordance with the standards in Section 5 is permitted. Filling proposed prior to the implementation of the drainage works to be carried out by Council is not in accordance with this DMP and subject to the respective performance outcomes of the Flood hazard overlay code.

Aspect of Development	Filling Requirements	Minimum Fill Level	Minimum Extent of Filling	Notes
Material change of use And/or Reconfiguring a lot (other than a boundary realignment)	Filling is mandatory	Flood Planning Level	The entire allotment/development site area and meeting the following: (a) provide a minimum 1:100 uniform cross fall shaped to contains flood waters to the street and drainage network with the exception of meeting (b) and (c); (b) provide an accessible grade for vehicle access by the applicable design vehicle for the development from the street to the minimum fill level; and (c) ensure no worsening of flood impacts to other properties beyond known flood impacts at the date of adoption of the planning scheme.	The filling requirements outlined in this DMP must be considered in conjunction with the other applicable code requirements identified in the MBRC Planning Scheme. This may include consideration of, but not limited to: ▪ earthworks, drainage, filling and associated retaining walls to avoid adverse impacts on adjacent properties; and ▪ flood immunity requirements for building work and other components of development where not achieved by filling alone.

Aspect of Development	Filling Requirements	Minimum Fill Level	Minimum Extent of Filling	Notes
Reconfiguring a lot where for a boundary realignment	Filling is permitted but not mandatory	N/A	N/A	Filling is permitted and minimum fill levels are not regulated by the DMP for this aspect of development. Note: Maximum fill to DMP levels is encouraged. Where filling occurs, other applicable code requirements apply in the MBRC Planning Scheme. This may include consideration of, but not limited to: ▪ earthworks, drainage, filling and associated retaining walls to avoid adverse impacts on adjacent properties; and ▪ flood immunity requirements for building work and other components of development where not achieved by filling alone.

Aspect of Development	Filling Requirements	Minimum Fill Level	Minimum Extent of Filling	Notes
Operational work (filling or excavation only)	Filling is mandatory	Flood Planning Level	The entire allotment/development site area and meeting the following: (a) provide a minimum 1:100 uniform cross fall shaped to contains flood waters to the street and drainage network with the exception of meeting (b) and (c); (b) provide an accessible grade for vehicle access by the applicable design vehicle for the development from the street to the minimum fill level; and (c) ensure no worsening of flood impacts to other properties beyond known flood impacts at the date of adoption of the planning scheme.	The filling requirements outlined in this DMP must be considered in conjunction with the other applicable code requirements identified in the MBRC Planning Scheme. This may include consideration of, but not limited to: ▪ earthworks, drainage, filling and associated retaining walls to avoid adverse impacts on adjacent properties; and ▪ flood immunity requirements for building work and other components of development where not achieved by filling alone.

Aspect of Development	Filling Requirements	Minimum Fill Level	Minimum Extent of Filling	Notes
All other operational work where not associated with a material change of use or reconfiguring a lot	Filling is permitted but not mandatory	N/A	N/A	Filling is permitted and minimum fill levels are not regulated by the DMP for this aspect of development. The filling requirements outlined in this DMP must be considered in conjunction with the other applicable code requirements identified in the MBRC Planning Scheme. This may include consideration of, but not limited to: ▪ earthworks, drainage filling and associated retaining walls to avoid adverse impacts on adjacent properties; and ▪ flood immunity requirements for building work and other components of development where not achieved by filling alone.
Building work where not associated with a material change of use	Filling is permitted but not mandatory	N/A	N/A	Filling is permitted and minimum fill levels are not regulated by the DMP for this aspect of development. The filling requirements outlined in this DMP must be considered in conjunction with the other applicable code requirements identified in the MBRC Planning Scheme. This may include consideration of, but not limited to: ▪ earthworks, filling and associated retaining walls to avoid adverse impacts on adjacent properties; and ▪ flood immunity requirements for building work and other components of development where not achieved by filling alone.

Appendix A - Flood Risk Mitigation to be undertaken by Council

Detailed Design DIA4

Moreton Bay Regional

ENGINEERING, CONSTRUCTION & MAINTENANCE

AUTHORISATION

PROJECT INFORMATION

ISSUE

PROJECT DESCRIPTION

WOODY POINT
OXLEY AVENUE
DRAINAGE UPGRADE
DIA 4

STRUCTURAL NOTES

DRAWING NUMBER

16-752-012

SMEC

SMEC PROJECT NO: 3001864

Moreton Bay
ENGINEERING, CONSTRUCTION & MAINTENANCE
AUTHORISATION
PROJECT INFORMATION
ISSUE
PROJECT DESCRIPTION
WOODY POINT
OXLEY AVENUE
DRAINAGE UPGRADE
DIA 4
DRAINAGE STRUCTURES
SHEET 1 OF 9
DRAWING NUMBER
16-752-013
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CONCRETE ACCESS CHAMBER 02/01
SMEC

Moreton Bay
ENGINEERING, CONSTRUCTION & MAINTENANCE
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DRAINAGE STRUCTURES SHEET 2 OF 9
DRAWING NUMBER
16-752-014
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SMEC

Moreton Bay
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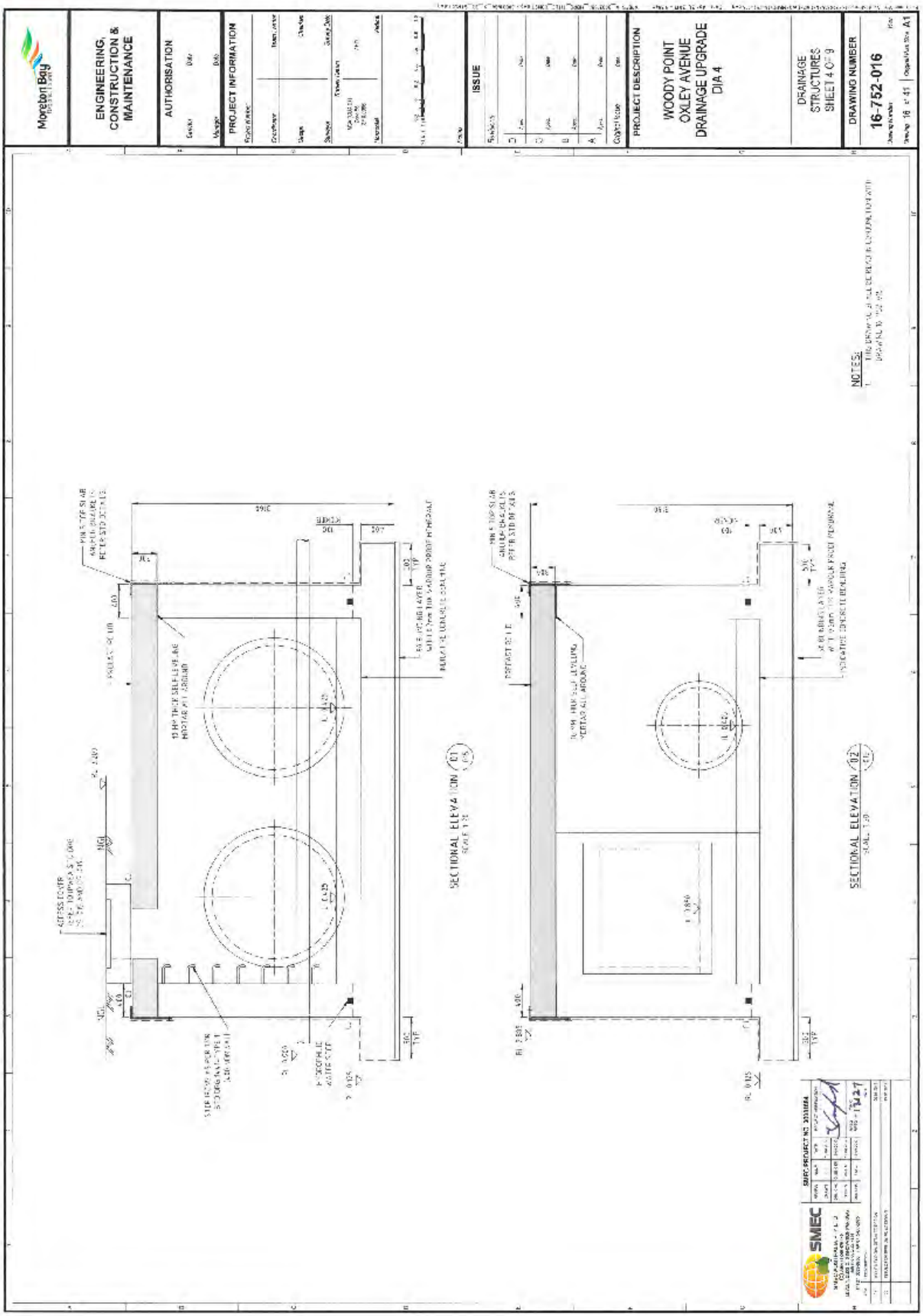
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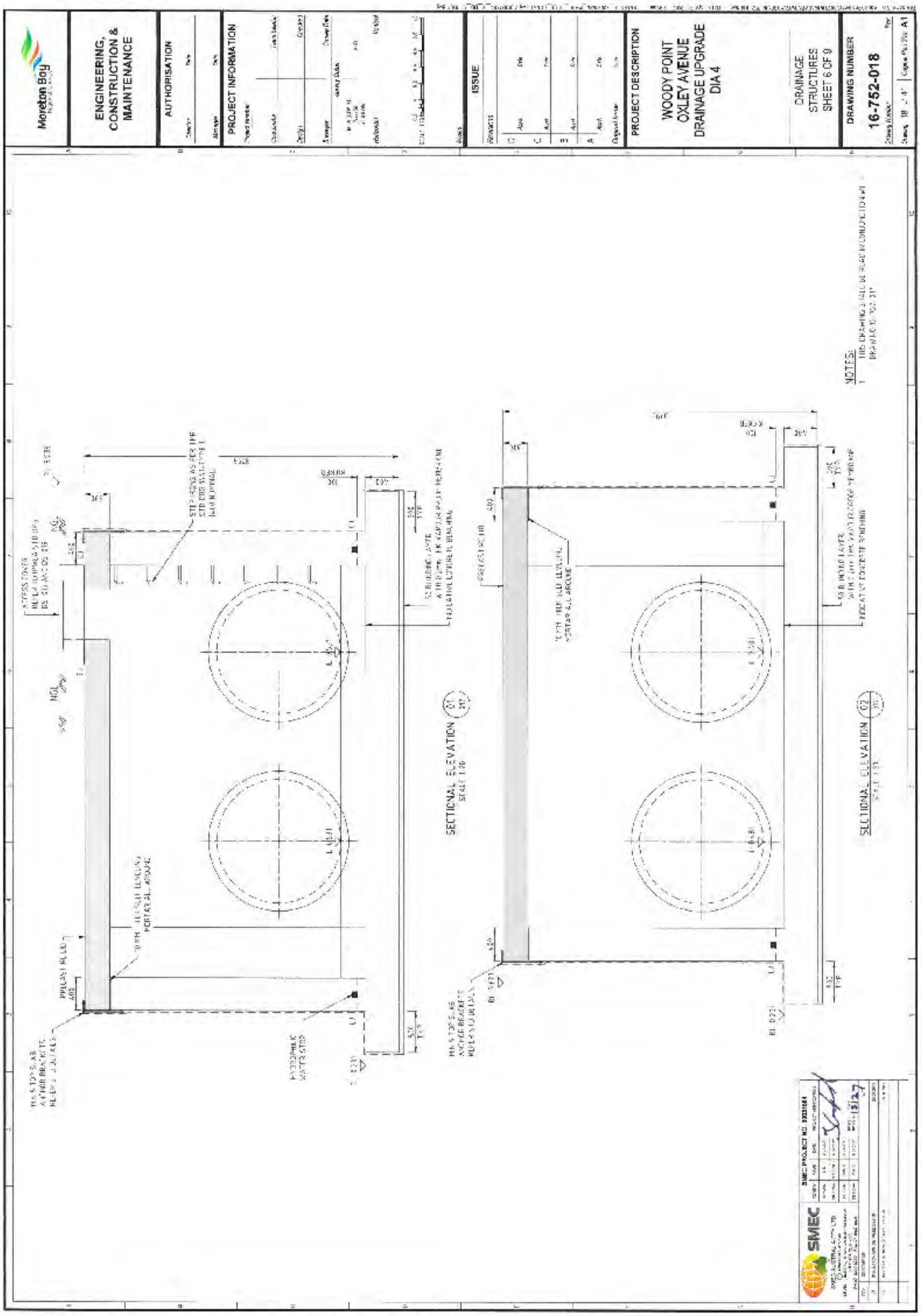
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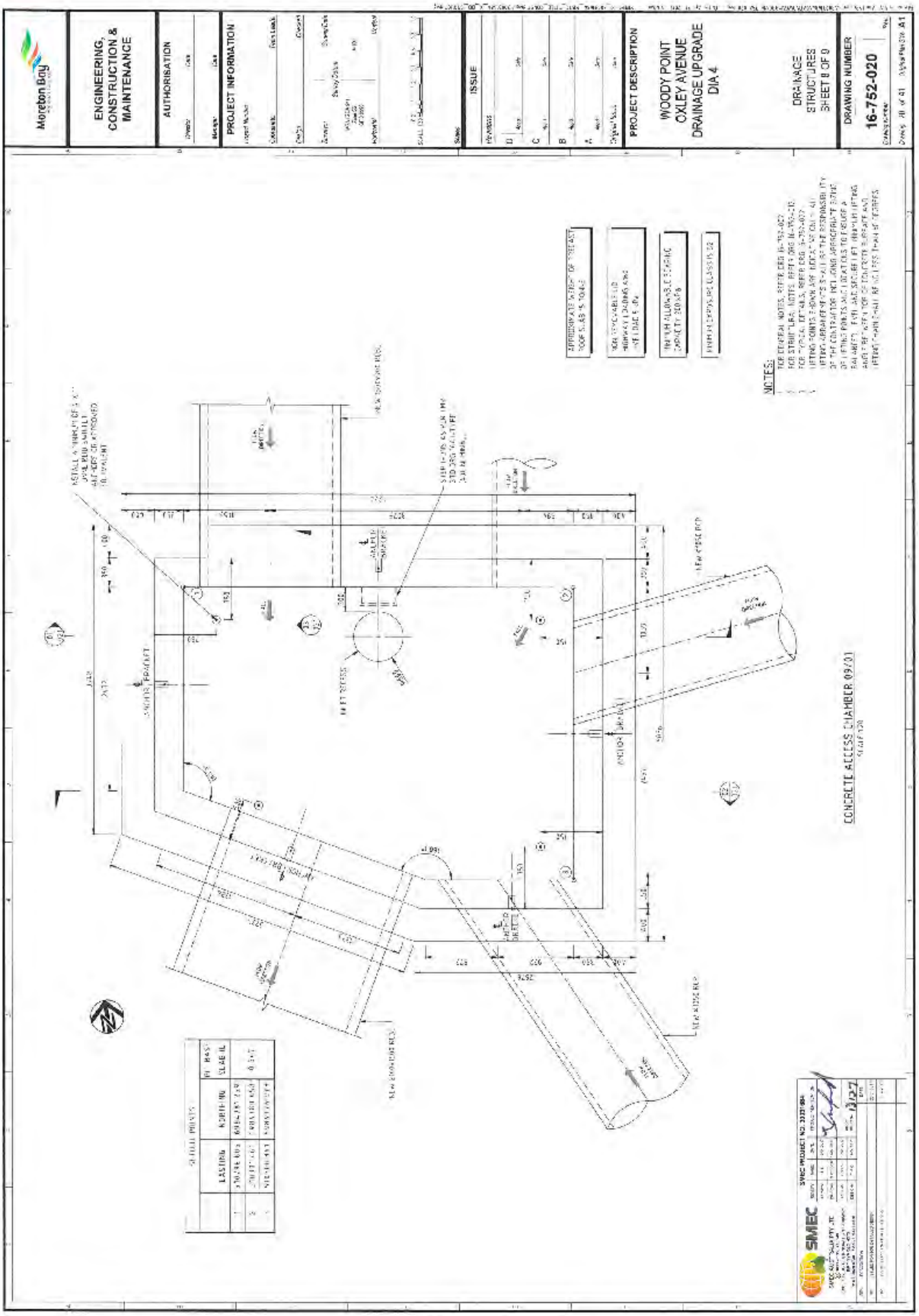
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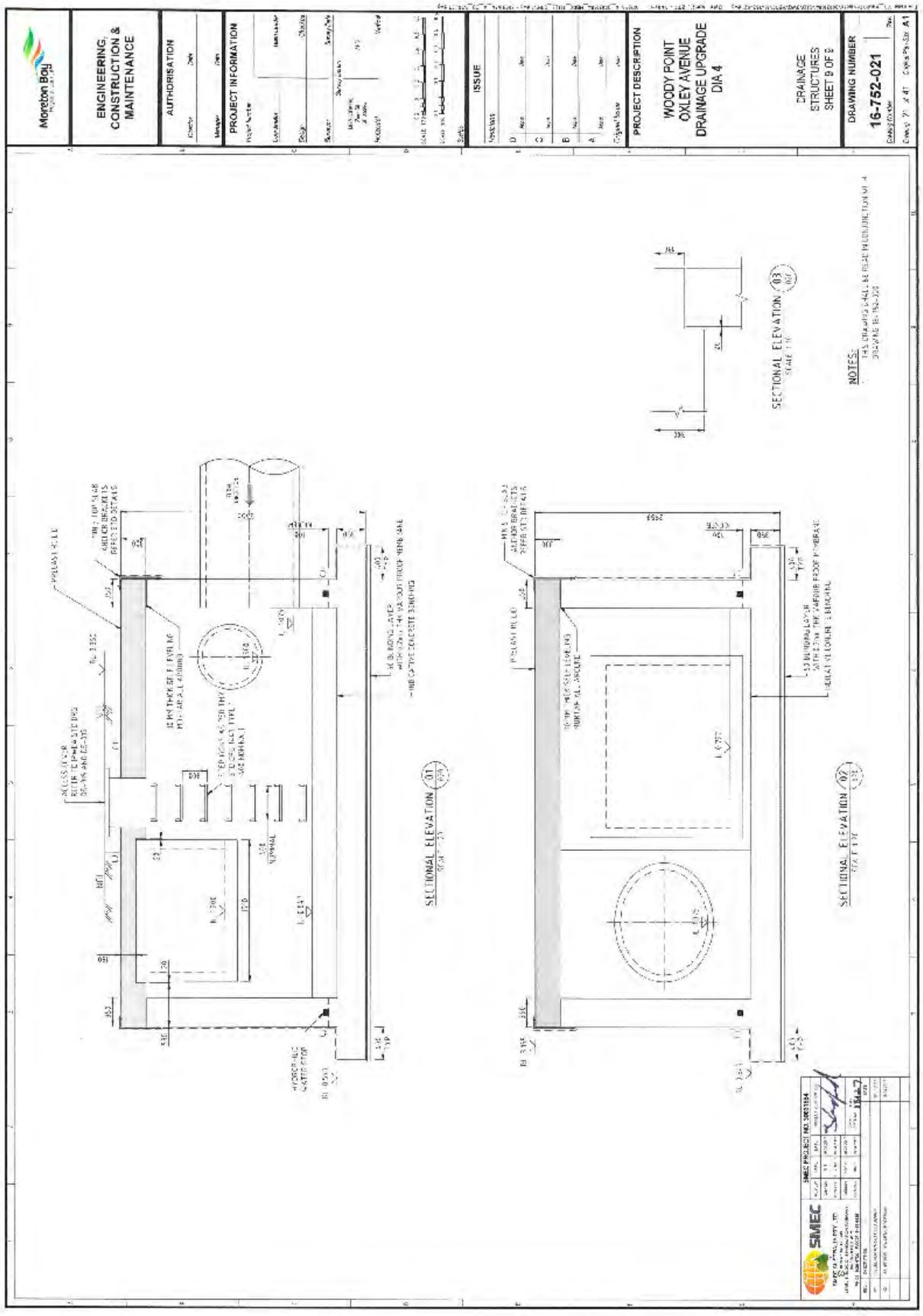
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SECTIONAL ELEVATION 02
SECTIONAL ELEVATION 03
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Moreton Bay
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TYPICAL CORNER DETAIL
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TYPICAL ADDITIONAL REINFORCEMENT DETAIL
AT SWEPT LIFT ANCHOR LOCATION
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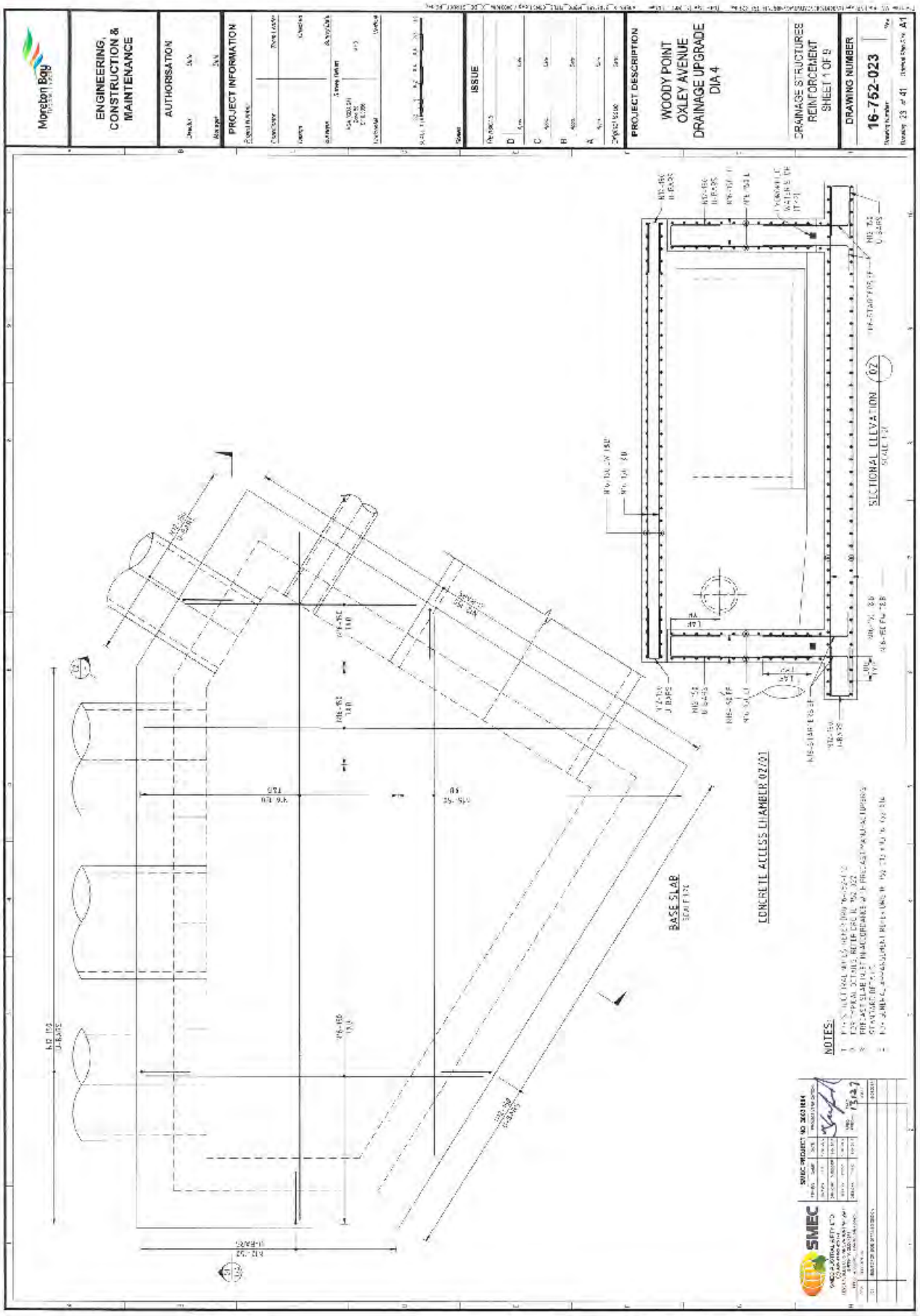
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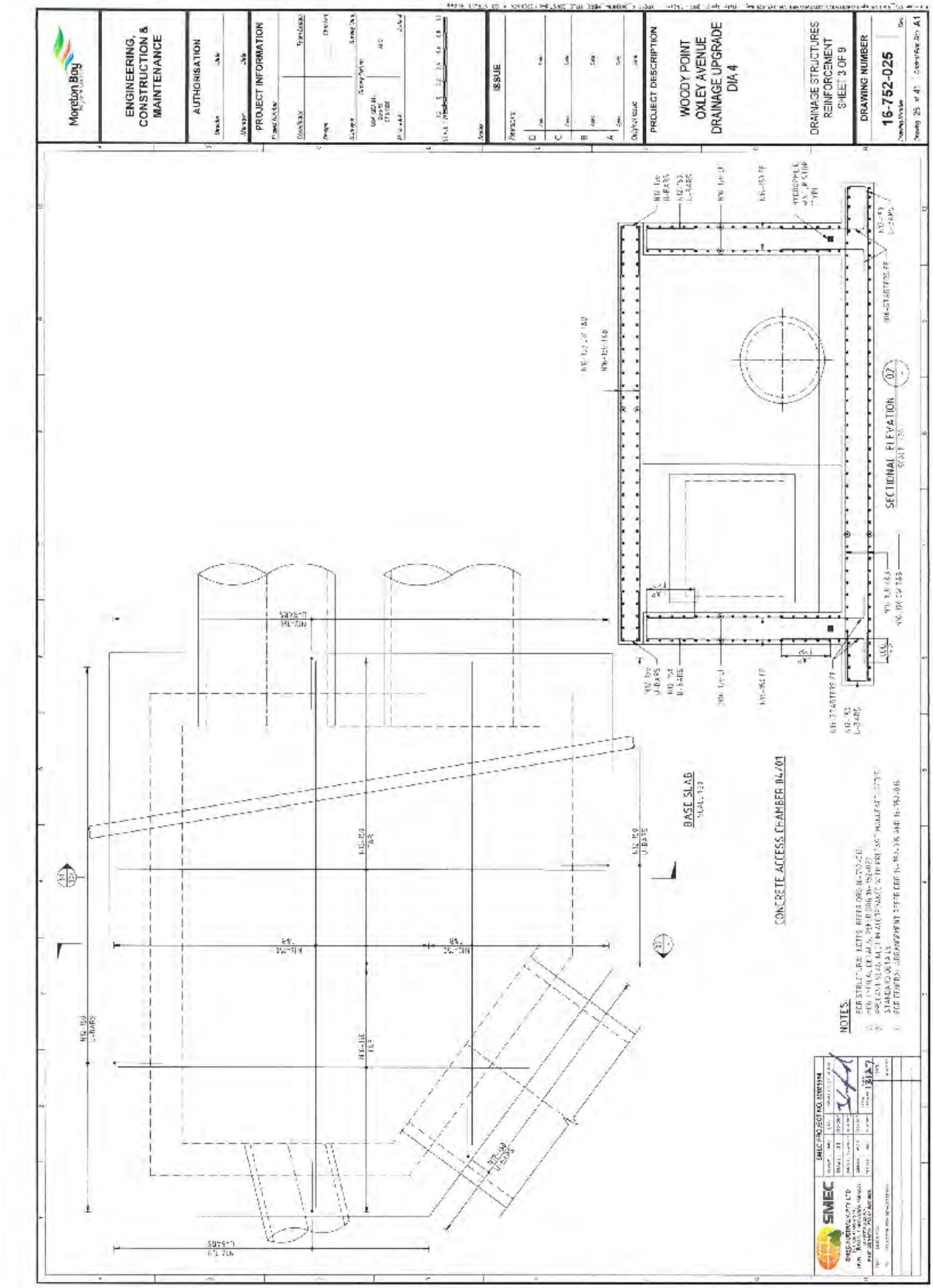
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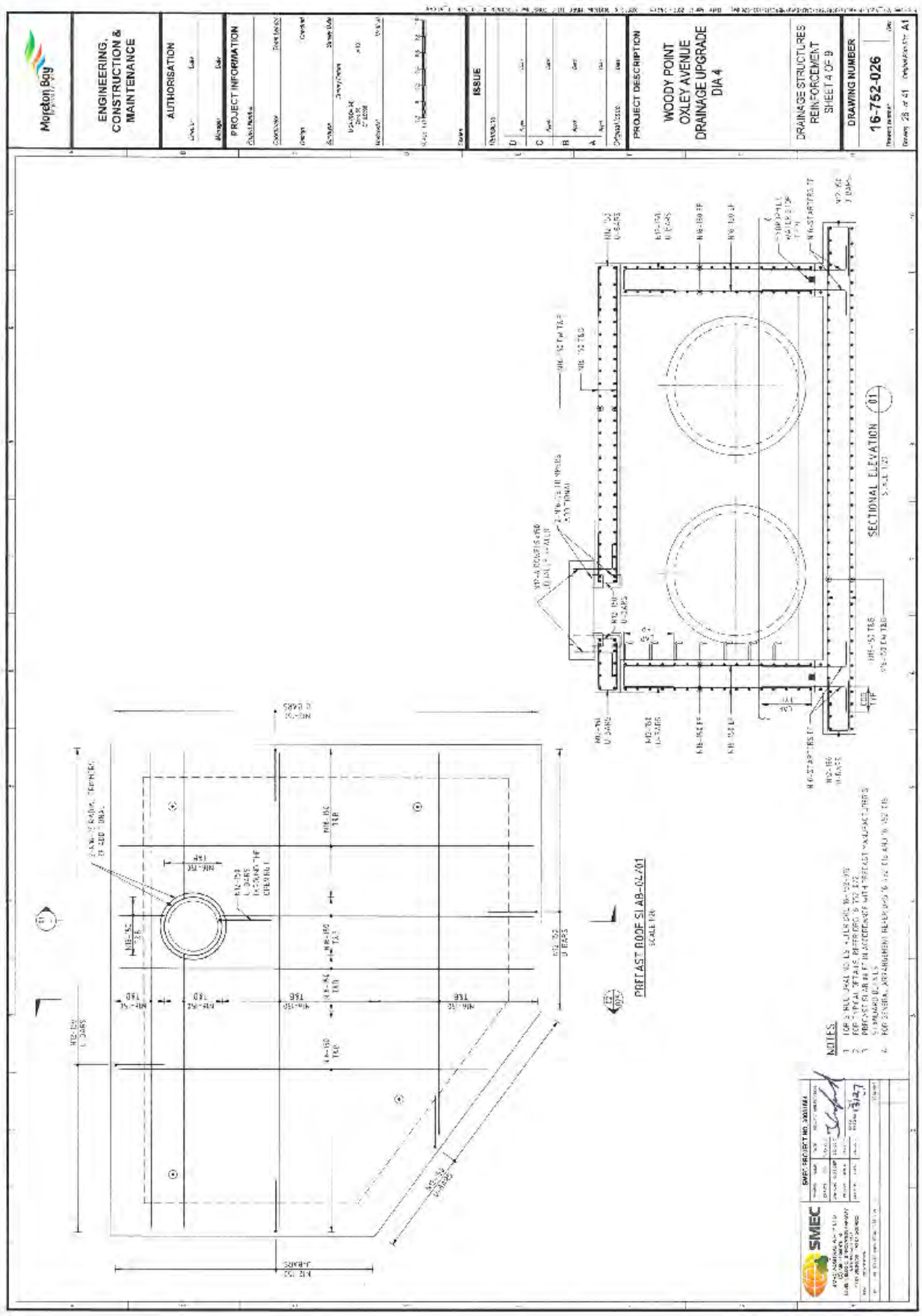
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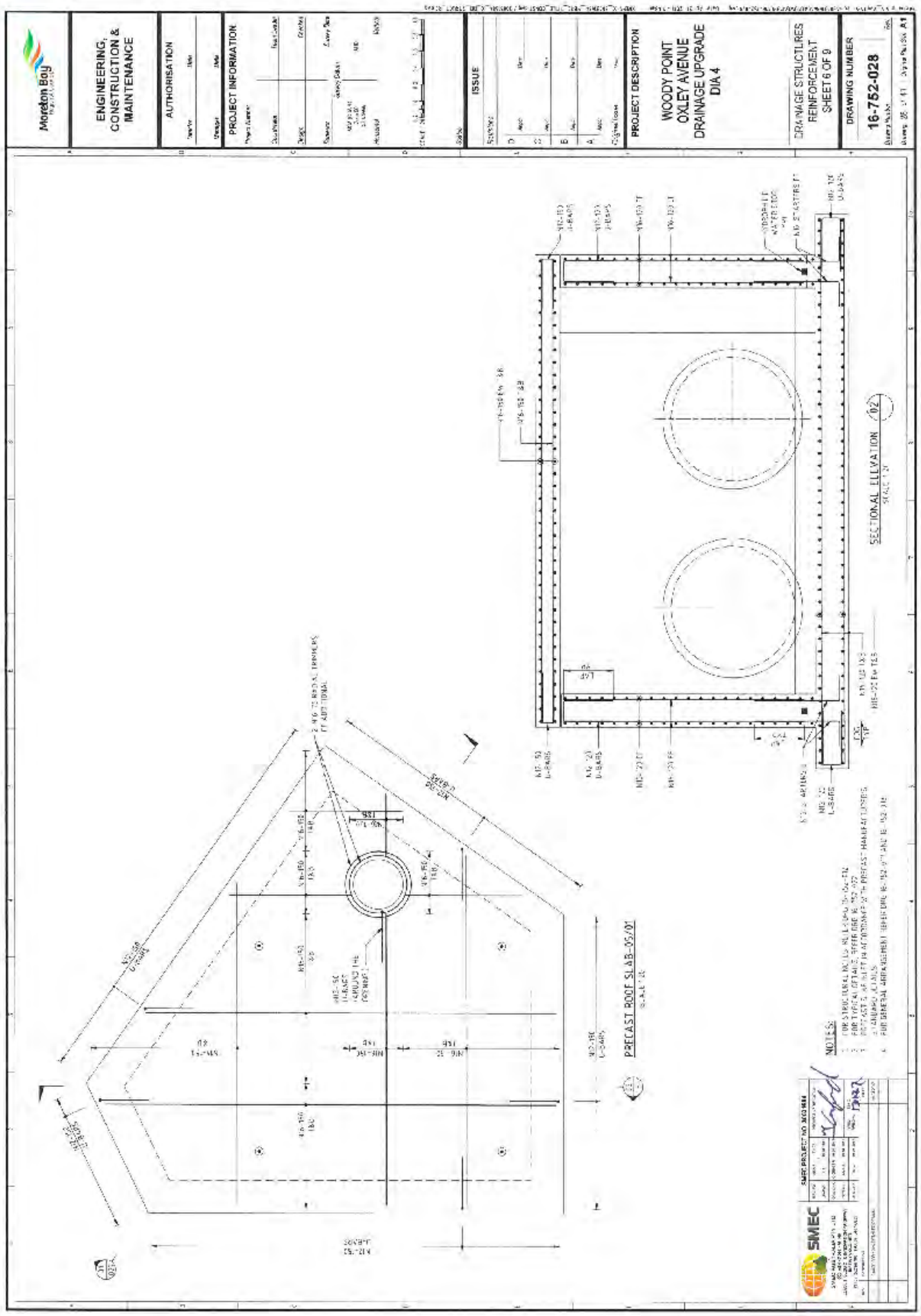
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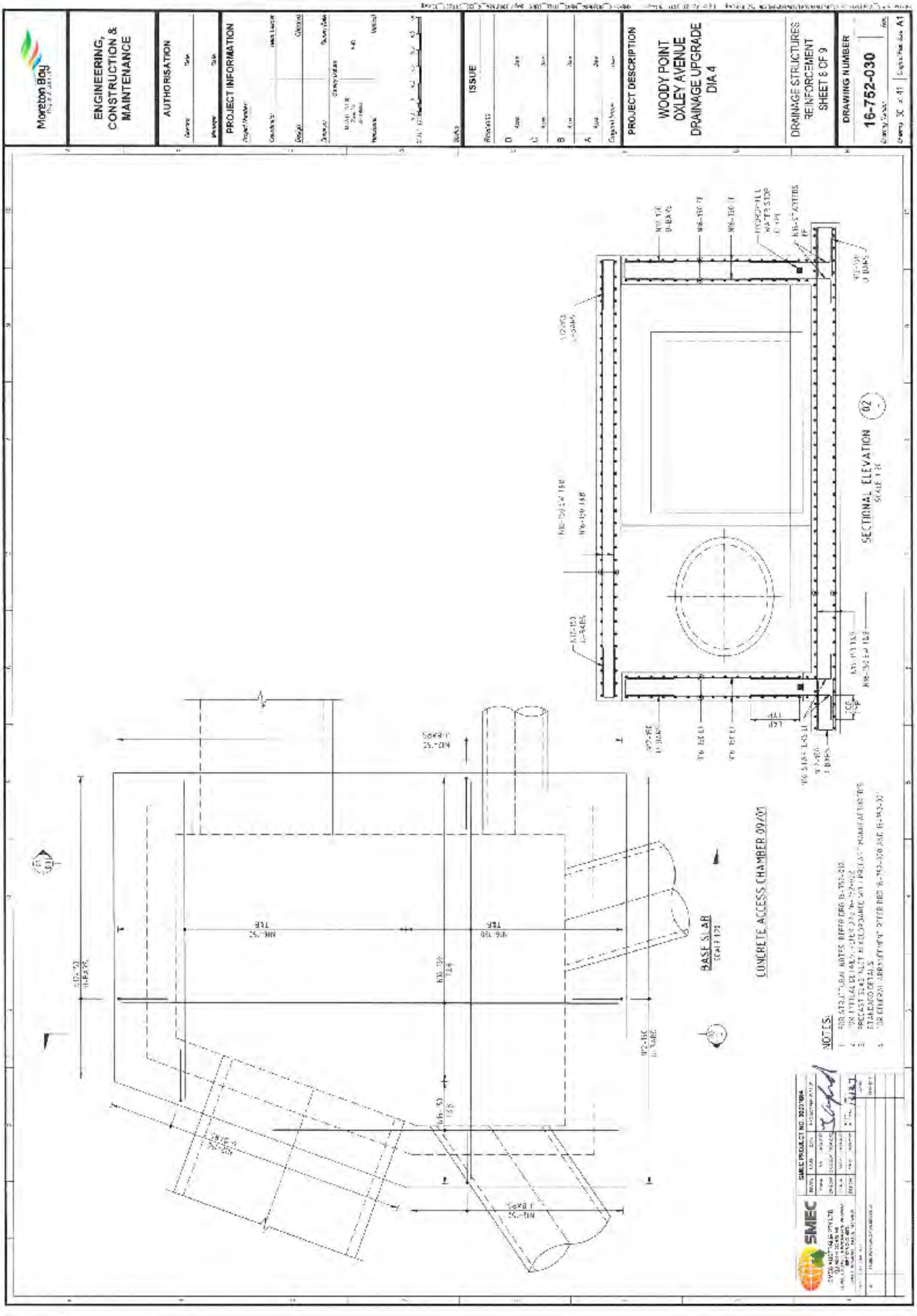
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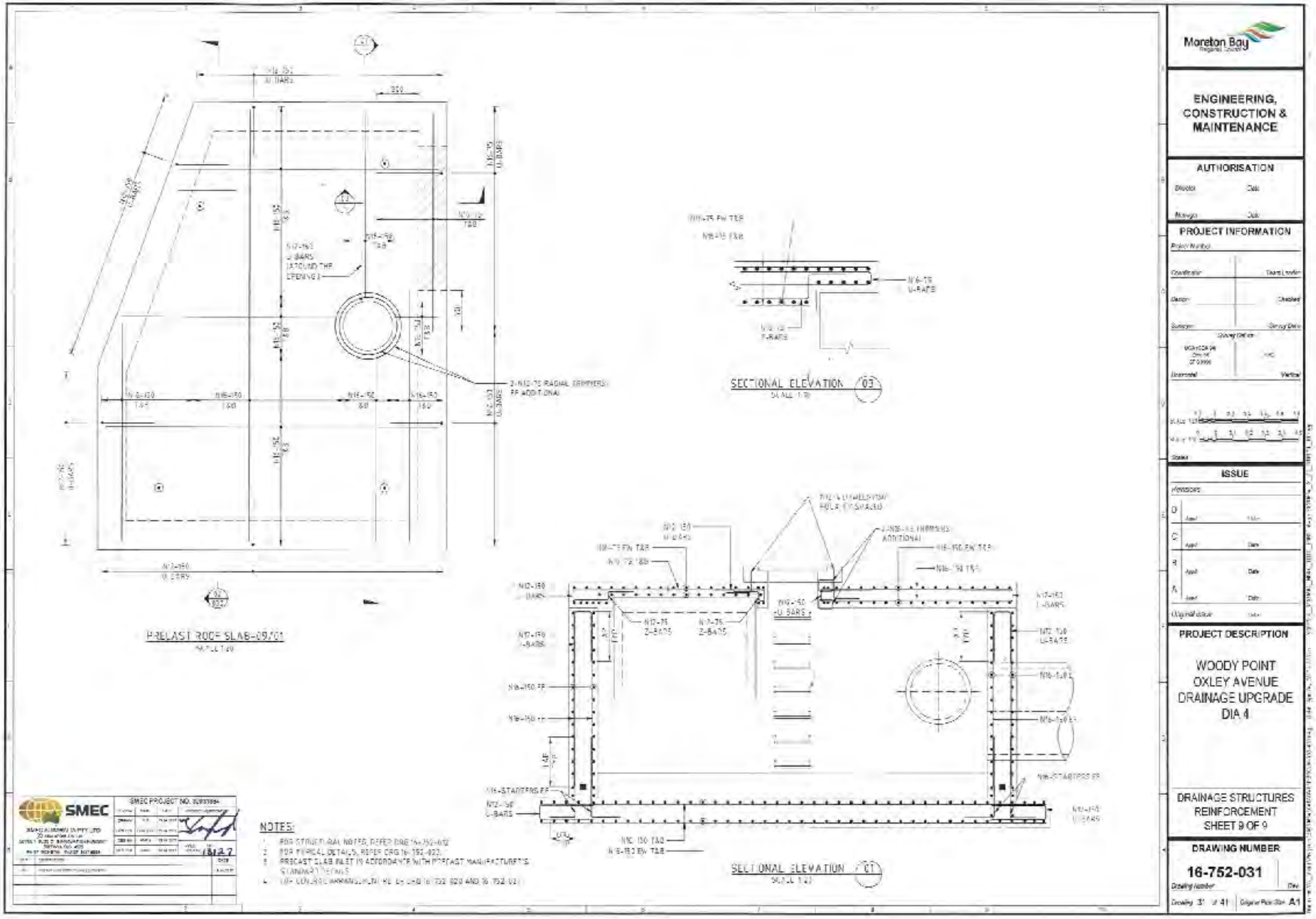
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2. FOR TYPICAL DETAILS, REFER DRG No 752-003.
3. PRECAST SLAB MUST BE MANUFACTURED IN ACCORDANCE WITH PRECAST MANUFACTURERS STANDARD DETAILS
4. FOR CONSTRUCTION NOTES REFER DRG No 752 020 AND 752 021
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Moreton Bay Regional Council
ENGINEERING, CONSTRUCTION & MAINTENANCE
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DRAINAGE UPGRADE
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DRAINAGE STRUCTURES
REINFORCEMENT
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DRAWING NUMBER
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GA PLAN
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DRAWING NUMBER
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RETAINING WALL FOOTING SET OUT
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ROCK APRON NOTES
DETAIL
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Moreton Bay
ENGINEERING, CONSTRUCTION & MAINTENANCE
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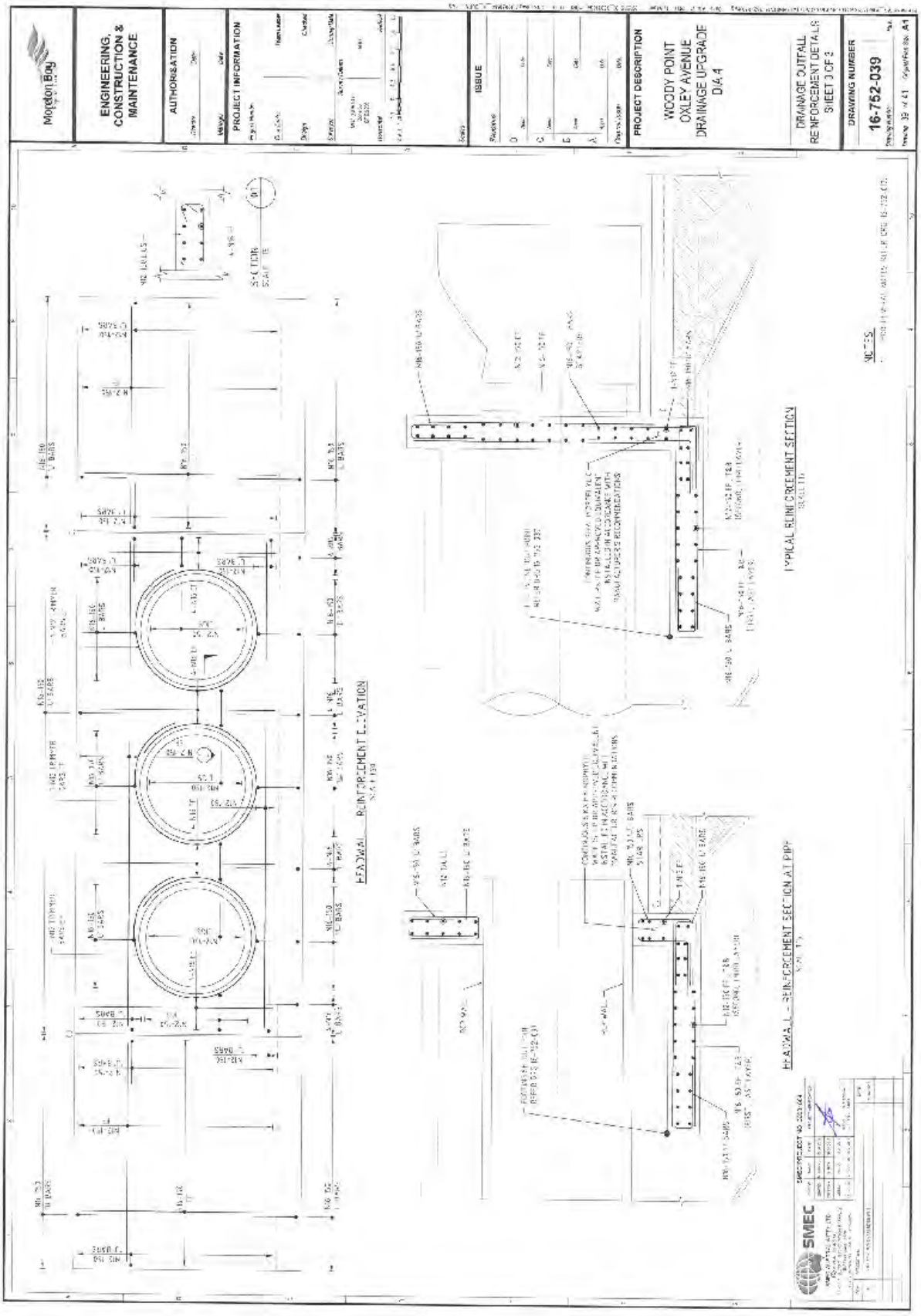
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DRAWING NUMBER
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TYPICAL REINFORCEMENT SECTION
HEADWALL - REINFORCEMENT SECTION AT PIPE
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SMEC

DRAINAGE MASTER PLAN

DRAINAGE INVESTIGATION AREA 6 MARGATE

DRAINAGE MASTER PLAN FOR DRAINAGE INVESTIGATION AREA 6

1 INTRODUCTION

1.2 Introduction and Purpose of Drainage Master Plan

This Drainage Master Plan (DMP) applies to Drainage Investigation Area (DIA) 6 identified in Figure 8.2.2.4 – Margate of the Flood Hazard Overlay Code. This DMP has been prepared by the Moreton Bay Regional Council in accordance with section 3.6 of the Planning Scheme Policy – Flood Hazard, Coastal Hazard and Overland Flow.

The purpose of the DMP is to identify:

(a) the flood and drainage constraints affecting DIA 6;
(b) the flood mitigation strategy for DIA 6 that achieves overall outcome d. of the Flood Hazard Overlay Code in a way intended to facilitate development in the DIA consistent with the Next Generation Neighbourhood Precinct of the General Residential Zone and the District Centre Precinct of the Centre Zone (overall outcomes of the zones for both reconfiguring a lot and material change of use);
(c) the particular components of the flood mitigation strategy that will be undertaken by the Council; and
(d) the particular components and applicable standards of the flood mitigation strategy that are required to be undertaken by applicants as part of carrying out assessable development.

The DMP contains the following sections:

- Section 1 (this section) – providing an introduction and confirming when the DMP applies to assessable development;
- Section 2 – Providing an overview and description of the DIA, a summary of the flood issues relevant to the DIA and summary of the planning context/intent;
- Section 3 – Providing a description of the flood risk mitigation strategy and the different components of the strategy;
- Section 4 – Identifying the preferred implementation and sequencing of the flood mitigation strategy; and
- Section 5 – The design standards and requirements for works for all aspects of development (i.e. material change of use, reconfiguring a lot, building work and operational work) in addition to the requirements otherwise required by the MBRC Planning Scheme.

1.2 Application of DMP

This DMP applies to development carried out in DIA 6 where required in accordance with the Flood Hazard Overlay Code.

This DMP identifies standards for carrying out development in addition to the applicable planning scheme codes.

This DMP does not apply to development identified as exempt in Part 5.10.2 Levels of Assessment for the Flood Hazard Overlay.

2 DIA DESCRIPTION

2.1 Overview/Description of DIA

DIA 6 is located in the suburb of Margate, located in the southern area of the Redcliffe Peninsula of the Moreton Bay Region. Refer to Figure 1 identifying the location of DIA 6 in Margate.

Figure 3 – DIA 6 Location

Source: Google Maps, 2016

DIA 6 comprises an area of approximately 78,500m^2 and follows the natural gully from the Duffield Road / Dover Road intersection in the west of the catchment to the Margate Parade / Mabel Street intersection on the Moreton Bay shoreline. Refer to Figure 2 for a map of the DIA 6.

Figure 4 - DIA 6

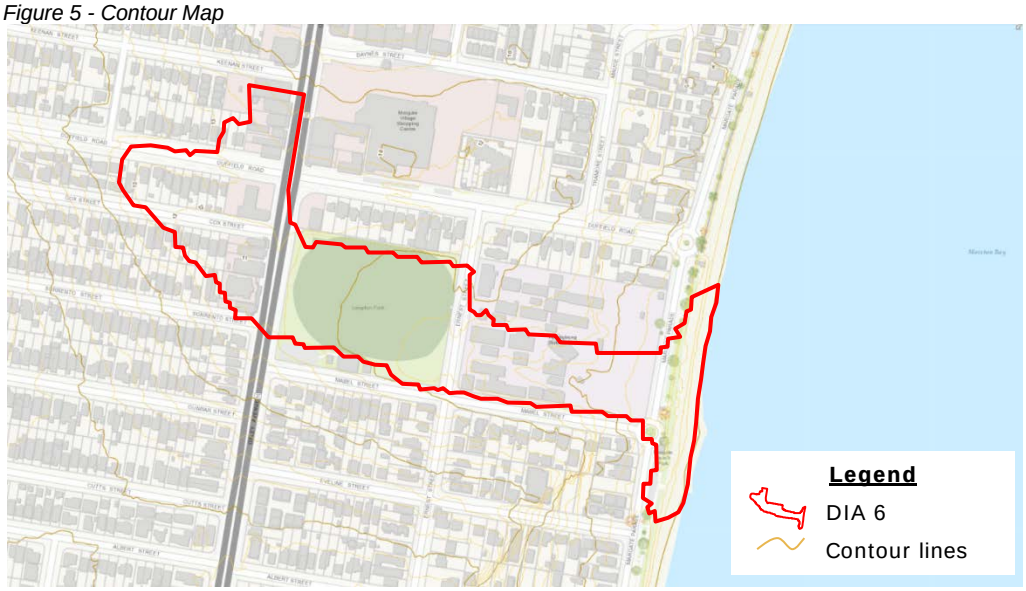
Source: MBRC Interactive Mapping, 2016

DIA 6 contains residential housing in the form of single detached dwellings to multiple dwelling units. A large portion of the DIA 6 includes an Educational Establishment and ancillary sporting fields that service the local community. A number of small-scale non-residential activities are also found in DIA 6.

DIA 6 is located in proximity to a District Centre, including the Margate Shopping Centre in addition to a wide range of services and facilities that service the catchment and surrounds. The area is accessible to a number of open space areas, beaches and local parks, including the Sutton's Beach Leisure Area which is located a short distance from DIA 6.

The area including DIA 6 and surrounds slopes downwards towards the east, ranging from approximately 13mAHD at Cox Street to 2mAHD at Margate Parade. Refer to Figure 3 below for a contour map of the area.

Figure 5 - Contour Map



Source: MBRC Contours (2016)

2.2 Summary of Flood Issues affecting the DIA

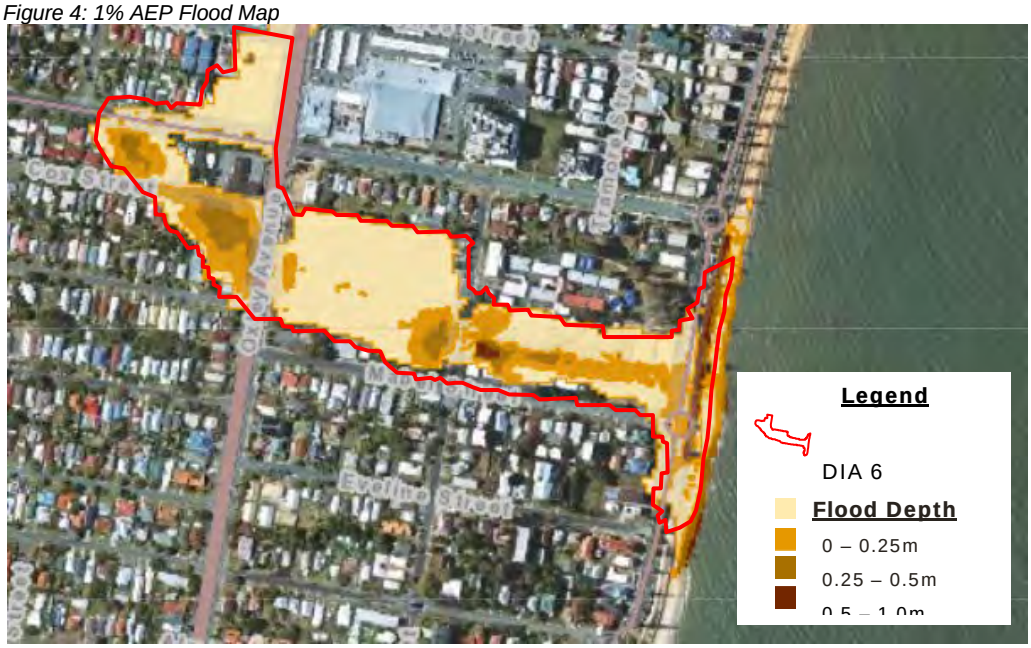
The flooding issues affecting DIA 6 are characterised by flooding impacts on properties caused by:

- the limited capacity of the existing drainage system to cater for minor storm events; and
- the high crown of Oxley Avenue which causes flooding of properties upstream (west of Oxley Avenue); and
- existing land development and construction within the natural gully/watercourse.

In the 1% AEP flood event it is estimated the majority of properties within the DIA are inundated to some degree (i.e. prior to the implementation of the flood risk mitigation strategy contained in this DMP).

Refer to Figure 4 identifying the 1% AEP flood map for DIA 6.

Figure 4: 1% AEP Flood Map



Source: MBRC Flood Explorer, 2016

2.3 Planning Context and Intent

DIA 6 is mostly included in the Next Generation Neighbourhood Precinct of the General Residential Zone. DIA 6 is supported by the Langdon Park sporting field included in the Recreation and Open Space Zone and a number of non-residential uses included in the District Centre Precinct of the Centre Zone. The Humpybong State School is located in DIA 6 and is designated as a community activity under the Community Activities and Neighbourhood Hubs Overlay, supported by the overall outcomes of the Next Generation Neighbourhood Precinct and General Residential Zone.

Accordingly, development outcomes expected by the DMP are those identified in the purpose and overall outcomes of the General Residential Zone Code, Recreation and Open Space Zone Code and Centre Zone Code.

In summary, this includes a diverse mix of residential and non-residential uses at a scale and density that facilities efficient land use patterns and supports compact, walkable and sustainable communities that are well connected.

Outcomes for other aspects of development not addressed by the zone codes (e.g. reconfiguring a lot, operational work etc) are expressed in the relevant planning scheme codes and continue to apply to development in the DIA.

Development outcomes in DIA 6 prior to the implementation of the flood risk mitigation strategy in this DMP are constrained due to the flood impacts affecting the area. The DMP supports the intended mix of uses and development density at this location (consistent with the outcomes of the zones) in conjunction with the implementation of the DMP.

Refer to Figure 5 identifying the planning scheme zone applying to DIA 6.

Figure 5 – Planning Scheme Zone

Source: MBRC Interactive Mapping, 2016

3 FLOOD RISK MITIGATION STRATEGY

3.1 Overview/Summary

The general approach to the flood risk mitigation strategy in DIA 6 is to increase the capacity of the drainage system to allow for filling of allotments to achieve appropriate flood immunity levels. Increasing the drainage capacity has the effect of reducing the known flood risk determined at the date of adoption of the planning scheme. In turn this allows the filling of all allotments in the DIA to flood immunity levels over time without exacerbating flood risks (as determined at the date of adoption of the planning scheme).

The flood risk mitigation strategy for DIA 6 therefore comprises:

- The flood risk mitigation to be undertaken by Council - Drainage upgrade works to parts of the drainage network; and
- The flood risk mitigation to be undertaken by applicants - Filling of all allotments west of Oxley Avenue within the DIA to the required flood immunity level.

Each of these components of the flood risk mitigation strategy are described in sections 3.2 and 3.3.

The flood risk mitigation strategy will significantly reduce the number of private properties within the DIA inundated during the 1% AEP event thereby substantially improving the development potential of the area.

3.2 Flood Risk Mitigation to be undertaken by Council

The drainage upgrade works to be undertaken by the Moreton Bay Regional Council involve an upgrade to the drainage lines down Duffield Road and Cox Street with an upgrade to the cross road drainage on Oxley Avenue. Details of the proposed work are included in *Appendix A - Flood Risk Mitigation to be undertaken by Council - Detailed Design DIA 6*.

The drainage upgrade works to be undertaken by Council rely on the acquisition of property at 63 Duffield Road, Margate described as Lot 2 on RP84070.

The Council can be contacted to confirm the expected timing for commencement/completion of the drainage works to be undertaken by Council.

3.3 Flood Risk Mitigation to be undertaken by Applicants

3.3.1 Allotment Filling

The flood risk mitigation to be undertaken by applicants is to fill all allotments west of Oxley Avenue in the DIA to the Flood Planning Level (Defined Flood Event + required freeboard for the Flood Planning Area)..

Filling required in accordance with the standards identified in Section 5 is required not only to achieve flood immunity for individual properties but to specifically direct flood waters to the street and drainage network away from surrounding properties. Filling is a fundamental part of the flood mitigation strategy for the DIA as a whole and accordingly will be a mandatory condition of development across the entire development site.

The general approach to allotment filling is to provide a uniform grade with a minimum 1:100 crossfall to the street for the whole allotment/development site. Section 5 and Table 1 of the DMP identifies the detailed standards and circumstances where filling is required for all aspects of development (i.e. material change of use, reconfiguring a lot etc). Filling is required where carrying out a material change of use and/or reconfiguring a lot (other than a boundary realignment). Filling is permitted but not mandatory in other circumstances.

3.3.2 Other Non-Trunk Works

Non-trunk drainage works (such as increasing the capacity of drains feeding into the new trunk drainage system) may be required as a condition of development.

Properties outside the DIA may need to consider non-trunk drainage to connect to their ‘legal point of discharge’ as well as filling (where permitted) to ensure flows are directed to the desired trunk drainage point.

These requirements are not addressed by this DMP and are regulated by the normal planning scheme provisions that apply.

4 FLOOD RISK MITIGATION IMPLEMENTATION AND SEQUENCING

The drainage upgrade works to be carried out by Council as detailed in Section 3.2 must be completed before filling of allotments in accordance with the standards in Section 5 is permitted.

Filling proposed prior to the implementation of the drainage works to be carried out by Council is not in accordance with this DMP and subject to the respective performance outcomes of the Flood hazard overlay code.

5 REQUIREMENTS FOR WORKS AND DESIGN STANDARDS

The flood risk mitigation to be undertaken by applicants includes filling where required in accordance with Table 1.

Alternative approaches to the standards in this section are subject to assessment against the applicable performance outcomes of the Flood hazard overlay code.

Table 1 - Fill Requirements

Note: The drainage upgrade works to be carried out by Council as detailed in Section 3.2 must be completed before filling of allotments in accordance with the standards in Section 5 is permitted. Filling proposed prior to the implementation of the drainage works to be carried out by Council is not in accordance with this DMP and subject to the respective performance outcomes of the Flood hazard overlay code.

Aspect of Development	**Filling Requirements**	**Minimum Fill Level**	**Minimum Extent of Filling**	**Notes**
If located west of Oxley Avenue and involving: Material change of use and/or Reconfiguring a lot (other than a boundary realignment)	Filling is mandatory	Flood Planning Level	The entire allotment/development site area and meeting the following: (d) provide a minimum 1:100 uniform cross fall shaped to contains flood waters to the street and drainage network with the exception of meeting (b) and (c); (e) provide an accessible grade for vehicle access by the applicable design vehicle for the development from the street to the minimum fill level; and (f) ensure no worsening of flood impacts to other properties beyond known flood impacts at the date of adoption of the planning scheme.	The filling requirements outlined in this DMP must be considered in conjunction with the other applicable code requirements identified in the MBRC Planning Scheme. This may include consideration of, but not limited to: ▪ earthworks, drainage, filling and associated retaining walls to avoid adverse impacts on adjacent properties; and ▪ flood immunity requirements for building work and other components of development where not achieved by filling alone.

Aspect of Development	Filling Requirements	Minimum Fill Level	Minimum Extent of Filling	Notes
If located west of Oxley Avenue and involving: Reconfiguring a lot where for a boundary realignment	Filling is permitted but not mandatory	N/A	N/A	Filling is permitted and minimum fill levels are not regulated by the DMP for this aspect of development. Note: Maximum fill to DMP levels is encouraged. Where filling occurs, other applicable code requirements apply in the MBRC Planning Scheme. This may include consideration of, but not limited to: ▪ earthworks, drainage, filling and associated retaining walls to avoid adverse impacts on adjacent properties; and ▪ flood immunity requirements for building work and other components of development where not achieved by filling alone.

Aspect of Development	Filling Requirements	Minimum Fill Level	Minimum Extent of Filling	Notes
If located west of Oxley Avenue and involving: Operational work (filling or excavation only)	Filling is mandatory	Flood Planning Level	The entire allotment/development site area and meeting the following: (d) provide a minimum 1:100 uniform cross fall shaped to contains flood waters to the street and drainage network with the exception of meeting (b) and (c); (e) provide an accessible grade for vehicle access by the applicable design vehicle for the development from the street to the minimum fill level; and (f) ensure no worsening of flood impacts to other properties beyond known flood impacts at the date of adoption of the planning scheme.	The filling requirements outlined in this DMP must be considered in conjunction with the other applicable code requirements identified in the MBRC Planning Scheme. This may include consideration of, but not limited to: ▪ earthworks, drainage, filling and associated retaining walls to avoid adverse impacts on adjacent properties; and ▪ flood immunity requirements for building work and other components of development where not achieved by filling alone.

Aspect of Development	Filling Requirements	Minimum Fill Level	Minimum Extent of Filling	Notes
If located west of Oxley Avenue and involving: All other operational work where not associated with a material change of use or reconfiguring a lot	Filling is permitted but not mandatory	N/A	N/A	Filling is permitted and minimum fill levels are not regulated by the DMP for this aspect of development. The filling requirements outlined in this DMP must be considered in conjunction with the other applicable code requirements identified in the MBRC Planning Scheme. This may include consideration of, but not limited to: ▪ earthworks, drainage filling and associated retaining walls to avoid adverse impacts on adjacent properties; and ▪ flood immunity requirements for building work and other components of development where not achieved by filling alone.
If located west of Oxley Avenue and involving: Building work where not associated with a material change of use	Filling is permitted but not mandatory	N/A	N/A	Filling is permitted and minimum fill levels are not regulated by the DMP for this aspect of development. The filling requirements outlined in this DMP must be considered in conjunction with the other applicable code requirements identified in the MBRC Planning Scheme. This may include consideration of, but not limited to: ▪ earthworks, filling and associated retaining walls to avoid adverse impacts on adjacent properties; and ▪ flood immunity requirements for building work and other components of development where not achieved by filling alone.

Aspect of Development	Filling Requirements	Minimum Fill Level	Minimum Extent of Filling	Notes
If located east of Oxley Avenue: All aspects of development	Refer to the Flood Hazard Overlay Code			Filling associated with development located east of Oxley Avenue is not regulated by the DMP. Filling where permitted is subject to the applicable requirements in the Flood Hazard Overlay Code and any other applicable code requirements in the MBRC Planning Scheme.

Appendix A - Flood Risk Mitigation to be undertaken by Council

Detailed Design DIA6

MARGATE - COX STREET
DRAINAGE UPGRADE DIA 6
DRAWING INDEX
STANDARD DRAWINGS
LOCALITY PLAN
SITE OF WORKS
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PROJECT INFORMATION
ISSUE
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MARGATE
COX STREET
DRAINAGE UPGRADE
DIA 6
LOCALITY PLAN AND DRAWING INDEX
DRAWING NUMBER
16-749-001


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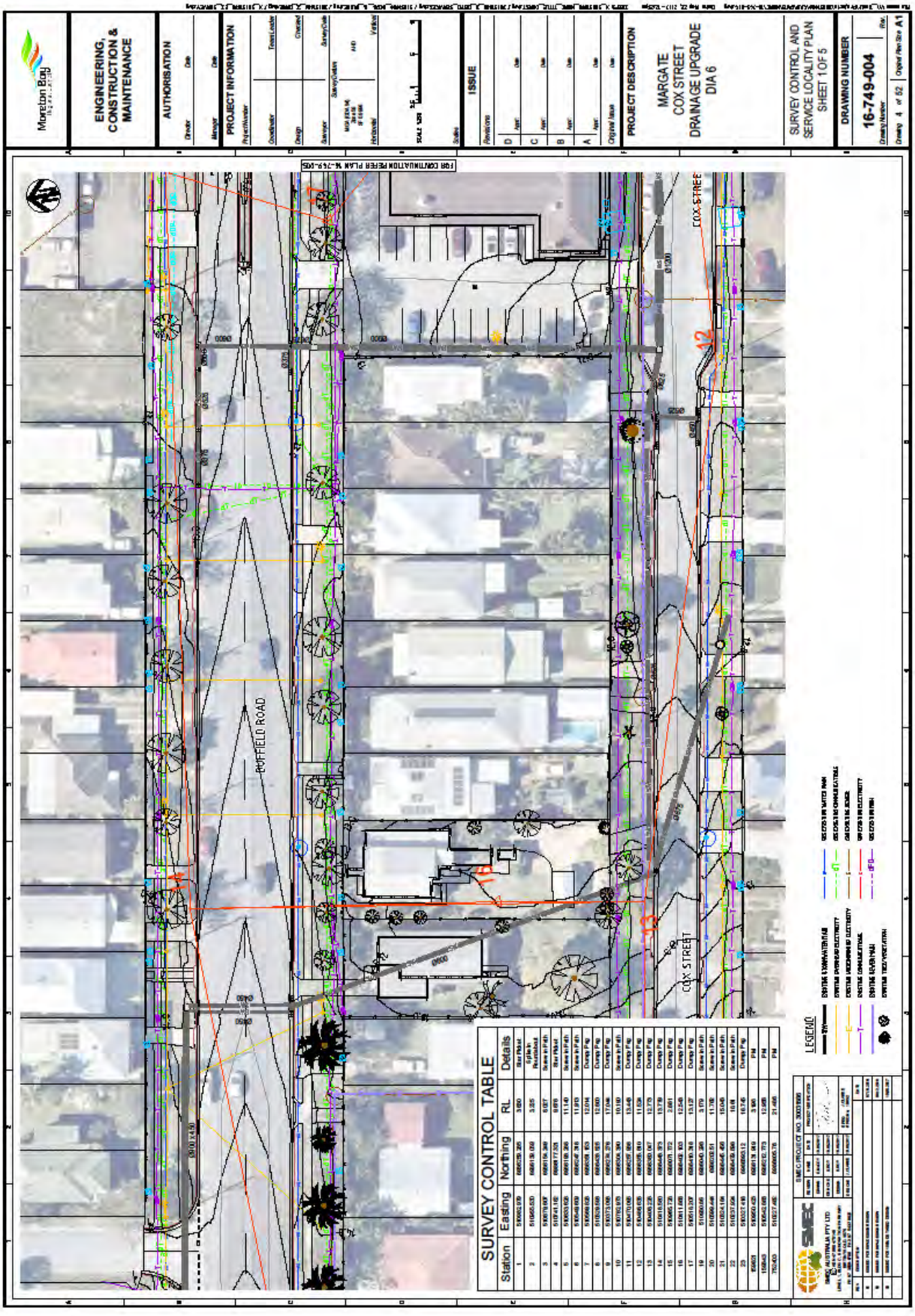
COX STREET
DRAINAGE UPGRADE
DIA 6
OVERALL SITE
LAYOUT PLAN
DRAWING NUMBER
16-749-003
DRAWING KEY
SHEET 1
SHEET 2
SHEET 3
SHEET 4
SHEET 5
MARGATE PARADE
ERNEST STREET
DUFFIELD ROAD
COX STREET
SORRENTO STREET
DUNBAR STREET
MABEL STREET
EVELINE STREET
OAKLEY AVENUE
LEGEND
PROPOSED DRAINAGE
EXISTING DRAINAGE
REMOVED DRAINAGE
ABANDONED DRAINAGE GROUT FILLED
CATCHMENT BOUNDARY
CATCHMENT LABELS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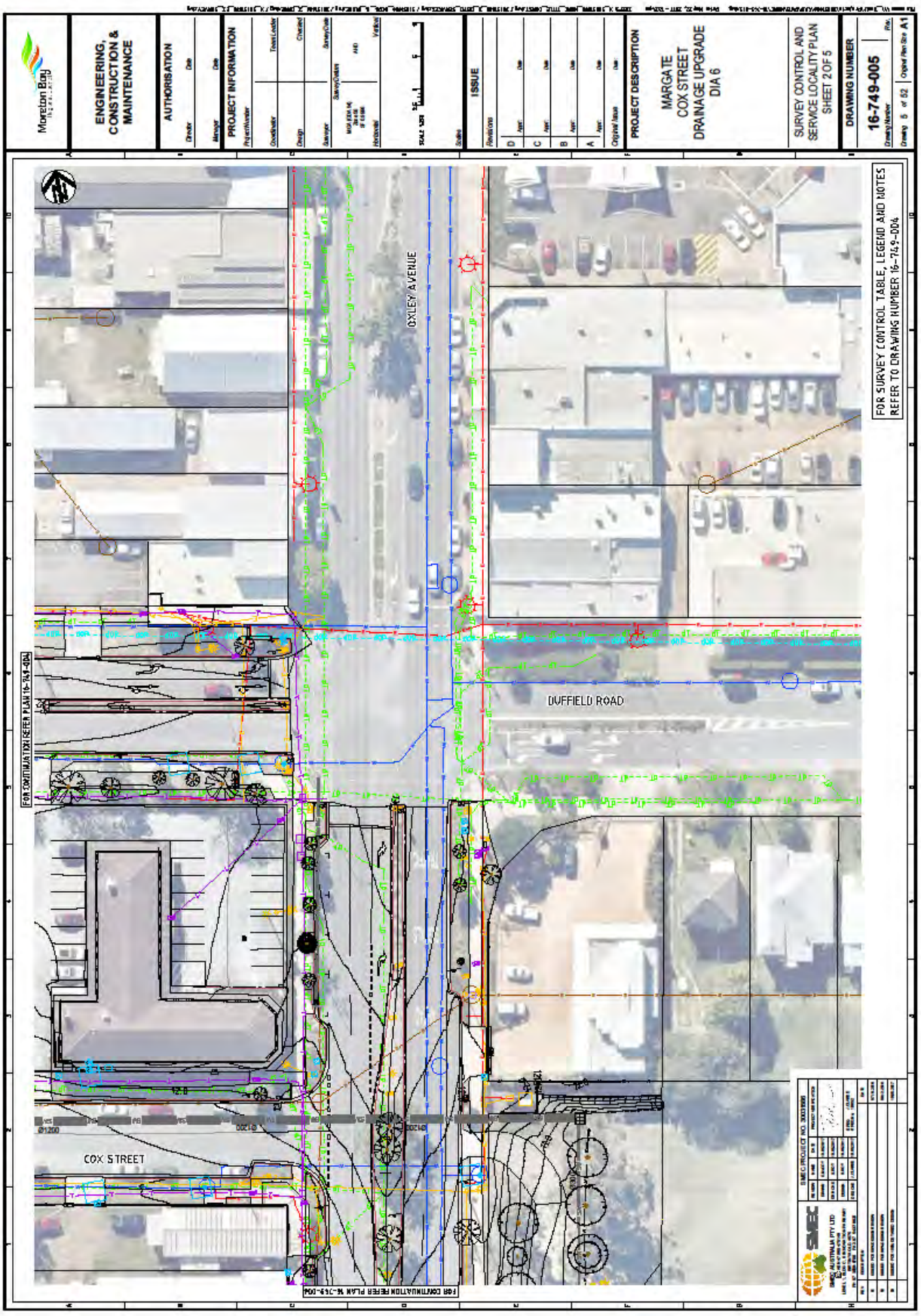
ENGINEERING, CONSTRUCTION & MAINTENANCE
AUTHORISATION
PROJECT INFORMATION
ISSUE
PROJECT DESCRIPTION
MARGATE COX STREET DRAINAGE UPGRADE DIA 6
SURVEY CONTROL AND SERVICE LOCALITY PLAN SHEET 1 OF 5
DRAWING NUMBER
16-749-004
FOR CONSTRUCTION REFER PLAN M-749-105
BOFFIELD ROAD
COX STREET
SURVEY CONTROL TABLE
LEGEND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PROJECT DESCRIPTION
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DRAINAGE UPGRADE
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SURVEY CONTROL AND SERVICE LOCALITY PLAN SHEET 2 OF 5
DRAWING NUMBER
16-749-005
OXLEY AVENUE
DUFFIELD ROAD
COX STREET
FOR SURVEY CONTROL TABLE, LEGEND AND NOTES REFER TO DRAWING NUMBER 16-749-004
FOR CONTINUATION REFER PLAN 16-749-004

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DIA 6
SURVEY CONTROL AND SERVICE LOCALITY PLAN SHEET 3 OF 5
DRAWING NUMBER
16-749-006
FOR SURVEY CONTROL TABLE, LEGEND AND NOTES REFER TO DRAWING NUMBER 16-749-004
SORRENTO STREET
MABEL STREET
OXLEY AVENUE

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MARGATE COX STREET DRAINAGE UPGRADE DIA 6
SURVEY CONTROL AND SERVICE LOCALITY PLAN SHEET 4 OF 5
DRAWING NUMBER
16-749-007
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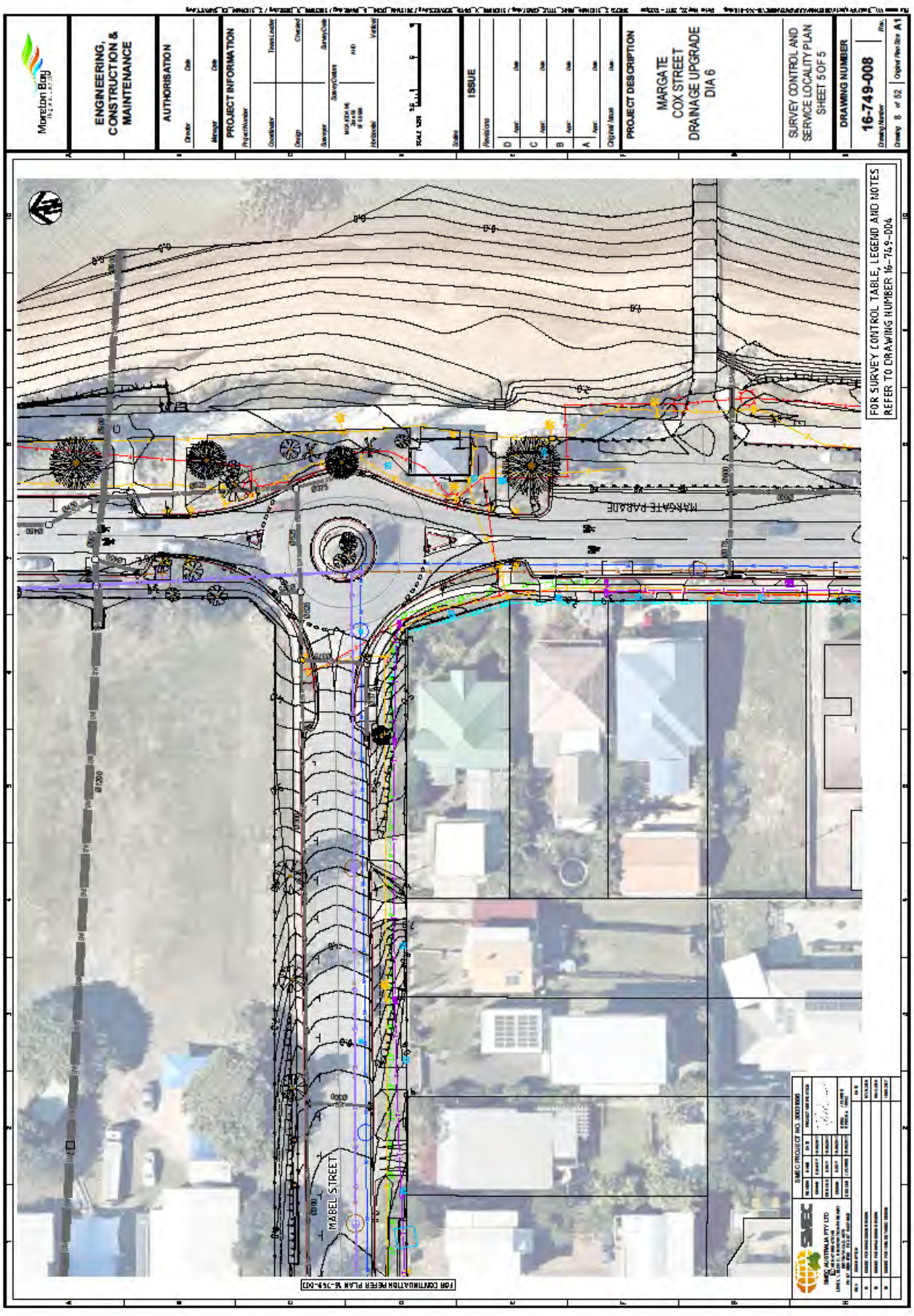
MABEL STREET
ERNEST STREET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SURVEY CONTROL AND SERVICE LOCALITY PLAN
SHEET 5 OF 5
DRAWING NUMBER
16-749-008
FOR SURVEY CONTROL TABLE, LEGEND AND NOTES
REFER TO DRAWING NUMBER 16-749-004
MARGATE PARADE
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FOR CONTINUATION REFER PLAN No.-749-003
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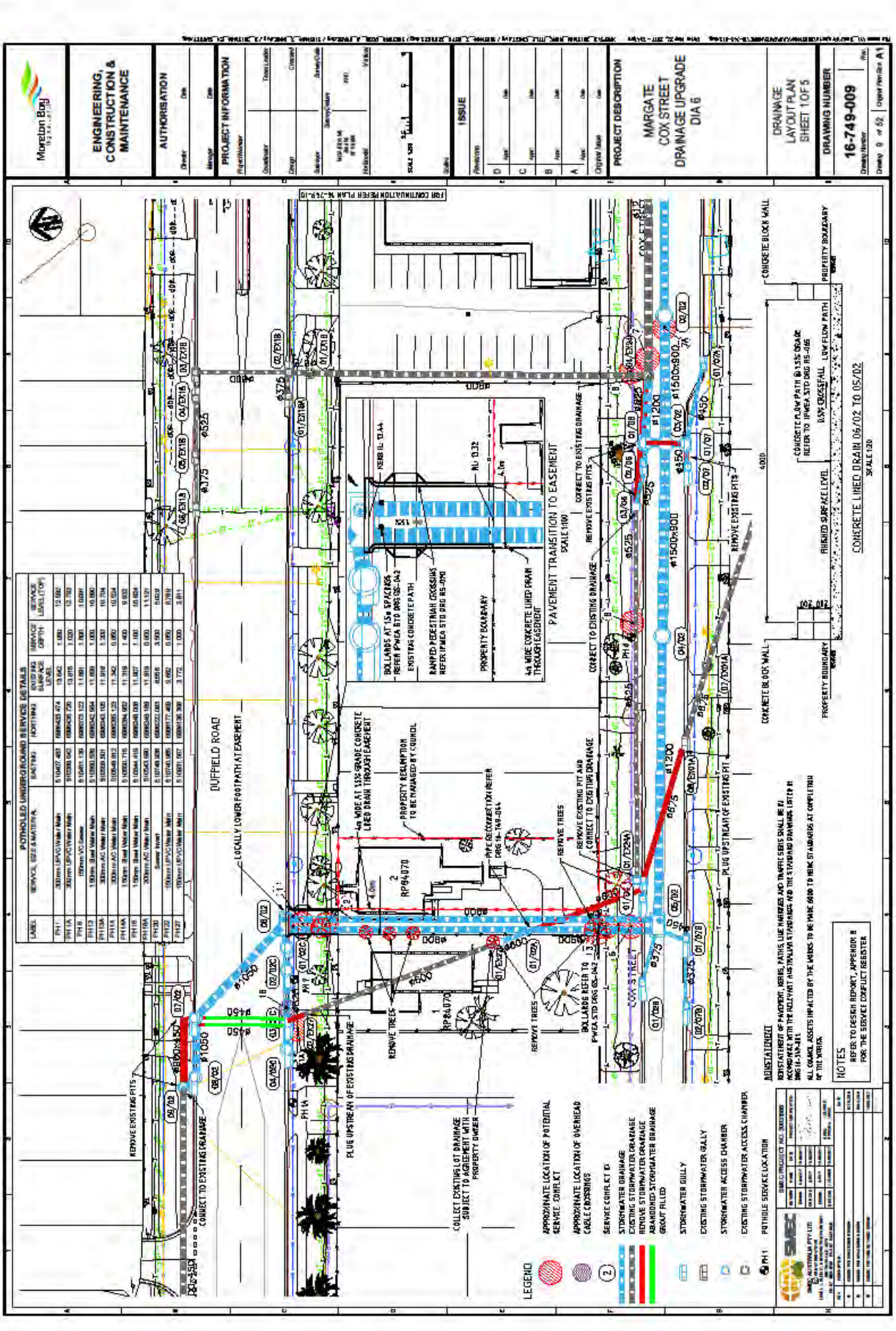
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PROJECT INFORMATION
ISSUE
PROJECT DESCRIPTION
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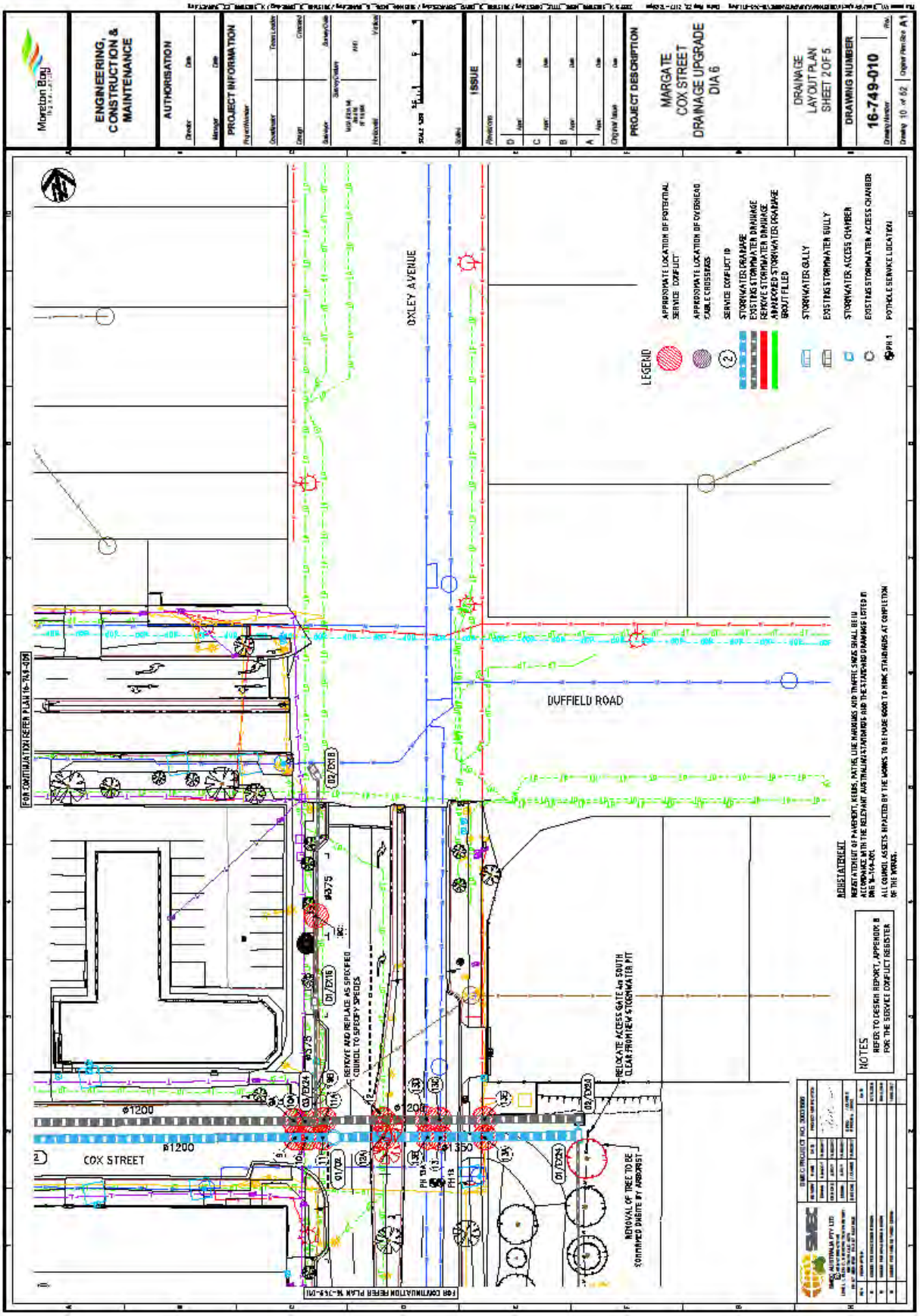
DRAINAGE LAYOUT PLAN SHEET 1 OF 5
DRAWING NUMBER
16-749-009
POTHOLED UNDERGROUND SERVICES DETAILS
LEGEND
NOTES
REFER TO DESIGN REPORT, APPENDIX B FOR THE SERVICES CONFLICT REGISTER
REINSTATEMENT
DUFFIELD ROAD
COX STREET
CONCRETE LINED DRAIN 06/02 TO 05/02
SCALE 1:20
PAVEMENT TRANSITION TO EASEMENT
SCALE 1:100
CONCRETE BLOCK WALL
PROPERTY BOUNDARY
RUSHED SURFACE LEVEL
LOW FLOW PATH
0.5% CROSSFALL
CONCRETE FLOW PATH @ 15% GRADE
REFER TO IPWEA STD DRG RS-046
LOCALLY LOWER FOOTPATH AT EASEMENT
CONNECT TO EXISTING DRAINAGE
REMOVE EXISTING PITS
REMOVE TREES
PLUG UPSTREAM OF EXISTING PIT
BOLLARDS AT 1.5m SPACINGS REFER IPWEA STD DRG RS-042
RAMPED PEDESTRIAN CROSSING REFER IPWEA STD DRG RS-090
4m WIDE AT 15% GRADE CONCRETE LINED DRAIN THROUGH EASEMENT
PROPERTY RESUMPTION TO BE MANAGED BY COUNCIL
PIPE RECONNECTION REFER DRG 16-749-004
COLLECT EXISTING LOT DRAINAGE SUBJECT TO AGREEMENT WITH PROPERTY OWNER
APPROXIMATE LOCATION OF POTENTIAL SERVICE CONFLICT
APPROXIMATE LOCATION OF OVERHEAD CABLE CROSSINGS
SERVICE CONFLICT ID
STORMWATER DRAINAGE
EXISTING STORMWATER DRAINAGE
REMOVE STORMWATER DRAINAGE
ABANDONED STORMWATER DRAINAGE GROUT FILLED
STORMWATER GULLY
EXISTING STORMWATER GULLY
STORMWATER ACCESS CHAMBER
EXISTING STORMWATER ACCESS CHAMBER
POTHOLE SERVICE LOCATION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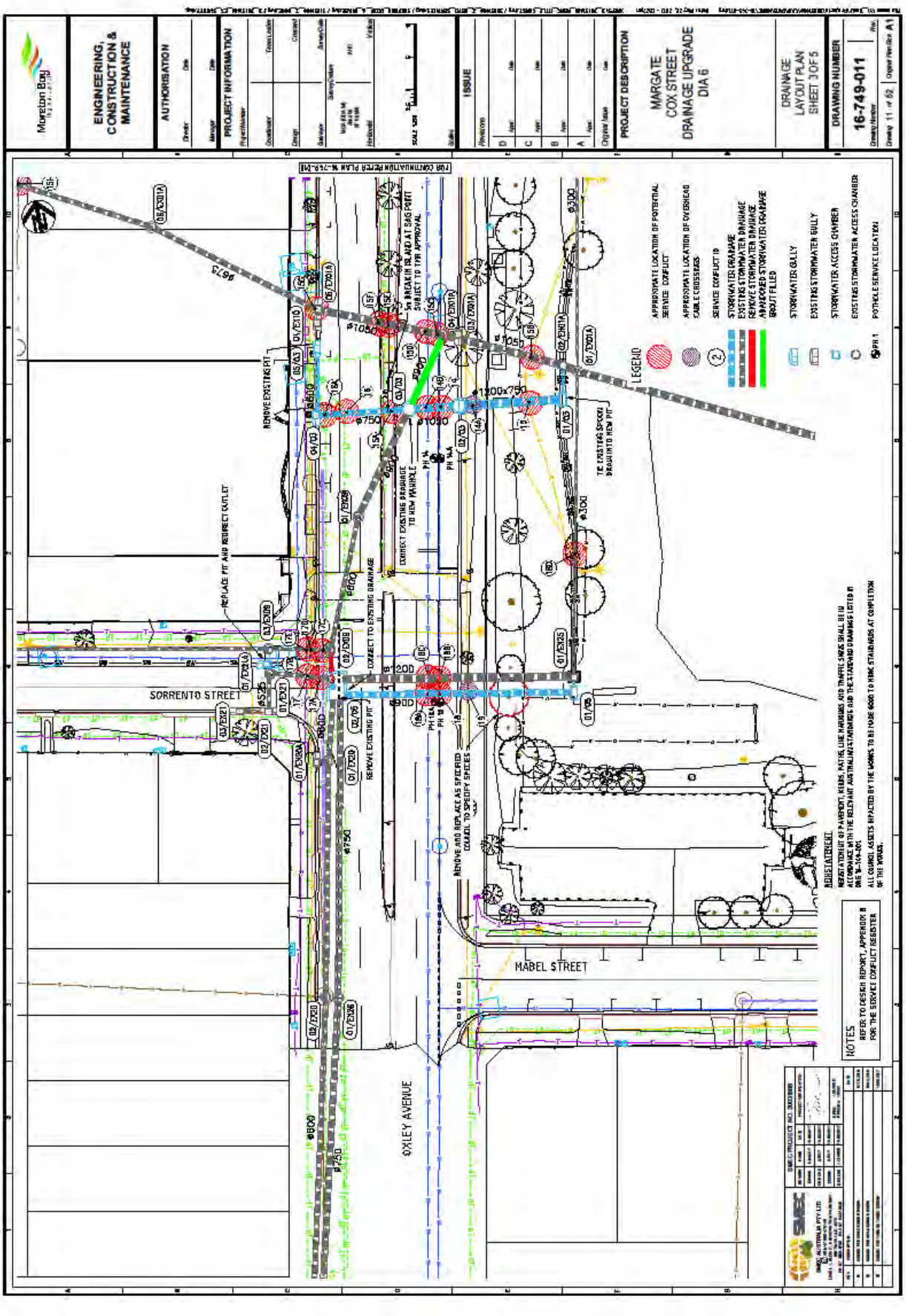
COX STREET
DRAINAGE UPGRADE
DIA 6
DRAINAGE LAYOUT PLAN SHEET 2 OF 5
DRAWING NUMBER
16-749-010
LEGEND
OXLEY AVENUE
DUFFIELD ROAD
COX STREET
NOTES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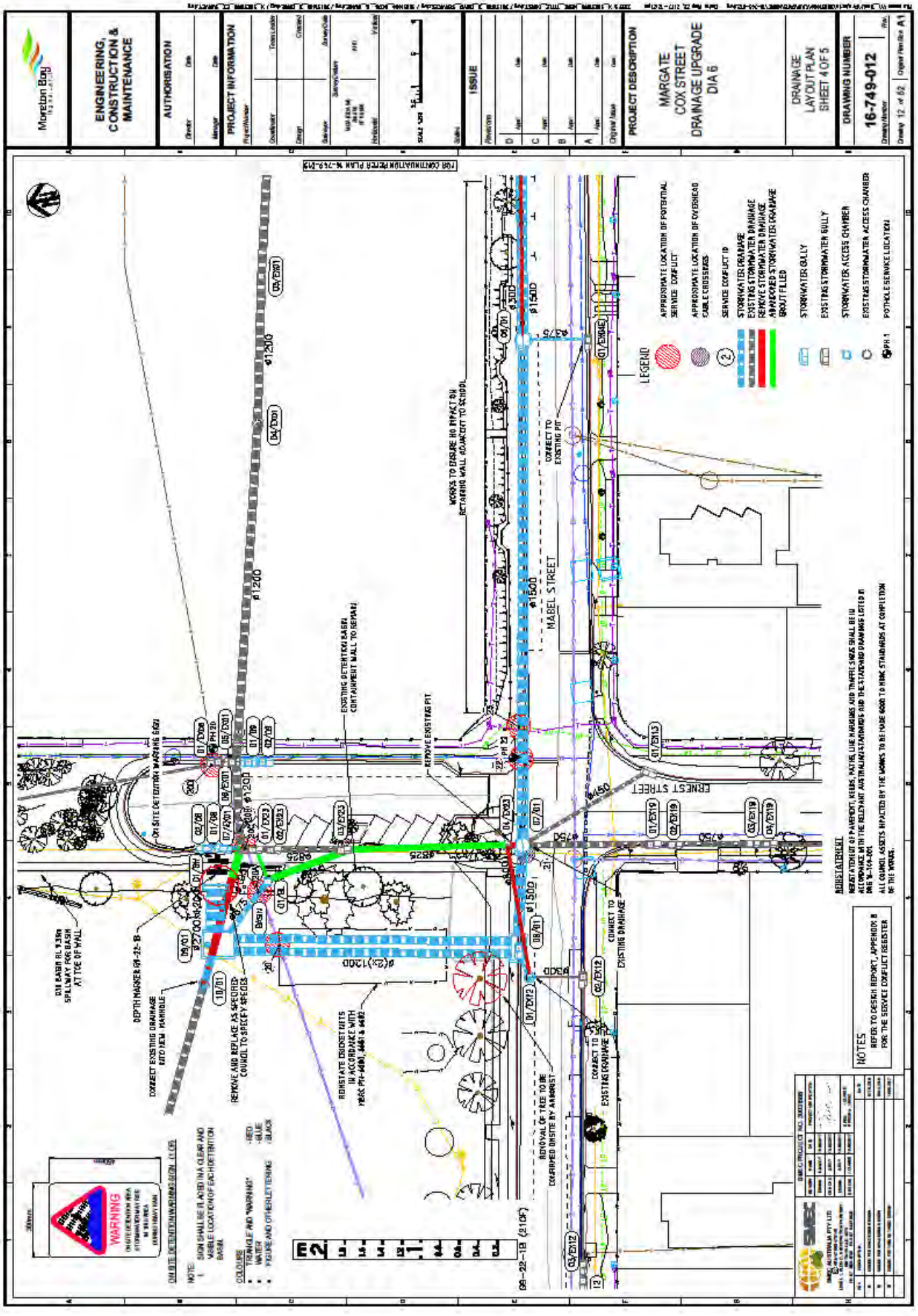
PROJECT DESCRIPTION
MARGATE
COX STREET
DRAINAGE UPGRADE
DIA 6
DRAINAGE LAYOUT PLAN SHEET 3 OF 5
DRAWING NUMBER
16-749-011
LEGEND
SORRENTO STREET
MABEL STREET
OXLEY AVENUE
NOTES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PROJECT DESCRIPTION
MARGATE
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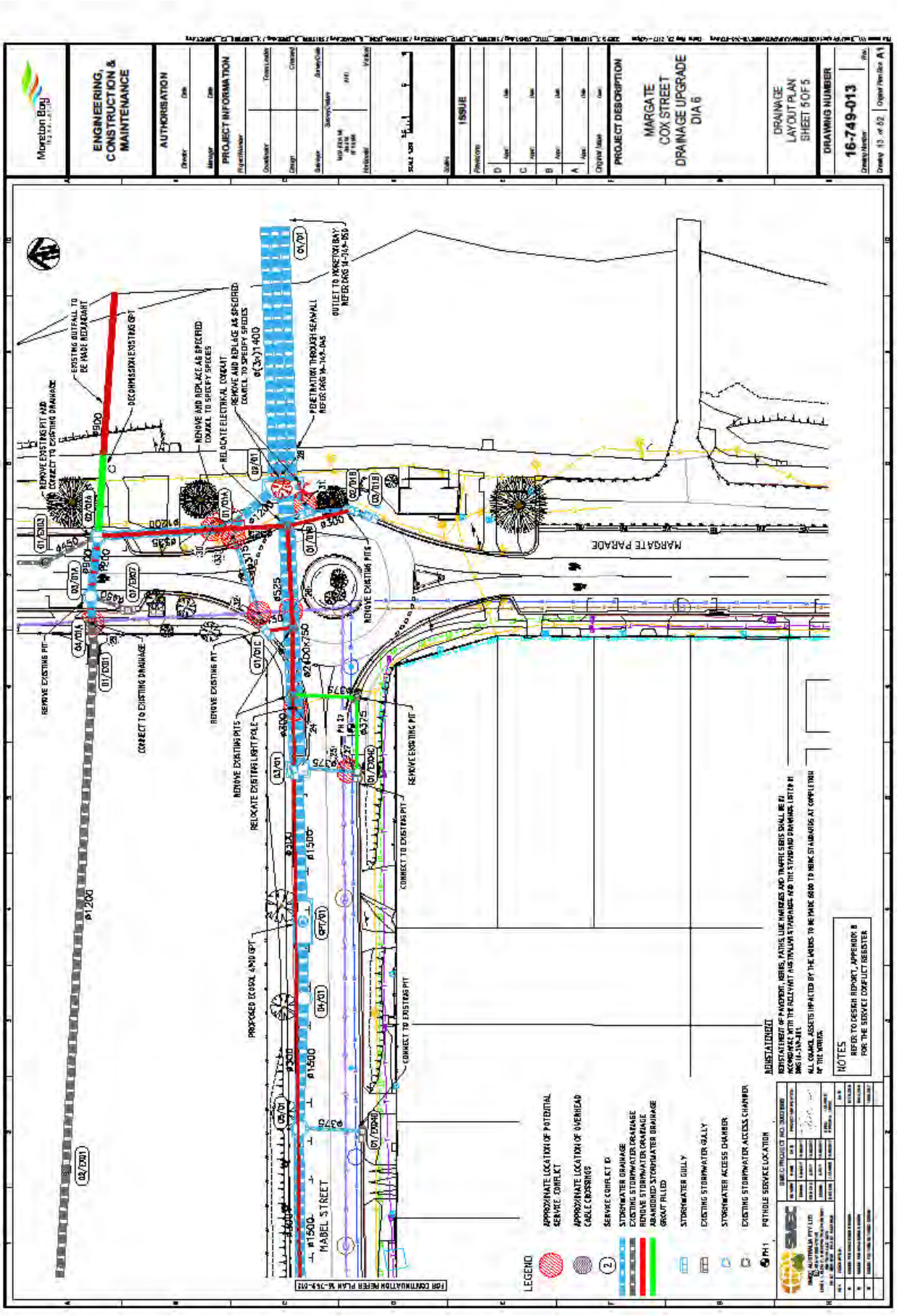
DRAINAGE UPGRADE
DIA 6
DRAINAGE LAYOUT PLAN SHEET 4 OF 5
DRAWING NUMBER
16-749-012
LEGEND
MABEL STREET
ERNEST STREET
NOTES
REFER TO DESIGN REPORT, APPENDIX B FOR THE SERVICE CONFLICT REGISTER
REMOVE AND REPLACE AS SPECIFIED COUNCIL TO SPECIFY SPEEDS
RENOVAL OF TREE TO BE CHAINPED ONSITE BY ARBORIST
REINSTATE DIDGET NETS IN ACCORDANCE WITH MBRC DR-4001, 4001 & 4002
CONNECT TO EXISTING DRAINAGE
CONNECT TO EXISTING PIT
WORKS TO ENSURE NO IMPACT ON RETAINING WALL ADJACENT TO SCHOOL
EXISTING DETENTION BASIN CONTAINMENT WALL TO REPAIR
REMOVE EXISTING PIT
ON SITE DETENTION WARNING SIGN
DEPTH MARKER 09-22-18
CONNECT EXISTING DRAINAGE INTO NEW MANHOLE
WARNING


Moreton Bay
ENGINEERING, CONSTRUCTION & MAINTENANCE
AUTHORISATION
PROJECT INFORMATION
ISSUE
PROJECT DESCRIPTION
MARGATE COX STREET DRAINAGE UPGRADE DIA 6
DRAWING NUMBER
16-749-013
DRAINAGE LAYOUT PLAN SHEET 5 OF 5
MARGATE PARADE
MABEL STREET
REMOVE EXISTING PIT AND CONNECT TO EXISTING DRAINAGE
EXISTING OUTFALL TO BE MADE REDUNDANT
DECOMMISSION EXISTING GPT
REMOVE AND REPLACE AS SPECIFIED COUNCIL TO SPECIFY SPECIES
RELOCATE ELECTRICAL CONDUIT
OUTLET TO MORETON BAY REFER DRG 16-749-150
PENETRATION THROUGH SEAWALL REFER DRG 16-749-045
REMOVE EXISTING PITS
RELOCATE EXISTING LIGHT POLE
PROPOSED CDS/OIL &AND GPT
CONNECT TO EXISTING PIT
REMOVE EXISTING PIT
FOR CONTINUATION REFER PLAN 16-749-012
LEGEND
APPROXIMATE LOCATION OF POTENTIAL SERVICE CONFLICT
APPROXIMATE LOCATION OF OVERHEAD CABLE CROSSINGS
SERVICE CONFLICT ID
STORMWATER DRAINAGE
EXISTING STORMWATER DRAINAGE
REMOVE STORMWATER DRAINAGE
ABANDONED STORMWATER DRAINAGE GROUT FILLED
STORMWATER GULLY
EXISTING STORMWATER GULLY
STORMWATER ACCESS CHAMBER
EXISTING STORMWATER ACCESS CHAMBER
POTHOLE SERVICE LOCATION
ADJUSTMENT
NOTES
REFER TO DESIGN REPORT, APPENDIX B FOR THE SERVICE CONFLICT REGISTER

STRUCTURAL NOTES (DRG 16-749-015 TO 16-749-033)

1.0 GENERAL WORKS:

1.1 THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS, SPECIFICATIONS, AND WITH ANY SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT ADMINISTRATOR FOR CLARIFICATION PRIOR TO CONVENING WORK.

1.2 DO NOT SCALE THE DRAWINGS. SETOUT DIMENSIONS AND SIZES OF STRUCTURAL MEMBERS SHALL BE CHECKED BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.

1.3 UNLESS NOTED OTHERWISE ON DWG, ALL LEVELS ARE IN METRES AND ALL DIMENSIONS ARE IN MILLIMETRES.

1.4 DURING CONSTRUCTION, IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT THE STRUCTURE IS MAINTAINED IN A SAFE AND STABLE CONDITION WITH NO PART BEING OVERSTRESSED.

1.5 THE DESIGN AND INSTALLATION OF TEMPORARY WORKS IS THE RESPONSIBILITY OF THE CONTRACTOR.

1.6 THE DESIGN AND INSTALLATION OF LIFTING ANCHORS IS THE RESPONSIBILITY OF THE CONTRACTOR.

2.0 FOUNDATIONS:

2.1 FOR SOIL CONDITIONS LIKELY TO BE ENCOUNTERED ON THIS CONSTRUCTION REFER TO GEOTECHNICAL REPORT BY CITY PROJECTS OFFICE DATED AUGUST 2014.

2.2 THE FOUNDATIONS HAVE BEEN DESIGNED FOR THE ALLOWABLE BEARING CAPACITY SHOWN ON THE DRAWINGS. THE FOUNDATION MATERIAL SHALL BE INSPECTED AND APPROVED BY THE SITE GEOTECHNICAL REPRESENTATIVE FOR THIS CAPACITY PRIOR TO PLACING REINFORCEMENT OR CONCRETE.

2.3 THE CONTRACTOR SHALL BE RESPONSIBLE FOR LIAISING WITH THE GEOTECHNICAL ENGINEER TO ORGANISE INSPECTIONS AS NECESSARY. A RECORD OF THE APPROVAL SHALL BE PROVIDED BY THE CONTRACTOR TO THE DESIGNER PRIOR TO PLACING REINFORCEMENT OR CONCRETE.

2.4 WHERE EXCAVATED SURFACES REQUIRED TO SUPPORT FOUNDATIONS HAVE BECOME SOFTENED OR LOOSENED DUE TO ADVERSE WEATHER, GROUND SEEPAGE OR OTHER CAUSES, ALL SUCH SOFT OR LOOSE MATERIAL SHALL BE REMOVED PRIOR TO ACCEPTABLE BEARING AND BE REPLACED IMMEDIATELY WITH A LAYER OF CONCRETE BLINDING.

2.5 THE SITE GEOTECHNICAL REPRESENTATIVE SHALL INSPECT EXCAVATIONS AS NECESSARY DURING EXCAVATION TO CONFIRM THE DESIRED FACTOR OF SAFETY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LIAISING WITH THE SITE GEOTECHNICAL REPRESENTATIVE TO ORGANISE INSPECTIONS AS NECESSARY. A RECORD OF THE INSPECTION SHALL BE PROVIDED BY THE CONTRACTOR TO THE DESIGNER ON COMPLETION OF THE INSPECTION.

2.6 FOUNDATION LEVELS ARE SHOWN ON THE DRAWINGS SHALL NOT BE VARIED OR CHANGED WITHOUT THE APPROVAL OF THE DESIGNER.

2.7 BACKFILLING BEHIND PIT WALLS:
COMPACT EXPOSED NATURAL SOILS TO BE 95% AT OMC ±2% UNDER GEOTECHNICAL SUPERVISION. FILL THE SITE USING APPROVED SITE WON MATERIALS OR IMPORTED COHESIVE STABLE FILL (CBR MIN 4% AT 0-5% SWELL <1%) IN MAX. 300 LAYERS TO 95% MODIFIED AT ±2% OF OMC UNDER LEVEL 1 CONDITIONS TO ASS3798.

3.0 FORMWORK:

3.1 ALL FORMWORK MATERIALS, WORKMANSHIP AND STRIPPING OF FORMWORK SHALL BE IN ACCORDANCE WITH AS 3610 AND AS 3610 INCLUDING ALL AMENDMENTS AND SUPPLEMENTS.

3.2 FORMWORK SHALL NOT BE STRIPPED OR BACKPROPS REMOVED UNTIL THE CONCRETE IS SUFFICIENTLY CURED TO SUPPORT THE DESIGN LOADS WITHOUT DISTORTION OR CRACKING.

3.3 THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN, CONSTRUCTION AND PERFORMANCE OF ALL FORMWORK AND FALSEWORK.

4.0 CONCRETE:

4.1 ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS 3600 AND THE CONCRETE SPECIFICATION.

4.2 THE FOLLOWING CONCRETE GRADES & CONCRETE COVER SHALL BE USED UNO.

MATERIAL	GRADE *	ELEMENTS	NOMINAL COVER (mm)
CONCRETE	S32MPa	CONCRETE PITS	50
	25MPa	MASS CONCRETE	75A
	20MPa	BLINDING CONCRETE	75A

4.3 CONCRETE FOR LIQUID RETAINING STRUCTURES SHALL BE IN ACCORDANCE WITH AS 3735 AND THE CONCRETE SPECIFICATION.

4.4 CONCRETE SHALL BE FROM AN APPROVED SOURCE AND SHALL COMPLY WITH THE REQUIREMENTS OF THE FOLLOWING STANDARDS, UNO:

AS 3600	CONCRETE STRUCTURES
AS 3735	CONCRETE STRUCTURES RETAINING LIQUID
AS 3972	PORTLAND AND BLENDED CEMENTS
AS 1379	SPECIFICATION AND SUPPLY OF CONCRETE
AS 2758.1	CONCRETE AGGREGATES
AS 1141	METHODS FOR SAMPLING AND TESTING AGGREGATES
AS 1478	CHEMICAL ADMIXTURES FOR CONCRETE
AS 1012	METHODS OF TESTING CONCRETE
AS 3582	SUPPLEMENTARY CEMENTITIOUS MATERIALS FOR USE WITH PORTLAND CEMENT

4.5 CONCRETE SHALL BE SUPPLIED BY A PERFORMANCE BASIS TO THE CONCRETE GRADES NOTED ON THE DRAWINGS. CONCRETE MIX DESIGNS INCLUDING WATER/CEMENT RATIOS AND ADMIXTURES SHALL BE SUBMITTED TO THE DESIGNER FOR APPROVAL PRIOR TO THE PLACEMENT. CALCIUM CHLORIDE SHALL NOT BE USED IN ANY MIX.

4.6 MAXIMUM CONCRETE SLUMP FOR NON-LIQUID RETAINING STRUCTURES SHALL BE 80mm.

4.7 CONCRETE COVER TO REINFORCEMENT SHALL BE AS SHOWN ON THE ABOVE TABLE. MAINTAIN COVER TO ALL REINFORCEMENT AT CHAIRS, BAR SPACERS, BOLSTERS, CHAIRS AND THE LIKE.

4.8 EDGES OF CONCRETE ELEMENTS SHOWN ON THE DRAWINGS, DO NOT INCLUDE THICKNESS OF APPLIED FINISHES.

4.9 THE FINISHED CONCRETE SHALL BE A DENSE HOMOGENEOUS MASS, COMPLETELY FILLING THE FORMWORK, THOROUGHLY EMBEDDING THE REINFORCEMENT AND FREE OF ANY STONE POCKETS OR VOIDS. CONCRETE SHALL BE COMPACTED BY MECHANICAL VIBRATORS DURING PLACEMENT.

4.10 ALL FORMED EXPOSED EDGES AND RE-ENTRANT CORNERS SHALL BE CHAMFERED OR FILLETED 20mm UNO.

4.11 NO PENETRATIONS, CHASES OR TEMPORARY FIXTURES OTHER THAN THOSE SHOWN ON THE DRAWINGS ARE PERMITTED IN THE CONCRETE MEMBERS WITHOUT PRIOR APPROVAL OF THE STRUCTURAL ENGINEER.

4.12 REINFORCEMENT AT PENETRATIONS SHALL BE TREATED THUS:
4.12.1 FOR PENETRATIONS WITH DIMENSIONS SMALLER THAN 300mm, REINFORCEMENT SHALL BE PLACED AS CLOSE AS POSSIBLE AND CUT TO SUIT PENETRATION. PROVIDE ADDITIONAL BARS TO MATCH THE SIZE, LENGTH AND NUMBER OF BARS CUT, AND PLACE EQUALLY ON ALL SIDES OF THE PENETRATION HOLE.
4.12.2 FOR PENETRATIONS WITH DIMENSIONS LARGER THAN 300mm, REINFORCEMENT SHALL BE PLACED AS CLOSE AS POSSIBLE TO EACH SIDE OF PENETRATION HOLE.

4.13 CONDUITS, PIPES, ETC. SHALL ONLY BE LOCATED IN THE MIDDLE ONE THIRD OF SLAB DEPTH AND SPACED AT NOT LESS THAN 3 DIAMETERS.

4.14 CONSTRUCTION JOINTS SHALL BE PROPERLY FORMED AND USED ONLY WHERE SHOWN ON THE DRAWINGS OR SPECIFICALLY APPROVED BY THE DESIGNER. FURTHER, CONCRETE SURFACES AGAINST WHICH NEW CONCRETE IS TO BE PLACED SHALL BE CLEAN, FREE OF ALL LAITANCE, AND BE SUFFICIENTLY ROUGH TO CONVENIENT OF POURING

4.15 ALL CONCRETE SURFACES ARE TO BE ROUGHENED TO PROVIDE SATISFACTORY BOND BETWEEN LIFTS OF CONCRETE AND CONCRETE TO STEEL. BEFORE PLACING NEW CONCRETE ONTO HARDENED CONCRETE UNO, ALL CONCRETE SURFACES TO BE FREE OF LAITANCE.

4.16 ALL PROPRIETARY FIXINGS TO CONCRETE MEMBERS (eg CHEMICAL ANCHORS) SHALL BE INSTALLED STRICTLY IN ACCORDANCE WITH THE FIXING MANUFACTURER'S RECOMMENDATIONS.

4.17 ALL CONCRETE INCLUDING SLABS ON GROUND & FOOTINGS SHALL BE COMPACTED USING VIBRATION EQUIPMENT AS FOLLOWS:
4.17.1 FOR SLABS USE IMMERSION TYPE VIBRATORS VERTICALLY, NOT HORIZONTALLY, AT OVERLAPPING SPOT PATTERN AND/OR VIBRATING SCREED.
4.17.2 FOR ALL OTHER ELEMENTS USE IMMERSION TYPE VIBRATOR VERTICALLY.
VIBRATORS IN EACH LOCATION SHOULD CONTINUE UNTIL AIR BUBBLES CEASE TO APPEAR (GENERALLY AFTER 10-15 SECONDS).

4.18 INITIAL CURING OF CONCRETE SHALL COMMENCE AS LATER THAN 3 HOURS AFTER FINISHING OPERATIONS HAVE BEEN COMPLETED. THE CONCRETE SHALL BE KEPT CONTINUOUSLY MOIST AT LEAST OVERNIGHT BY:
4.18.1 PONDING OR CONTINUOUS SPRINKLING WITH WATER
4.18.2 USE OF AN ABSORPTIVE COVER KEPT CONTINUOUSLY WET
4.18.3 COATING WITH AN APPROVED SPRAYED MEMBRANE CURING COMPOUND.

4.19 FINAL CURING SHALL IMMEDIATELY FOLLOW INITIAL CURING AND SHALL BE CONTINUED FOR 7 DAYS. ONE OF THE FOLLOWING CURING METHODS SHALL BE ADOPTED FOR FINAL CURING:
4.19.1 PONDING OR CONTINUOUS SPRINKLING WITH WATER
4.19.2 USE OF AN APPROVED MOISTURE RETAINING COVERING SUCH AS HEAVY GAUGE CLEAR POLYTHENE SHEETING OR BUILDERS PAPER, FIRMLY HELD AGAINST THE CONCRETE SURFACES TO PREVENT AIR CIRCULATION AT THE CONCRETE SURFACES. SUCH COVERS SHALL BE MAINTAINED WORKABLE DURING THE CURING PERIOD.
4.19.3 COATING WITH AN APPROVED SPRAYED MEMBRANE.

4.20 PLACE A 50mm MIN. THICKNESS CONCRETE BLINDING LAYER UNDER ALL CONCRETE CAST AGAINST THE GROUND.

4.21 COMPLY WITH THE TESTING AND SAMPLING OF CONCRETE IN ACCORDANCE WITH AS 3600, AS 1379, AS1012, AND THE SPECIFICATION.

5.0 REINFORCEMENT:

5.1 SHOWN ON THE DRAWINGS IS REPRESENTED DIAGRAMMATICALLY AND NOT NECESSARILY SHOWN IN TRUE PROJECTION.

5.2 REINFORCEMENT SYMBOLS INDICATE THE FOLLOWING:
S - DENOTES GRADE 250 HOT ROLLED DEFORMED BARS TO AS1654
R - DENOTES GRADE 250R HOT ROLLED PLAIN BARS TO AS 1654
SL/RL - DENOTES HARD-DRAWN WIRE REINFORCING FABRIC TO AS 4671
W - DENOTES HARD-DRAWN PLAIN WIRE TO AS 4671
D - DENOTES GRADE 500N HIGH YIELD DEFORMED BARS TO AS 4671

5.3 REINFORCEMENT ABBREVIATIONS INDICATE THE FOLLOWING:
EF ——— EACH FACE
NF ——— NEAR FACE
FF ——— FAR FACE
EW ——— EACH WAY
T or TOP ——— TOP
B or BTM ——— BOTTOM

5.4 WELDING OF REINFORCEMENT BY MECHANICAL OR ANY OTHER MEANS IS NOT PERMITTED WITHOUT THE APPROVAL OF THE DESIGNER.

5.5 REINFORCEMENT SHALL BE LAPPED ONLY AT THE LOCATIONS SHOWN ON THE DRAWINGS OR AS OTHERWISE APPROVED BY THE DESIGNER. LAPS ARE TO BE STAGGERED AND SHALL BE SUFFICIENT TO DEVELOP THE FULL STRENGTH OF THE REINFORCEMENT. BAR LAP LENGTHS SHALL BE AS SHOWN BELOW UNO.

BAR DIAMETER	HORIZONTAL BARS WITH MORE THAN 300mm OF CONCRETE CAST BELOW THE BAR (mm)	ALL OTHER BARS (mm)
	f'c = 25MPa	f'c = 32MPa
10	500	400
12	600	500
16	800	650
20	950	800
24	1100	950
28	1400	1200
32	1800	1550

5.6 WHERE MORE THAN 50% OF ADJACENT BARS ARE LAPPED IN ANY ONE CROSS SECTION OR ARE FACE THE LAP LENGTH SHALL BE INCREASED BY 30%, UNO.

5.7 MECHANICAL SPLICES SHALL ONLY BE USED WHERE APPROVED BY THE CONTRACT ADMINISTRATOR.

5.8 REINFORCEMENT SHALL NOT BE WELDED UNLESS SHOWN ON THE DRAWINGS OR APPROVED BY THE DESIGNER.

5.9 ALL REINFORCEMENT SHALL BE SECURELY SUPPORTED ON APPROVED BAR CHAIRS AT NOT GREATER THAN 1 METRE CENTRES EACH WAY. ALL INTERSECTIONS SHALL BE SECURELY TIED WITH GALVANISED WIRE TIES. TIE ENDS SHALL NOT EXTEND INTO THE COVER ZONE. MESH SHALL BE SUPPORTED ON APPROVED CHAIRS AT 800 MAXIMUM CENTRES.

5.10 LAPS IN MESH SHALL BE THE SPACING OF TRANSVERSE WIRES PLUS 50mm UNO.

5.11 REINFORCING MESH SHALL NOT BE ROLLED INTO POSITION THROUGH THE WET CONCRETE.

5.12 REINFORCEMENT DEVELOPMENT LENGTHS SHALL EQUAL LAP LENGTHS.

5.13 THE CONTRACT ADMINISTRATOR SHALL BE GIVEN A MINIMUM OF 24 HOURS NOTICE FOR REINFORCEMENT INSPECTIONS AND CONCRETE SHALL NOT BE DELIVERED UNTIL FINAL APPROVAL IS OBTAINED.

5.14 DISTRIBUTION REINFORCEMENT WHERE NOT SHOWN ON THE DRAWINGS SHALL BE N12-230, LAPPED 375 AT STAGGERED CENTRES UNO.

6.0 CONCRETE PITS:

6.1 REFER TO CIVIL DRAWINGS FOR SETOUT CO-ORDINATES AND SITE GEOTECHNICAL RUBBED CONCRETE LEVELS ARE PROVIDED FOR INFORMATION ONLY AND SHOULD BE CONFIRMED PRIOR TO CONVENTION OF WORKS.

7.0 PIPE PENETRATIONS:

7.1 FOR PIPE PENETRATIONS THROUGH WALLS, ALL REINFORCEMENT SHALL BE CONTINUOUS WITH OPENINGS CUT AND FORMED AROUND THE TYPICAL DETAILS INDICATED ON THE DRAWING. REFER TO CIVIL DRAWINGS FOR PIPE DIAMETER, SETTING OUT AND INVERT LEVELS.

7.2 REFER TO CIVIL DRAWINGS FOR COVER DETAILS TO ACCESS OPENINGS. ALL REBATES ARE INDICATIVE ONLY AND REFERENCE SHOULD BE MADE TO COVER MANUFACTURERS DRAWINGS FOR EXACT REQUIREMENTS.

7.3 REFER TO CIVIL DRAWINGS FOR OPENINGS AND CAST IN RINGS ASSOCIATED WITH LADDERS, TEMPORARY HAND RAILING, VALVE SPINDLES, PORTABLE DAVITETC.

7.4 PRECAST CONCRETE LIDS DETAILS SHOWN ON THE DRAWINGS INDICATE THE MINIMUM REQUIRED ANCHOR LIFTING REQUIREMENT ASSUMING A 4 POINT LIFTING ARRANGEMENT WITH SPREADER BEAMS. THE FINAL LIFTING LAYOUT AND REQUIREMENTS SHALL BE DESIGNED AND CERTIFIED BY THE CONTRACTOR'S RPEQ ENGINEER.

7.5 C.J. - JOINTS CONSTRUCTION JOINT. PROVIDE CONTINUOUS WATERSTOP I.E. SIKA WATERBAR WATERSTOP OR SIMILAR APPROVED. FULLY PREPARE SURFACE TO SIKA ROUGHNESS EXCEPT WHERE WATERSTOP IS PLACED AS PER MANUFACTURERS RECOMMENDATIONS. DAMPEN EXISTING CONCRETE BEFORE PLACING FRESH CONCRETE.

7.6 PIPE CROSS PENETRATIONS TO BE CORE DRILLED AFTER CONCRETE HAS ACHIEVED 28 DAY STRENGTH AS PER MANUFACTURERS RECOMMENDATIONS. DAMPEN EXISTING CONCRETE BEFORE PLACING FRESH CONCRETE.

7.7 PIPE CROSS PENETRATIONS THROUGH PIT WALLS TO BE CORE DRILLED AFTER CONCRETE HAS ACHIEVED 28 DAY STRENGTH AS PER MANUFACTURERS RECOMMENDATIONS. DAMPEN EXISTING CONCRETE BEFORE PLACING FRESH CONCRETE.

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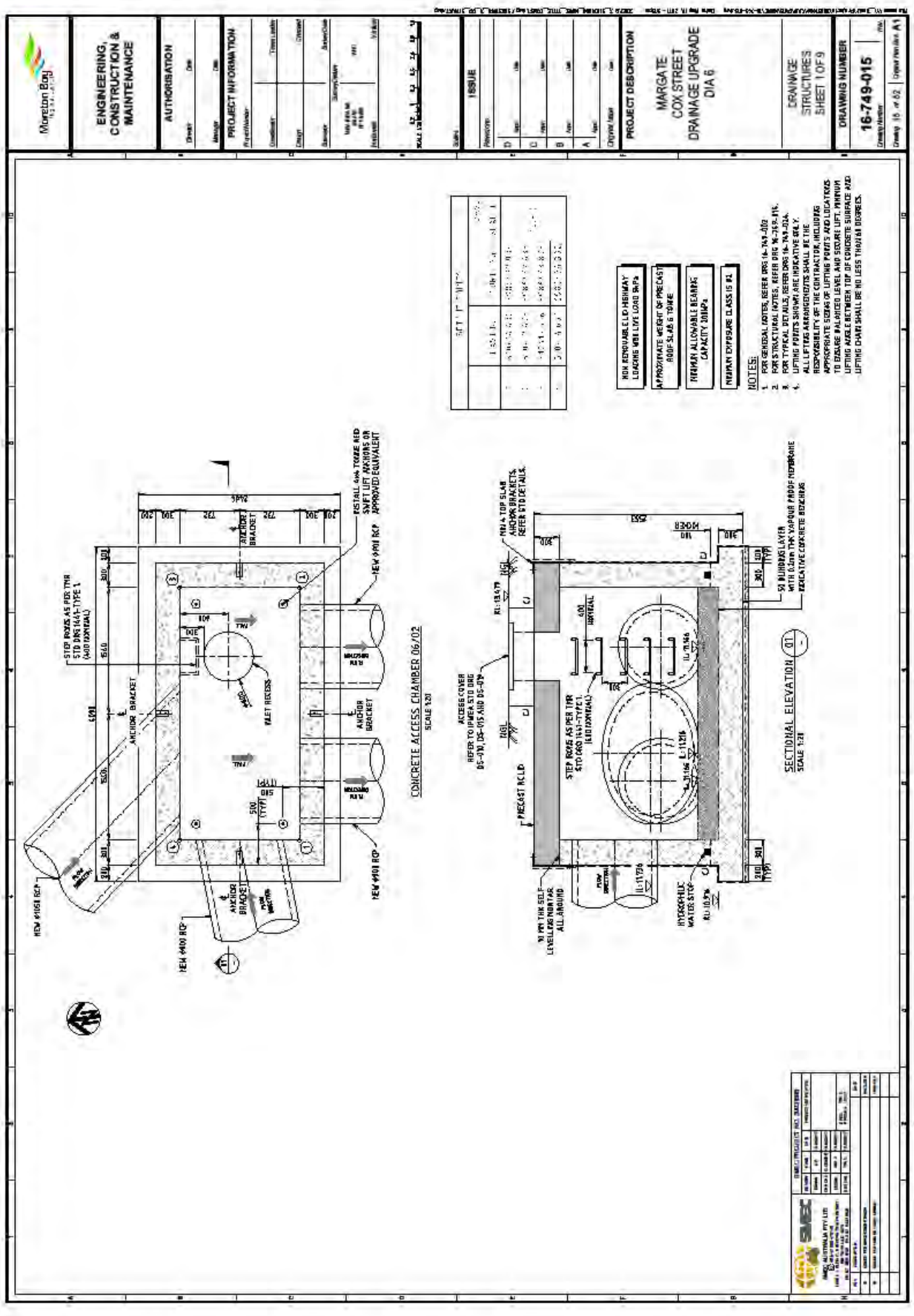
PROJECT DESCRIPTION
MARGATE COAST STREET DRAINAGE UPGRADE QTR 6

STRUCTURAL NOTES

DRAWING NUMBER
16-749-014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MARGATE COX STREET DRAINAGE UPGRADE DIA 6
DRAWING NUMBER
16-749-015
DRAINAGE STRUCTURES SHEET 1 OF 9
CONCRETE ACCESS CHAMBER 06/02
SCALE 1:20
SECTIONAL ELEVATION
SCALE 1:20
NOTES:

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DRAWING NUMBER
16-749-016
DRAINAGE STRUCTURES SHEET 2 OF 9
NOTES:
CONCRETE ACCESS CHAMBER 05/02
SCALE 1:20
SECTIONAL ELEVATION
SCALE 1:20

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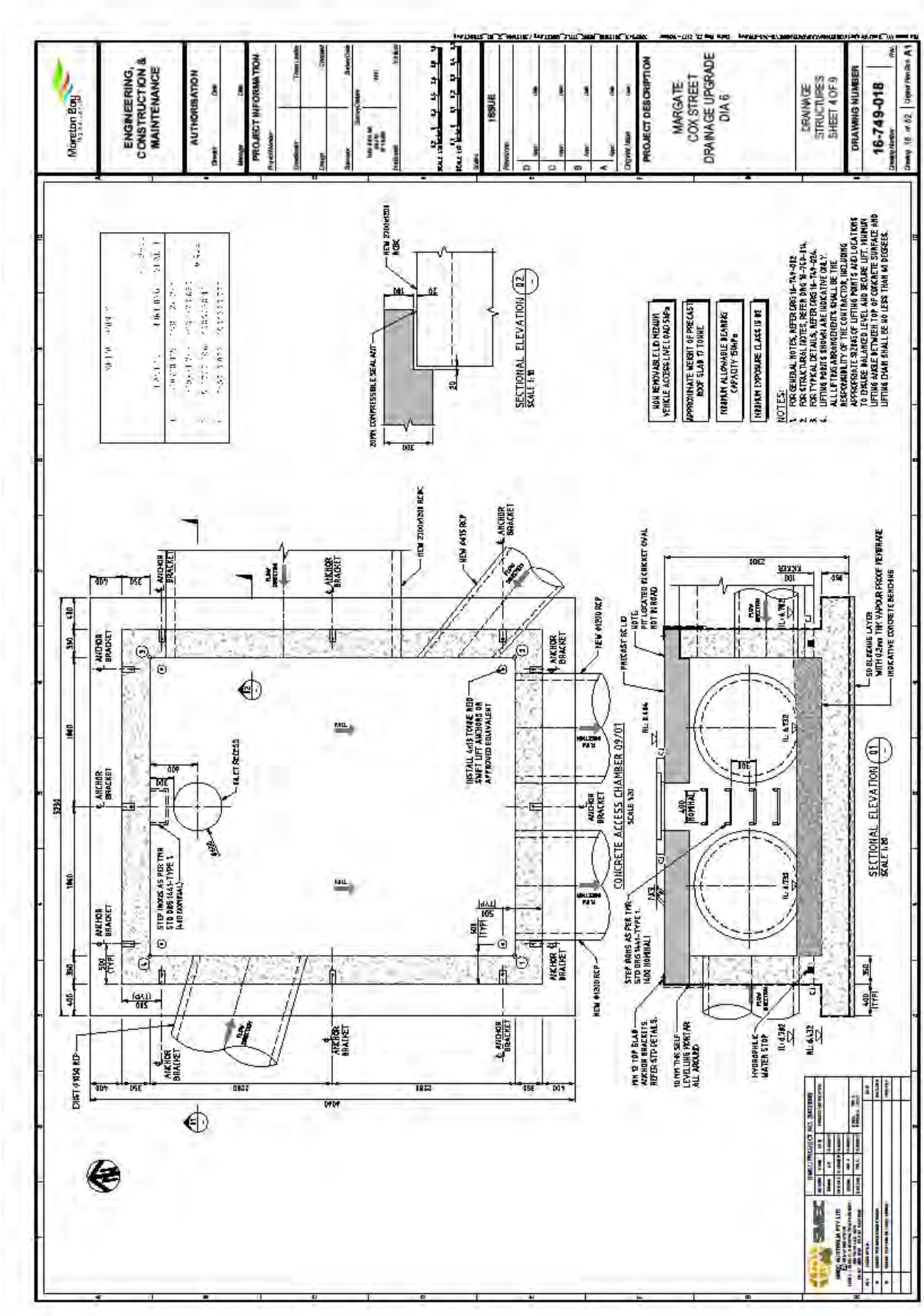
MARGATE COX STREET DRAINAGE UPGRADE DIA 6
DRAINAGE STRUCTURES SHEET 3 OF 9
DRAWING NUMBER
16-749-017
NOTES:
CONCRETE ACCESS CHAMBER 02/05
SCALE 1:20
SECTIONAL ELEVATION 01
SCALE 1:20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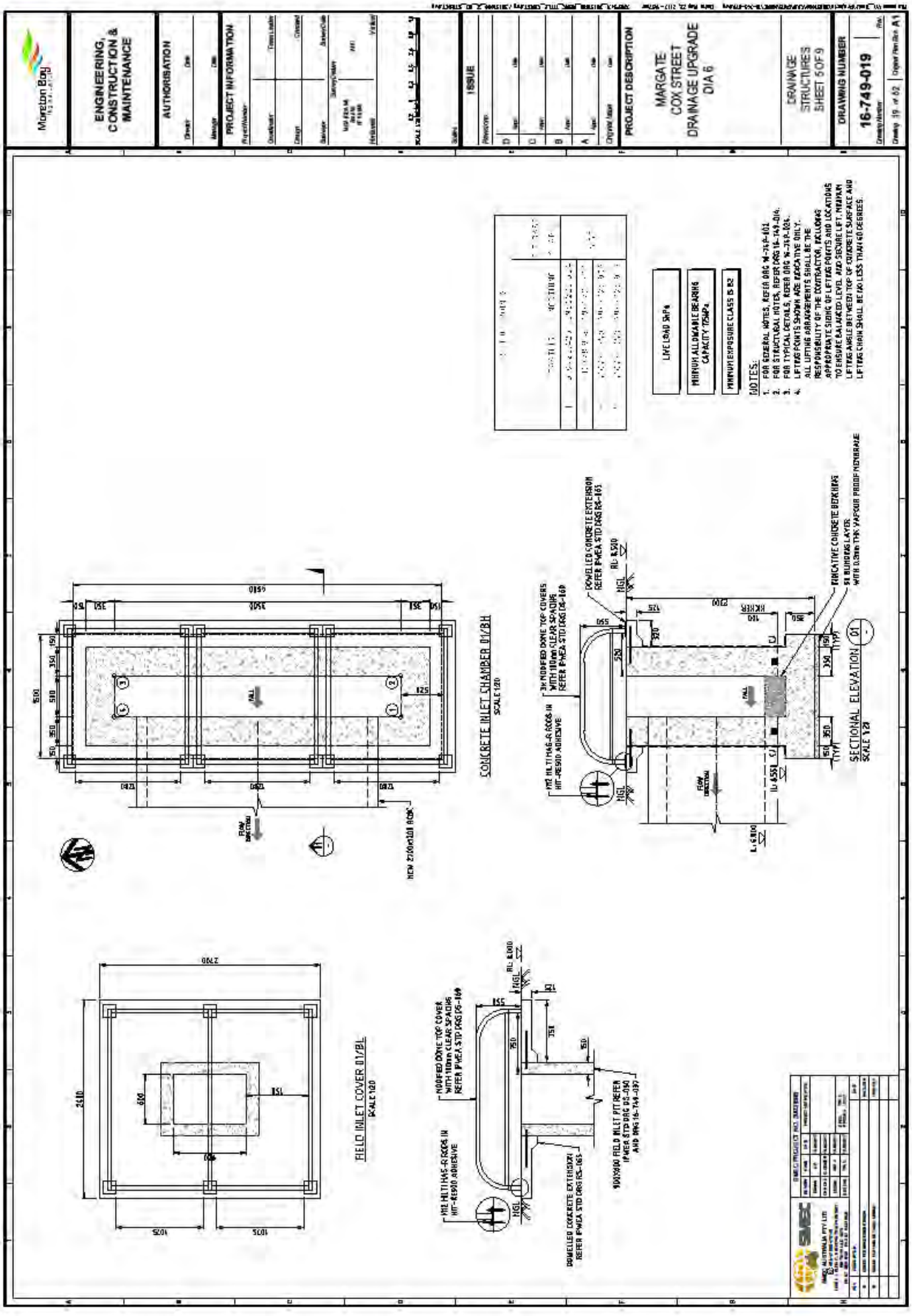
MARGATE COX STREET DRAINAGE UPGRADE DIA 6
DRAINAGE STRUCTURES SHEET 4 OF 9
DRAWING NUMBER
16-749-018
SECTIONAL ELEVATION 02
SECTIONAL ELEVATION 01
CONCRETE ACCESS CHAMBER 09/01
NOTES:
1. FOR GENERAL NOTES, REFER DRG 16-749-012
2. FOR STRUCTURAL NOTES, REFER DRG 16-749-114.
3. FOR TYPICAL DETAILS, REFER DRG 16-749-014.
4. LIFTING POINTS SHOWN ARE INDICATIVE ONLY. ALL LIFTING ARRANGEMENTS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, INCLUDING APPROPRIATE SIZING OF LIFTING POINTS AND LOCATIONS TO ENSURE BALANCED LEVEL AND SECURE LIFT. MINIMUM LIFTING ANGLE BETWEEN TOP OF CONCRETE SURFACE AND LIFTING CHAIN SHALL BE NO LESS THAN 60 DEGREES.
NON REMOVABLE LID NOMINAL VEHICLE ACCESS LIVE LOAD 5kPa
APPROXIMATE WEIGHT OF PRECAST ROOF SLAB 17 TONNE
MINIMUM ALLOWABLE BEARING CAPACITY 150kPa
MINIMUM EXPOSURE CLASS U2
ANCHOR BRACKET
STEP IRONS AS PER TYR STD DRG 1441-TYPE 1. (400 NOMINAL)
INSTALL 4x15 TONNE RED SWIFT LIFT ANCHORS OR APPROVED EQUIVALENT
PRECAST RC LID NOTE: PIT LOCATED IN CONKET OVAL NOT IN ROAD
ED BLENDE LAYER WITH 142mm THK VAPOUR PROOF MEMBRANE INDICATIVE CONCRETE BENCHING
HYDRAULIK WATER STOP
10 MM THK SELF LEVELLING MORTAR ALL AROUND
MIN 10 TOP SLAB ANCHOR BRACKETS. REFER STD DETAILS.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MARGATE
COX STREET
DRAINAGE UPGRADE
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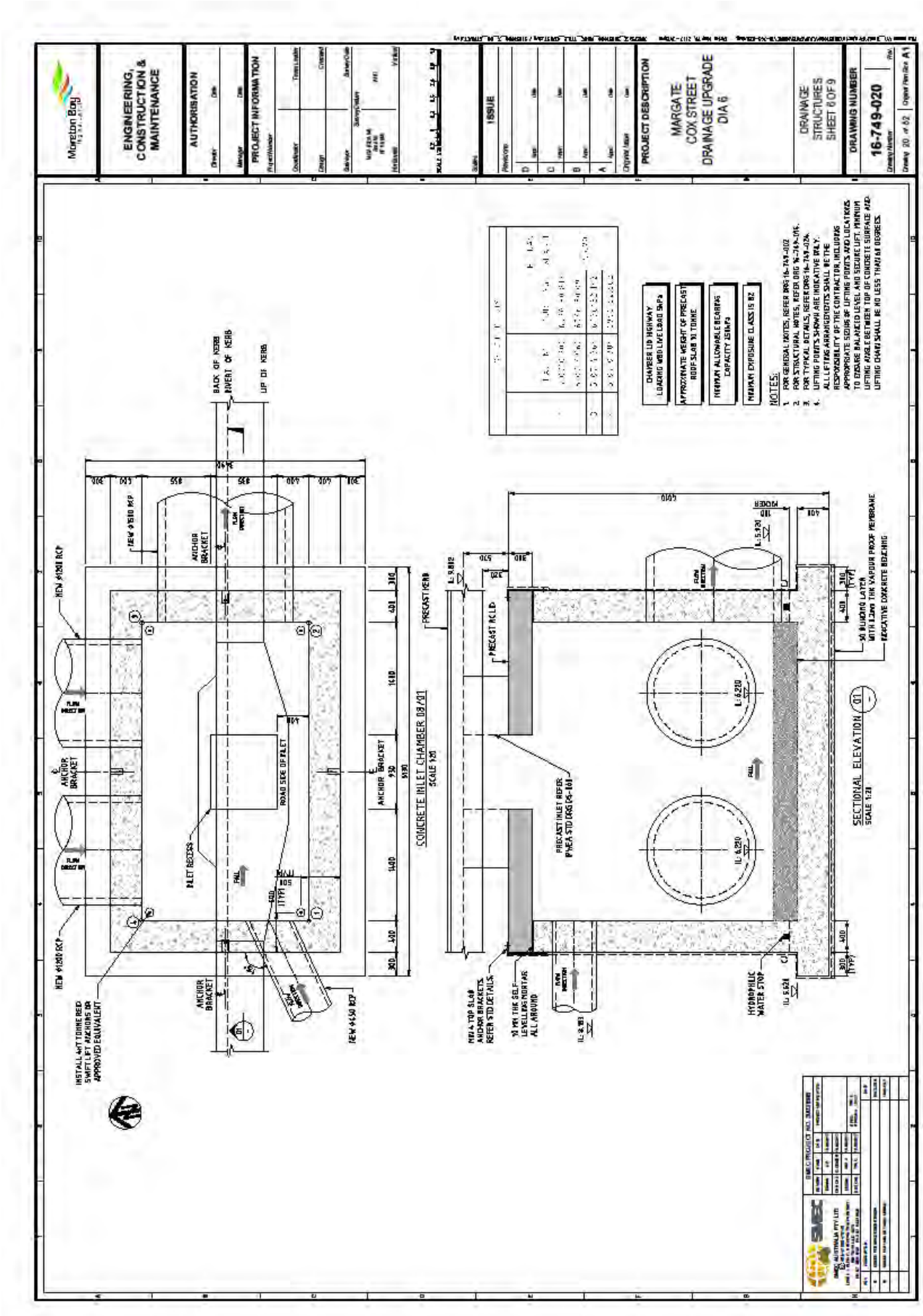
DRAINAGE STRUCTURES SHEET 5 OF 9
DRAWING NUMBER
16-749-019
NOTES:
1. FOR GENERAL NOTES, REFER DRG No 16-749-001
2. FOR STRUCTURAL NOTES, REFER DRG No 16-749-004.
3. FOR TYPICAL DETAILS, REFER DRG No 16-749-005.
4. LIFTING POINTS SHOWN ARE INDICATIVE ONLY.
ALL LIFTING ARRANGEMENTS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, INCLUDING APPROPRIATE SIZING OF LIFTING POINTS AND LOCATIONS TO ENSURE BALANCED LEVEL AND SECURE LIFT. MINIMUM LIFTING ANGLE BETWEEN TOP OF CONCRETE SURFACE AND LIFTING CHAIN SHALL BE NO LESS THAN 60 DEGREES.
LIVE LOAD 5kPa
MINIMUM ALLOWABLE BEARING CAPACITY 150kPa
MINIMUM EXPOSURE CLASS IS B2
CONCRETE INLET CHAMBER 01/BH
SCALE 1:20
SECTIONAL ELEVATION 01
SCALE 1:20
FIELD INLET COVER 01/BL
SCALE 1:20
MODIFIED DOME TOP COVERS WITH 100mm CLEAR SPACING REFER PWEA STD DRG RS-169
M12 HILTI HAS-R RODS IN HIT-RE500 ADHESIVE
DOWELLED CONCRETE EXTENSION REFER PWEA STD DRG RS-165
900X900 FIELD INLET PIT REFER IPWEA STD DRG RS-150 AND DRG 16-749-007
SWEC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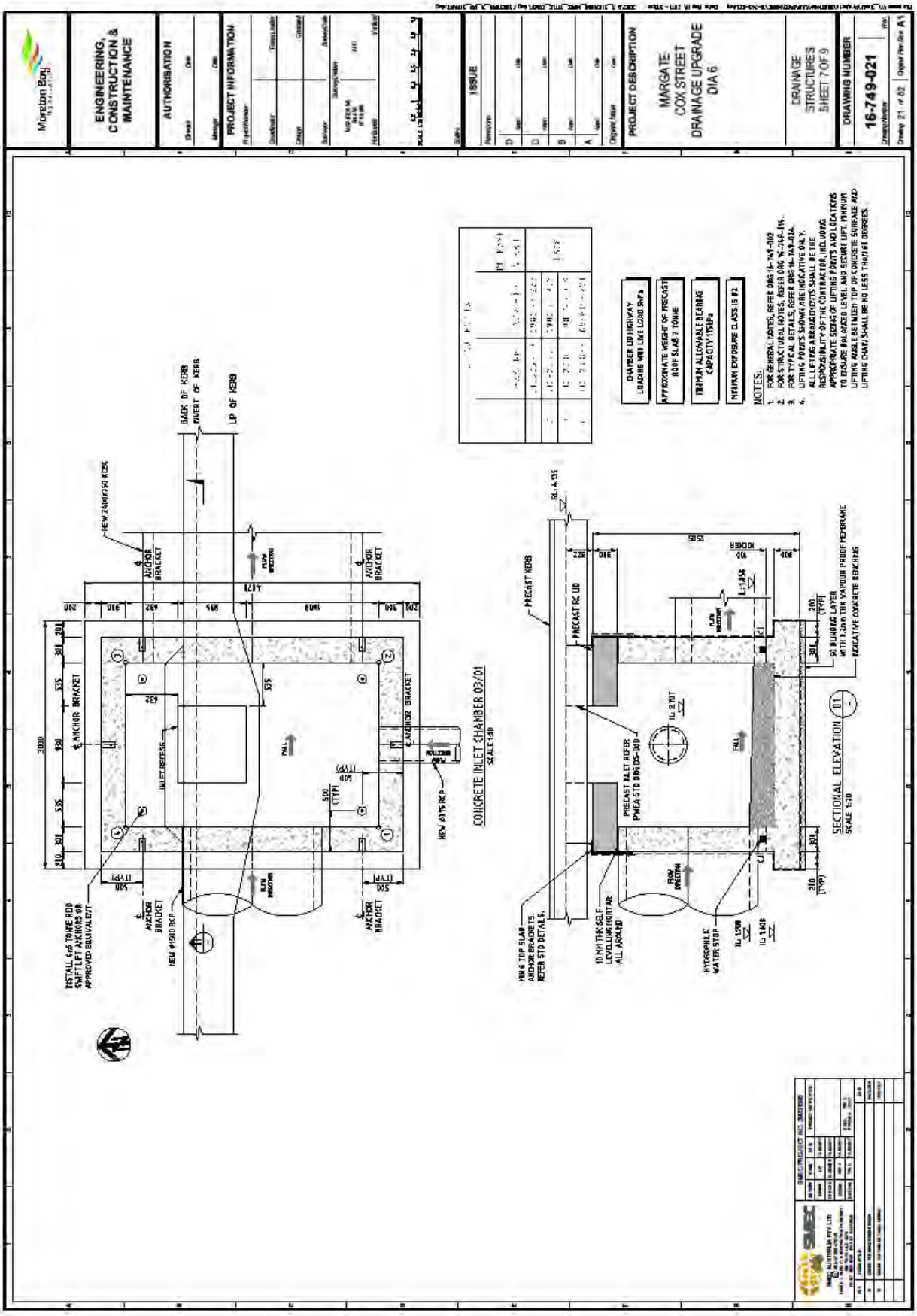
DRAWING NUMBER
16-749-020
CONCRETE INLET CHAMBER 03/01
SCALE 1:20
SECTIONAL ELEVATION 01
SCALE 1:20
NOTES:
1. FOR GENERAL NOTES, REFER DRG No 16-749-002
2. FOR STRUCTURAL NOTES, REFER DRG No 16-749-005.
3. FOR TYPICAL DETAILS, REFER DRG No 16-749-006.
4. LIFTING PIPES SHOWN ARE INDICATIVE ONLY.
ALL LIFTING ARRANGEMENTS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, INCLUDING APPROPRIATE SIZING OF LIFTING POINTS AND LOCATIONS TO ENSURE BALANCED LIFTS AND SECURE LIFTS. MINIMUM LIFTING ANGLE BETWEEN TOP OF CONCRETE SURFACE AND LIFTING CHAIN SHALL BE NO LESS THAN 60 DEGREES.
CHAMBER LID HIGHWAY LOADING W60 LIVE LOAD 5kPa
APPROXIMATE WEIGHT OF PRECAST ROOF SLAB 31 TONNE
MAXIMUM ALLOWABLE BEARING CAPACITY 250kPa
MAXIMUM EXPOSURE CLASS IS B2
BACK OF KERB
INVERT OF KERB
LIP OF KERB
NEW ø1350 RCP
NEW ø1650 RCP
ANCHOR BRACKET
INLET RECESS
ROAD SIDE OF INLET
PRECAST SLAB
PRECAST INLET REFER IPWEA STD DRG DS-161
HYDROPHILIC WATER STOP
INSTALL M7 TORNRED SWIFTLIFT ANCHORS OR APPROVED EQUIVALENT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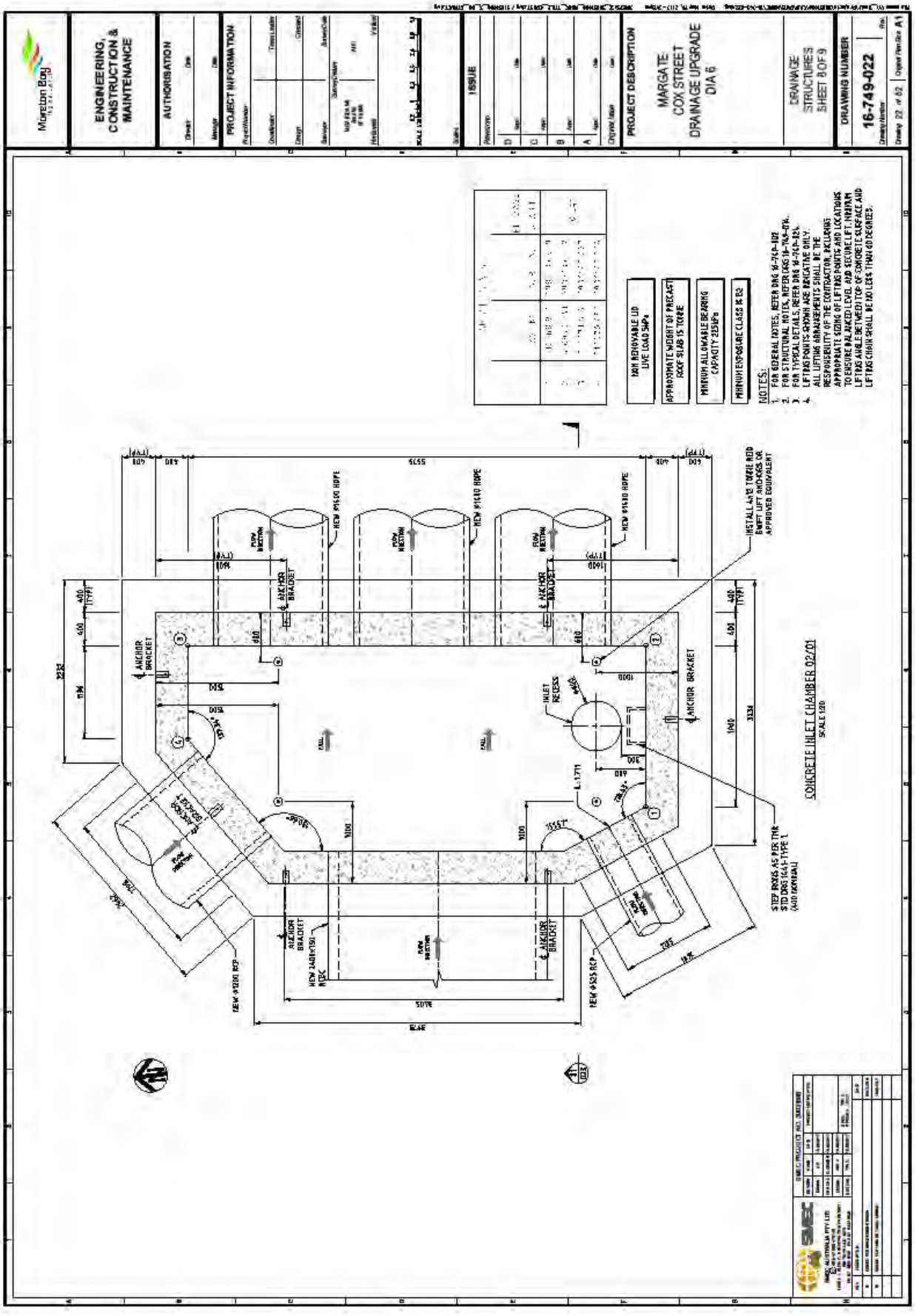
DRAINAGE STRUCTURES SHEET 7 OF 9
DRAWING NUMBER
16-749-021
CONCRETE INLET CHAMBER 02/01
SCALE 1:30
SECTIONAL ELEVATION
SCALE 1:20
NOTES:
1. FOR GENERAL NOTES, REFER DRG 16-749-002
2. FOR STRUCTURAL NOTES, REFER DRG 16-749-015.
3. FOR TYPICAL DETAILS, REFER DRG 16-749-024.
4. LIFTING POINTS SHOWN ARE INDICATIVE ONLY.
ALL LIFTING ARRANGEMENTS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, INCLUDING APPROPRIATE SIZING OF LIFTING POINTS AND LOCATIONS TO ENSURE BALANCED LEVEL AND SECURE LIFT. MINIMUM LIFTING ANGLE BETWEEN TOP OF CONCRETE SURFACE AND LIFTING CHAIN SHALL BE NO LESS THAN 60 DEGREES.
CHAMBER LID HIGHWAY LOADING W60 LIVE LOAD 84Pa
APPROXIMATE WEIGHT OF PRECAST ROOF SLAB 7 TONNE
MINIMUM ALLOWABLE BEARING CAPACITY 150Pa
MINIMUM EXPOSURE CLASS IS B2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MARGATE
COX STREET
DRAINAGE UPGRADE
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DRAINAGE STRUCTURES SHEET 8 OF 9
DRAWING NUMBER
16-749-022
NOTES:
1. FOR GENERAL NOTES, REFER DRG 16-749-102
2. FOR STRUCTURAL NOTES, REFER DRG 16-749-124.
3. FOR TYPICAL DETAILS, REFER DRG 16-749-124.
4. LIFTING POINTS SHOWN ARE INDICATIVE ONLY.
ALL LIFTING ARRANGEMENTS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, INCLUDING APPROPRIATE SIZING OF LIFTING POINTS AND LOCATIONS TO ENSURE BALANCED LEVEL AND SECURE LIFT. MINIMUM LIFTING ANGLE BETWEEN TOP OF CONCRETE SURFACE AND LIFTING CHAIN SHALL BE NO LESS THAN 60 DEGREES.
MIN REMOVABLE LID LIVE LOAD 5kPa
APPROXIMATE WEIGHT OF PRECAST ROOF SLAB IS 10TONNE
MINIMUM ALLOWABLE BEARING CAPACITY 250kPa
MINIMUM EXPOSURE CLASS N 32
CONCRETE INLET CHAMBER 02/01
SCALE 1:20
INSTALL 4 NO TIMES NEED LIFT LIFT ANCHORS OR APPROVED EQUIVALENT
STEP IRONS AS PER TMR STD DRG 1441 TYPE 1 (ALID ALUMINIUM)
ANCHOR BRACKET
INLET RECESS
NEW Ø1500 RCP
NEW Ø825 RCP

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MARGATE
COX STREET
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DIA 6
DRAINAGE STRUCTURES SHEET 9 OF 9
DRAWING NUMBER
16-749-023
NOTES:
1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING 16-749-022
SECTIONAL ELEVATION
SCALE 1:20
PRECAST RCLD
ACCESS COVER REFER TO DRAWING STD DRG DS-015 AND DS-019
HYDRAULIC WATER STOP
51 BUNDRAS LAYER WITH 0.2mm THK VAPOUR PROOF MEMBRANE
INDICATIVE CONCRETE BENCHING

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DRAINAGE UPGRADE
DIA 6
DRAINAGE STRUCTURE
TYPICAL DETAILS
DRAWING NUMBER
16-749-024
TYPICAL CONSTRUCTION JOINT (CJ)
SCALE 1:5
TYPICAL TRIMMER DETAIL
NTS
TYPICAL CORNER DETAIL
SCALE 1:5
INDICATIVE LIFTING DIAGRAM
NTS
TYPICAL - EAST IN PIPE DETAIL
SCALE 1:5
SECTION
SCALE 1:5
TYPICAL ADDITIONAL REINFORCEMENT DETAIL
AT SWIFTLIFT ANCHOR LOCATION
NTS
TOP SLAB ANCHOR BRACKET FOR
USE WITH BOLT DOWN COVERS
SCALE 1:10
TOP SLAB ANCHOR BRACKET DETAIL
SCALE 1:10
NOTES:
1. FOR GENERAL NOTES, REFER DWG 16-749-002
2. FOR STRUCTURAL NOTES, REFER DWG 16-749-016

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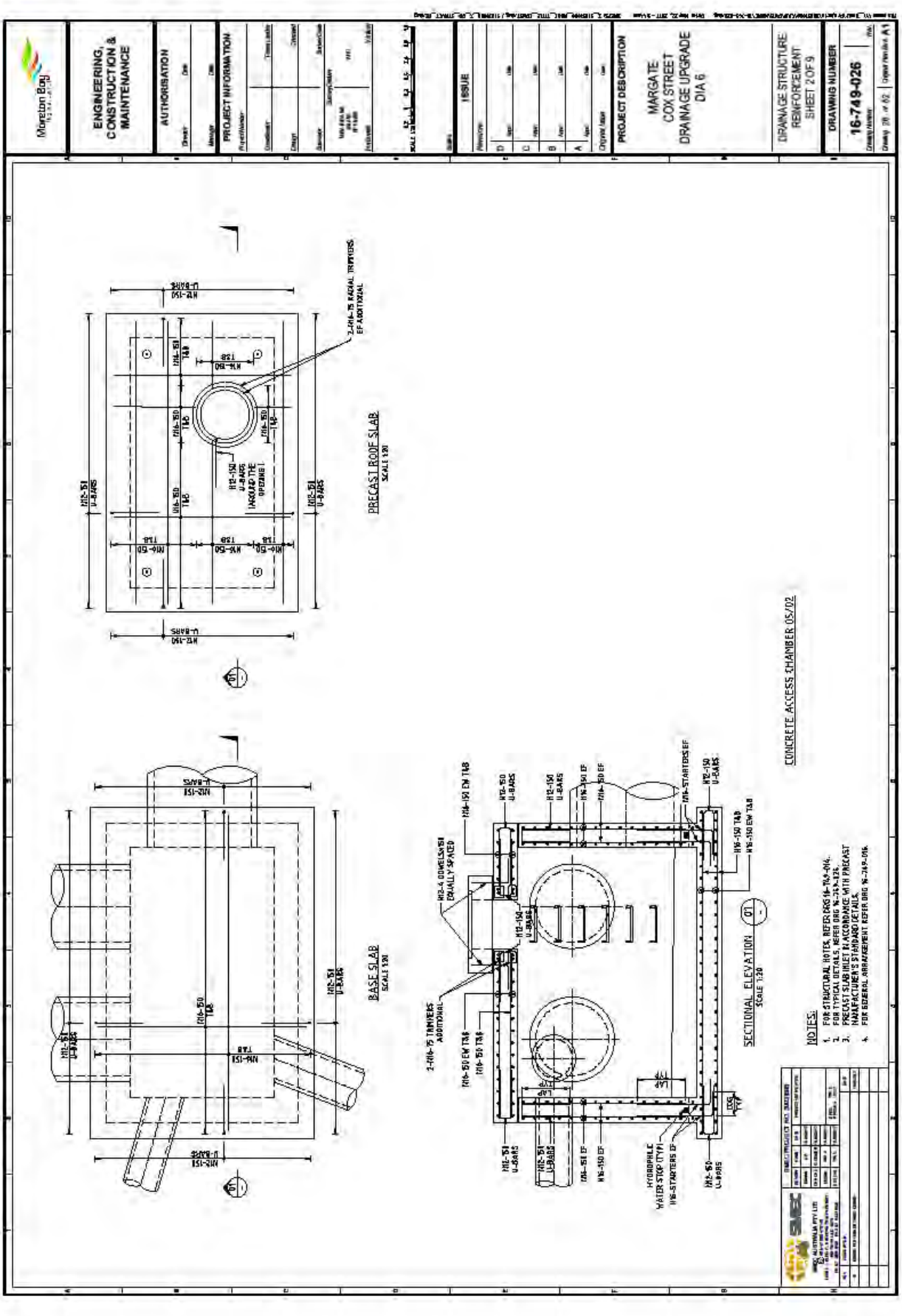
MARGATE COX STREET DRAINAGE UPGRADE DIA 6
DRAINAGE STRUCTURE REINFORCEMENT SHEET 1 OF 9
DRAWING NUMBER
16-749-025
PRECAST ROOF SLAB
SCALE 1:20
BASE SLAB
SCALE 1:20
SECTIONAL ELEVATION
SCALE 1:20
CONCRETE ACCESS CHAMBER 06/02
NOTES:
1. FOR STRUCTURAL NOTES, REFER DRG 16-749-014.
2. FOR TYPICAL DETAILS, REFER DRG 16-749-126.
3. PRECAST SLAB INLET IN ACCORDANCE WITH PRECAST MANUFACTURER'S STANDARD DETAILS.
4. FOR GENERAL ARRANGEMENT REFER DRG 16-749-005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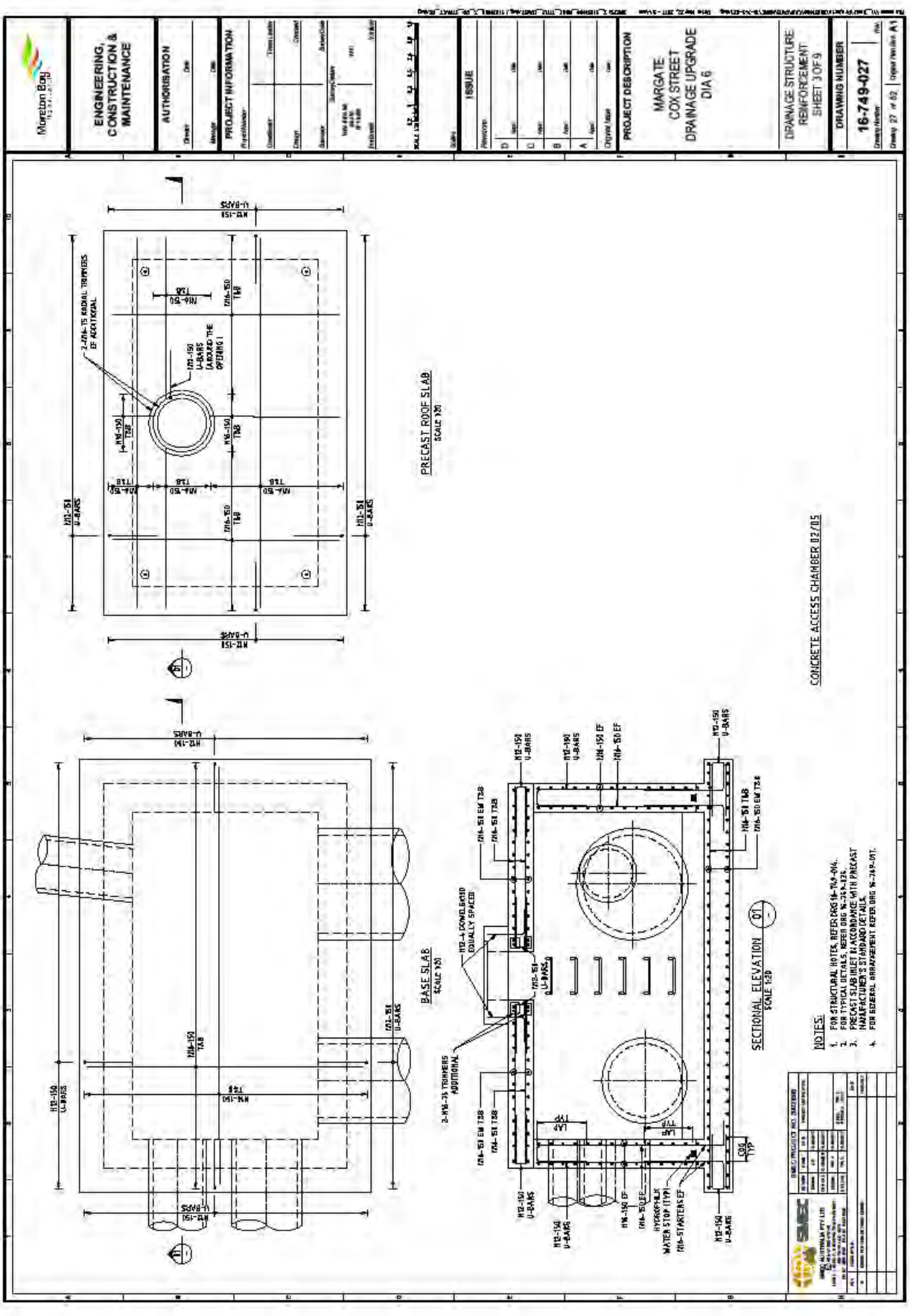
PROJECT DESCRIPTION
MARGATE COX STREET DRAINAGE UPGRADE DIA 6
DRAINAGE STRUCTURE REINFORCEMENT SHEET 2 OF 9
DRAWING NUMBER
16-749-026
PRECAST ROOF SLAB
SCALE 1:20
BASE SLAB
SCALE 1:20
CONCRETE ACCESS CHAMBER 05/02
SECTIONAL ELEVATION
SCALE 1:20
NOTES:
1. FOR STRUCTURAL NOTES, REFER DRG 16-749-004.
2. FOR TYPICAL DETAILS, REFER DRG 16-749-126.
3. PRECAST SLAB INLET IN ACCORDANCE WITH PRECAST MANUFACTURER'S STANDARD DETAILS.
4. FOR GENERAL ARRANGEMENT REFER DRG 16-749-006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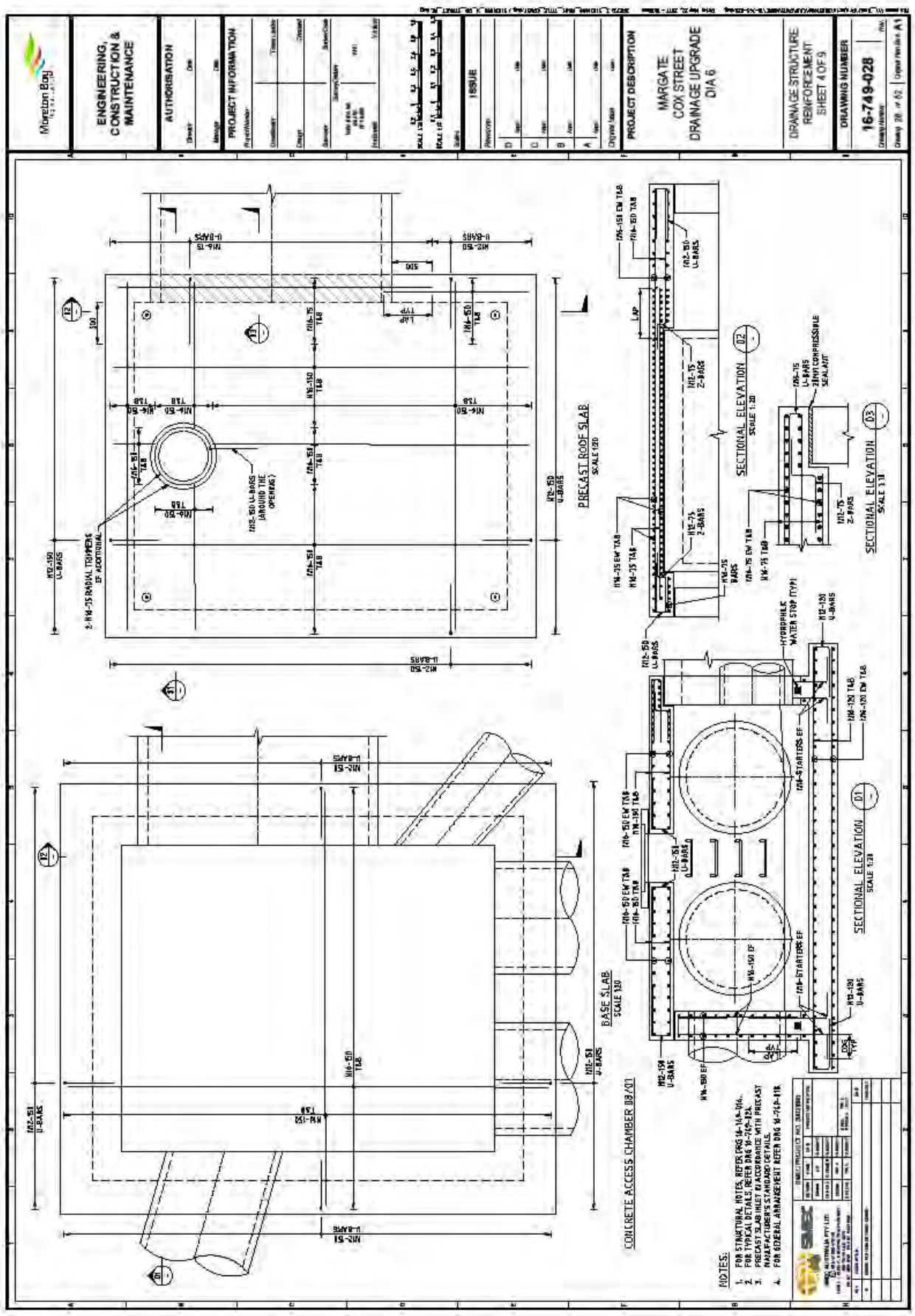
MARGATE COX STREET DRAINAGE UPGRADE DIA 6
DRAINAGE STRUCTURE REINFORCEMENT SHEET 3 OF 9
DRAWING NUMBER
16-749-027
PRECAST ROOF SLAB
SCALE 1:20
BASE SLAB
SCALE 1:20
SECTIONAL ELEVATION
SCALE 1:20
CONCRETE ACCESS CHAMBER 02/05
NOTES:
1. FOR STRUCTURAL NOTES, REFER DRG 16-749-004.
2. FOR TYPICAL DETAILS, REFER DRG 16-749-126.
3. PRECAST SLAB INLET IN ACCORDANCE WITH PRECAST MANUFACTURER'S STANDARD DETAILS.
4. FOR GENERAL ARRANGEMENT REFER DRG 16-749-001.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DIA 6
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DRAWING NUMBER
16-749-028
PRECAST ROOF SLAB
SCALE 1:20
BASE SLAB
SCALE 1:20
SECTIONAL ELEVATION
SCALE 1:20
SECTIONAL ELEVATION
SCALE 1:10
SECTIONAL ELEVATION
SCALE 1:20
CONCRETE ACCESS CHAMBER DIA 1.01
NOTES:
1. FOR STRUCTURAL NOTES, REFER DRG 16-749-004.
2. FOR TYPICAL DETAILS, REFER DRG 16-749-024.
3. PRECAST SLAB INLET IN ACCORDANCE WITH PRECAST MANUFACTURER'S STANDARD DETAILS.
4. FOR GENERAL ARRANGEMENT REFER DRG 16-749-018.

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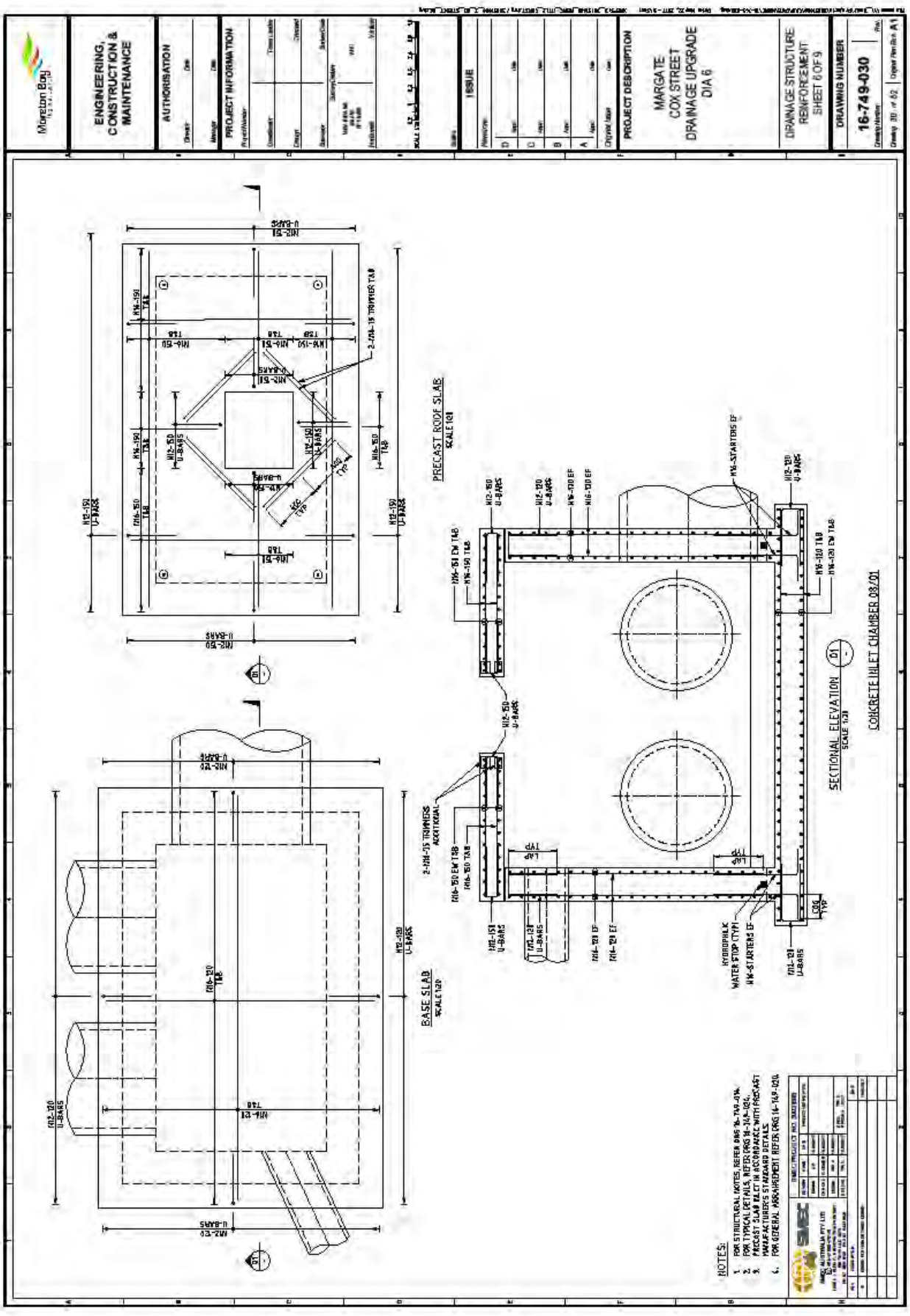
DIA 6
DRAINAGE STRUCTURE REINFORCEMENT SHEET 5 OF 9
DRAWING NUMBER
16-749-029
BASE SLAB
SCALE 1:20
SECTIONAL ELEVATION
SCALE 1:20
CONCRETE INLET CHAMBER 01/BH
NOTES:
1. FOR STRUCTURAL NOTES, REFER DRG 16-749-014.
2. FOR TYPICAL DETAILS, REFER DRG 16-749-024.
3. FOR GENERAL ARRANGEMENT REFER DRG 16-749-013.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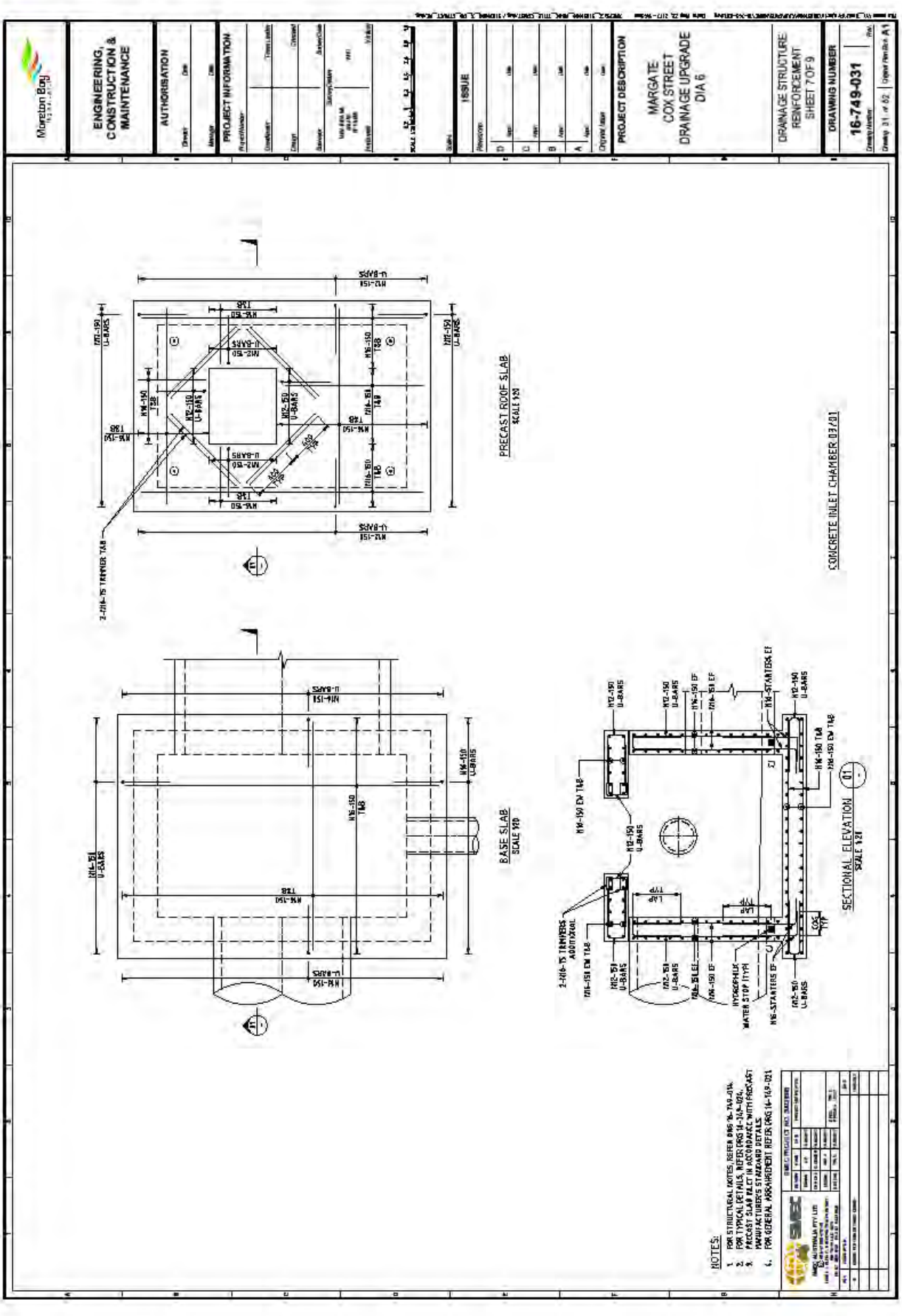
DRAINAGE UPGRADE
DIA 6
DRAINAGE STRUCTURE REINFORCEMENT SHEET 6 OF 9
DRAWING NUMBER
16-749-030
PRECAST ROOF SLAB
SCALE 1:20
SECTIONAL ELEVATION
SCALE 1:20
CONCRETE INLET CHAMBER 08/01
BASE SLAB
SCALE 1:20
NOTES:
1. FOR STRUCTURAL NOTES, REFER DWG 16-749-01N.
2. FOR TYPICAL INLET PITS, REFER DWG 16-749-02N.
3. FOR PRECAST INLET CHAMBER DETAILS WITH PRECAST PIT LINERS SEE DRAWING 16-749-04N.
4. FOR GENERAL ARRANGEMENT REFER DWG 16-749-02N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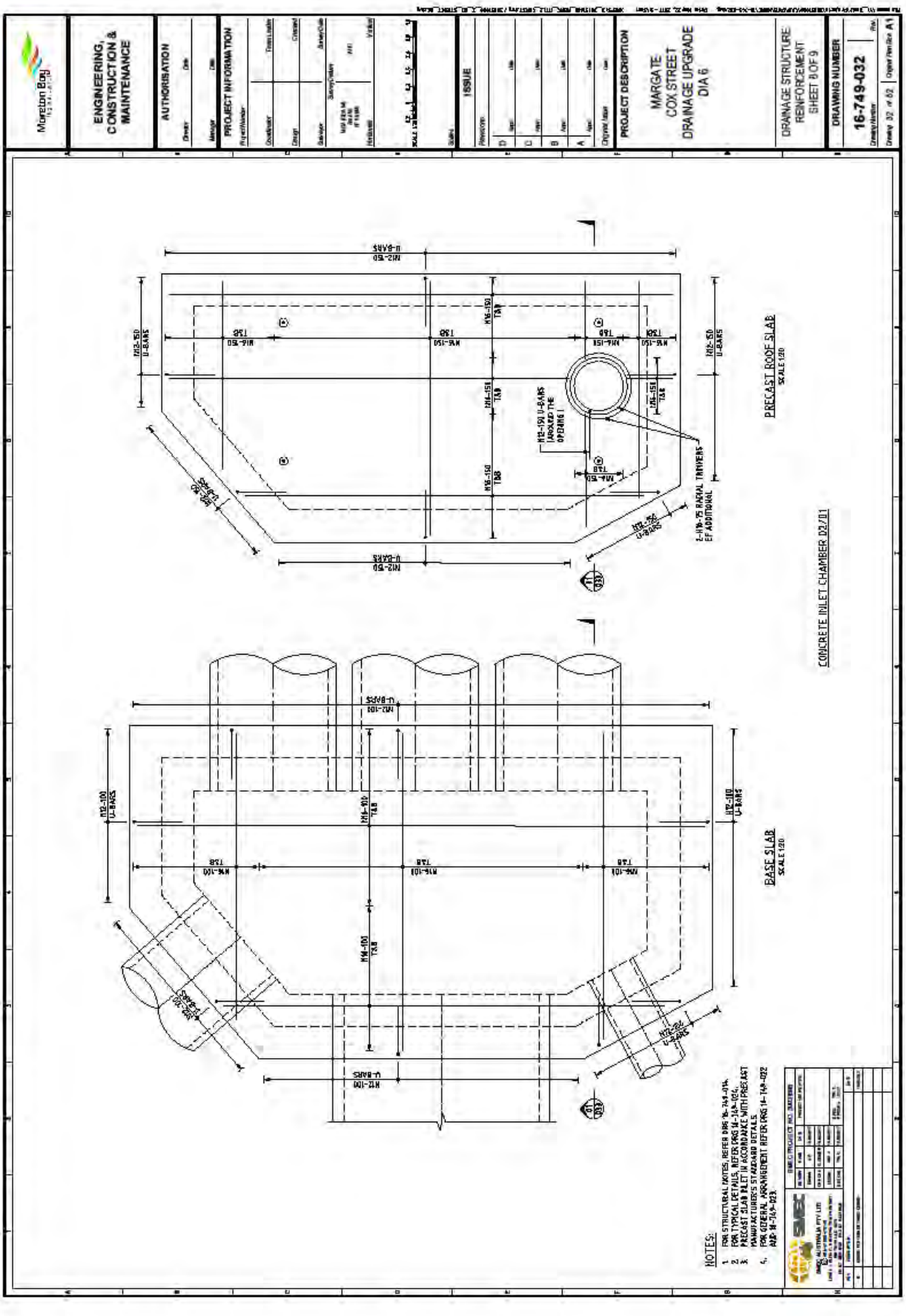
PROJECT DESCRIPTION
MARGATE COX STREET DRAINAGE UPGRADE DIA 6
DRAINAGE STRUCTURE REINFORCEMENT SHEET 7 OF 9
DRAWING NUMBER
16-749-031
PRECAST ROOF SLAB
SCALE 1:20
BASE SLAB
SCALE 1:20
SECTIONAL ELEVATION
SCALE 1:20
CONCRETE INLET CHAMBER 03/01
NOTES:
1. FOR STRUCTURAL NOTES, REFER DWG No. 16-749-031.
2. FOR TYPICAL DETAILS, REFER DWG 16-749-021.
3. PRECAST SLAB INLET IN ACCORDANCE WITH PRECAST MANUFACTURERS STANDARD DETAILS.
4. FOR GENERAL ARCHITECTURAL NOTES REFER DWG 16-749-021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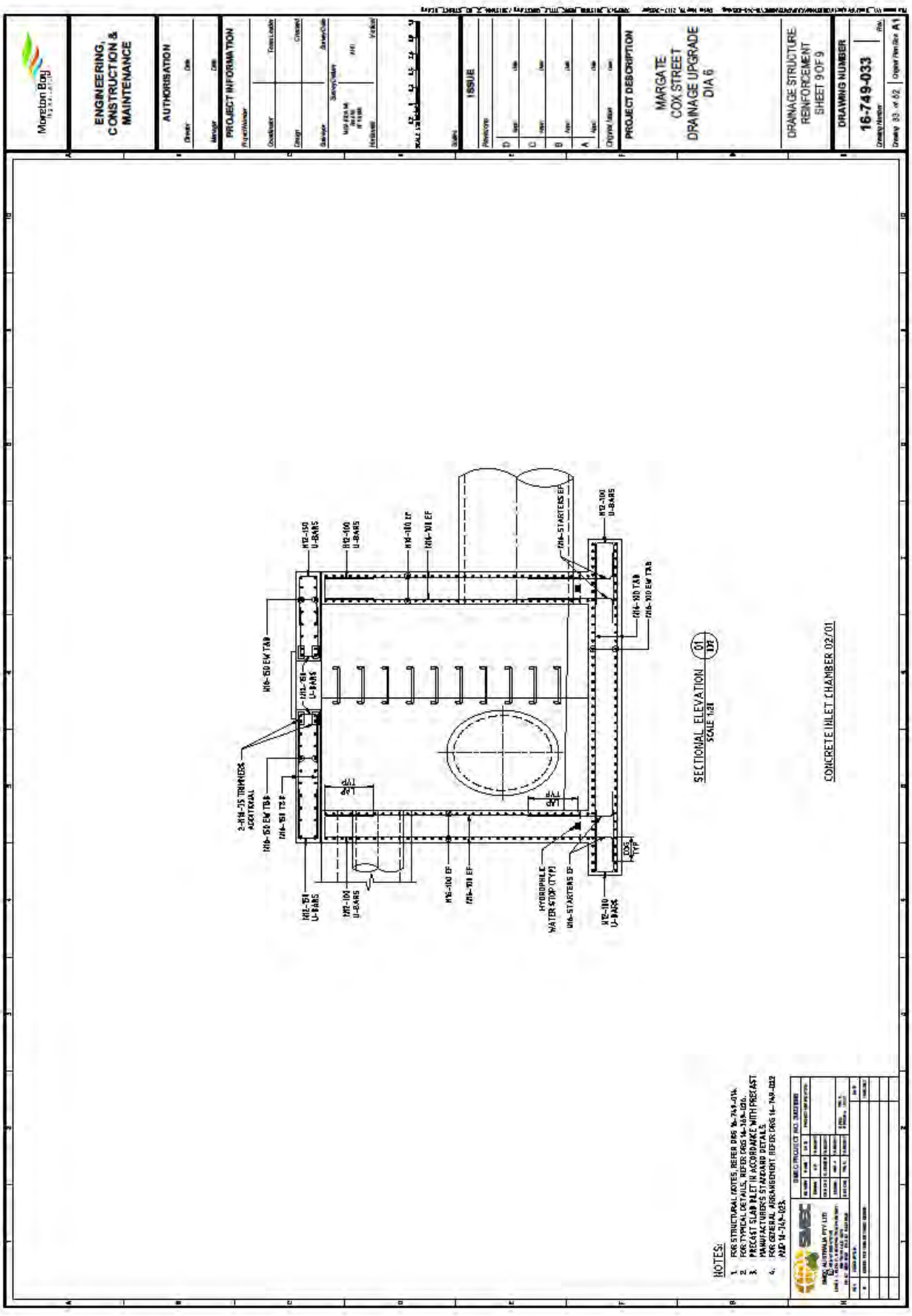
MARGATE COX STREET DRAINAGE UPGRADE DIA 6
DRAINAGE STRUCTURE REINFORCEMENT SHEET 8 OF 9
DRAWING NUMBER
16-749-032
PRECAST ROOF SLAB
SCALE 1:20
CONCRETE INLET CHAMBER 02/01
BASE SLAB
SCALE 1:20
NOTES:
1. FOR STRUCTURAL NOTES, REFER DWG No. 14-749-014.
2. FOR TYPICAL DETAILS, REFER DRG 14-749-024.
3. PRECAST SLAB PILOT IN ACCORDANCE WITH PRECAST MANUFACTURER'S STANDARD DETAILS.
4. FOR GENERAL ARRANGEMENT REFER DRG 14-749-022 AND 14-749-023.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COX STREET
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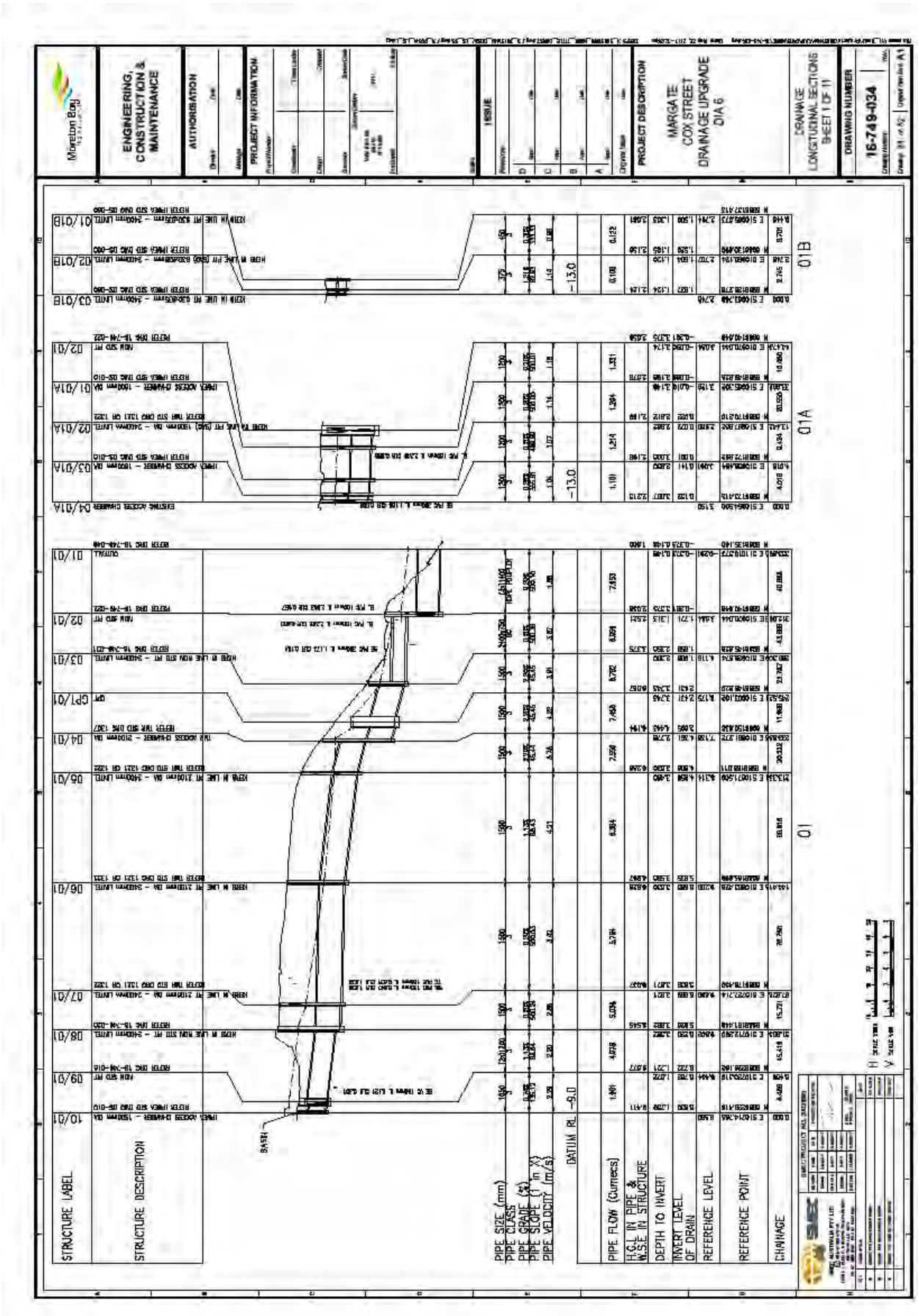
DIA 6
DRAINAGE STRUCTURE REINFORCEMENT SHEET 9 OF 9
DRAWING NUMBER
16-749-033
SECTIONAL ELEVATION
SCALE 1:20
CONCRETE INLET CHAMBER 02/01
NOTES:
1. FOR STRUCTURAL NOTES, REFER DRG 16-749-014.
2. FOR TYPICAL DETAILS, REFER DRG 16-749-020.
3. PRECAST SLAB INLET IN ACCORDANCE WITH PRECAST MANUFACTURER'S STANDARD DETAILS.
4. FOR GENERAL ARRANGEMENT REFER DRG 16-749-002 AND 16-749-003.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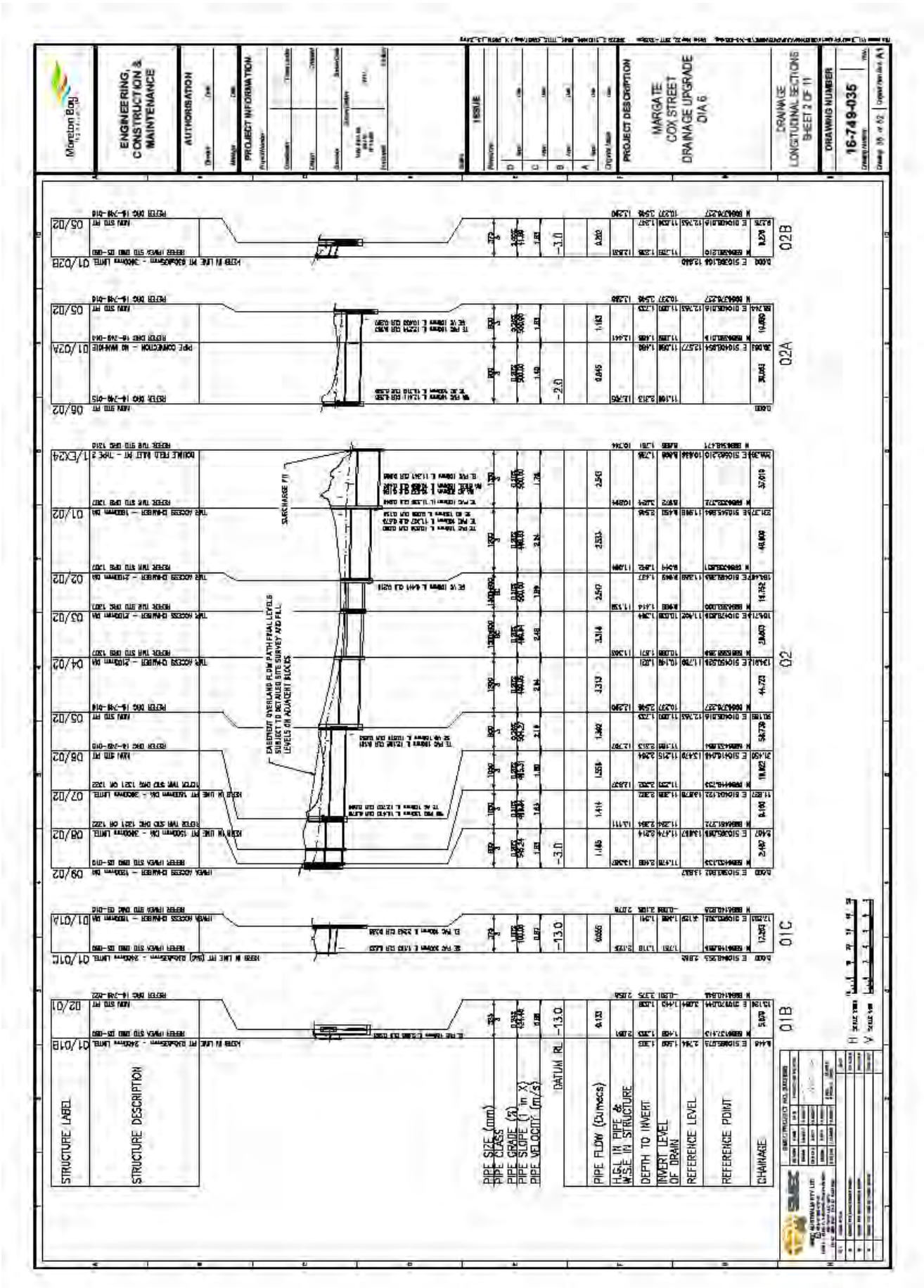
MARGATE COX STREET DRAINAGE UPGRADE DIA 6
DRAINAGE LONGITUDINAL SECTIONS SHEET 1 OF 11
DRAWING NUMBER
16-749-034
STRUCTURE LABEL
STRUCTURE DESCRIPTION
PIPE SIZE (mm)
PIPE CLASS
PIPE GRADE (%)
PIPE SLOPE (1 in X)
PIPE VELOCITY (m/s)
DATUM RL -9.0
PIPE FLOW (Cumecs)
H.G.L. IN PIPE & W.S.E. IN STRUCTURE
DEPTH TO INVERT
INVERT LEVEL OF DRAIN
REFERENCE LEVEL
REFERENCE POINT
CHAINAGE
01
01A
01B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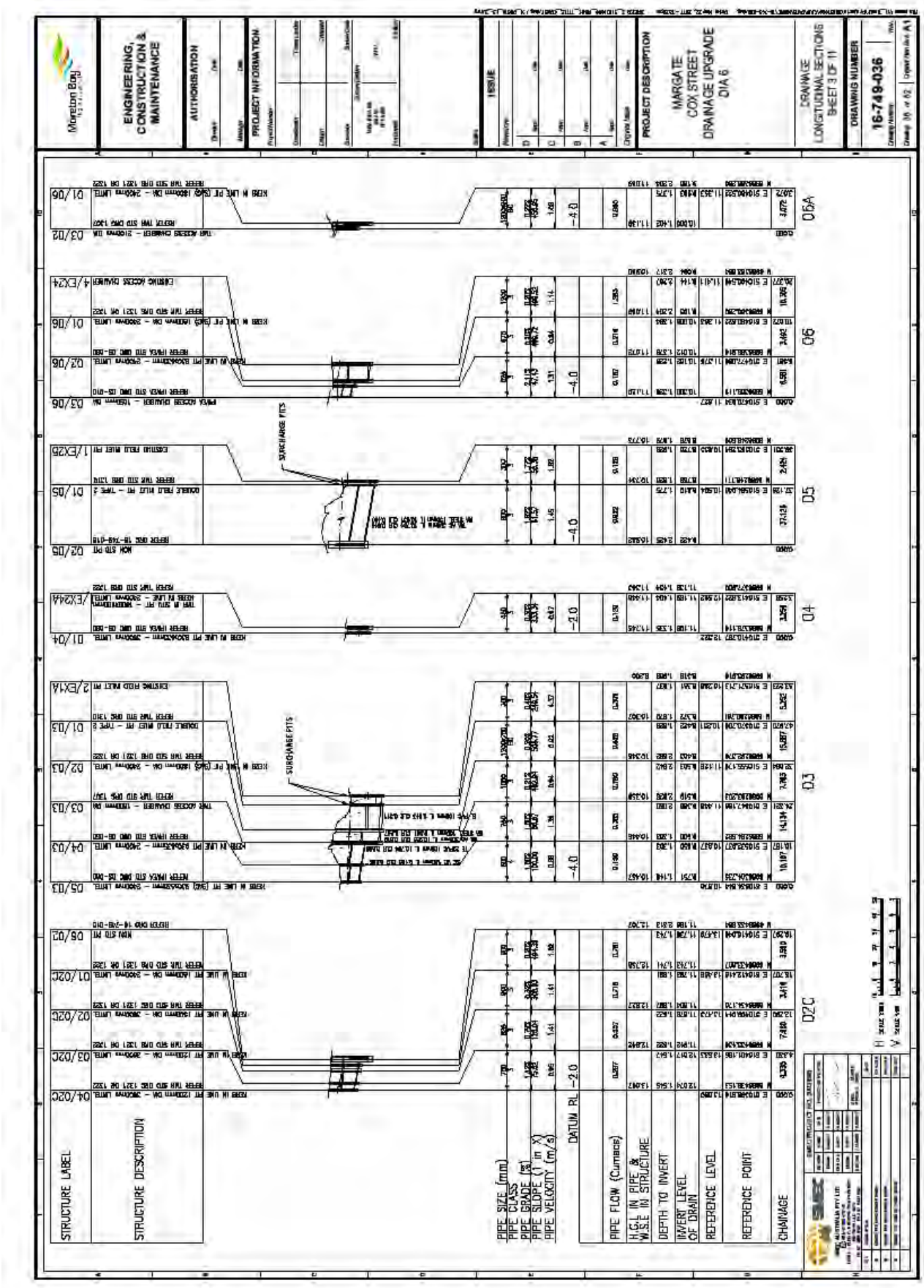
DRAWING LONGITUDINAL SECTIONS SHEET 2 OF 11
DRAWING NUMBER
16-749-035
02B
02A
02
01C
01B
STRUCTURE LABEL
STRUCTURE DESCRIPTION
PIPE SIZE (mm)
PIPE CLASS
PIPE GRADE (%)
PIPE SLOPE (1 in X)
PIPE VELOCITY (m/s)
DATUM RL
PIPE FLOW (Dumass)
H.G.L IN PIPE & W.S.E IN STRUCTURE
DEPTH TO INVERT
INVERT LEVEL OF DRAIN
REFERENCE LEVEL
REFERENCE POINT
CHAINAGE
EARTHEN OVERLAND FLOW PATH FINAL LEVELS SUBJECT TO DETAILED SITE SURVEY AND P.L.L. LEVELS ON ADJACENT BLOCKS
SURCHARGE FIT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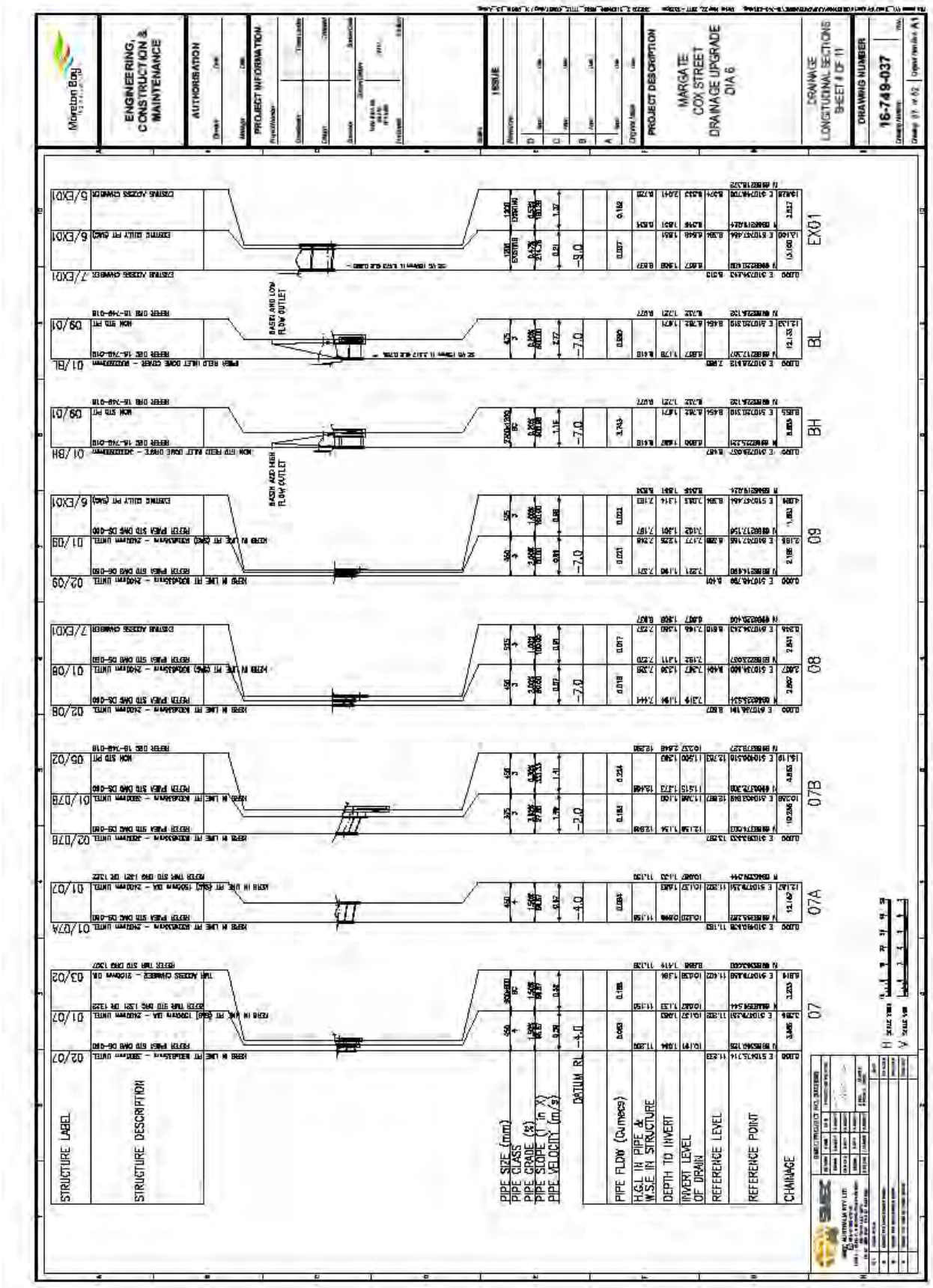
DRAINAGE LONGITUDINAL SECTIONS SHEET 3 OF 11
DRAWING NUMBER
16-749-036
STRUCTURE LABEL
STRUCTURE DESCRIPTION
PIPE SIZE (mm)
PIPE CLASS
PIPE GRADE (%)
PIPE SLOPE (1 in X)
PIPE VELOCITY (m/s)
DATUM RL –2.0
PIPE FLOW (Cumecs)
H.G.L IN PIPE & W.S.L IN STRUCTURE
DEPTH TO INVERT
INVERT LEVEL OF DRAIN
REFERENCE LEVEL
REFERENCE POINT
CHAINAGE
SURCHARGE PITS
D6A
D6
D5
D4
D3
D2C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DRAINAGE UPGRADE
DIA 6
DRAWING
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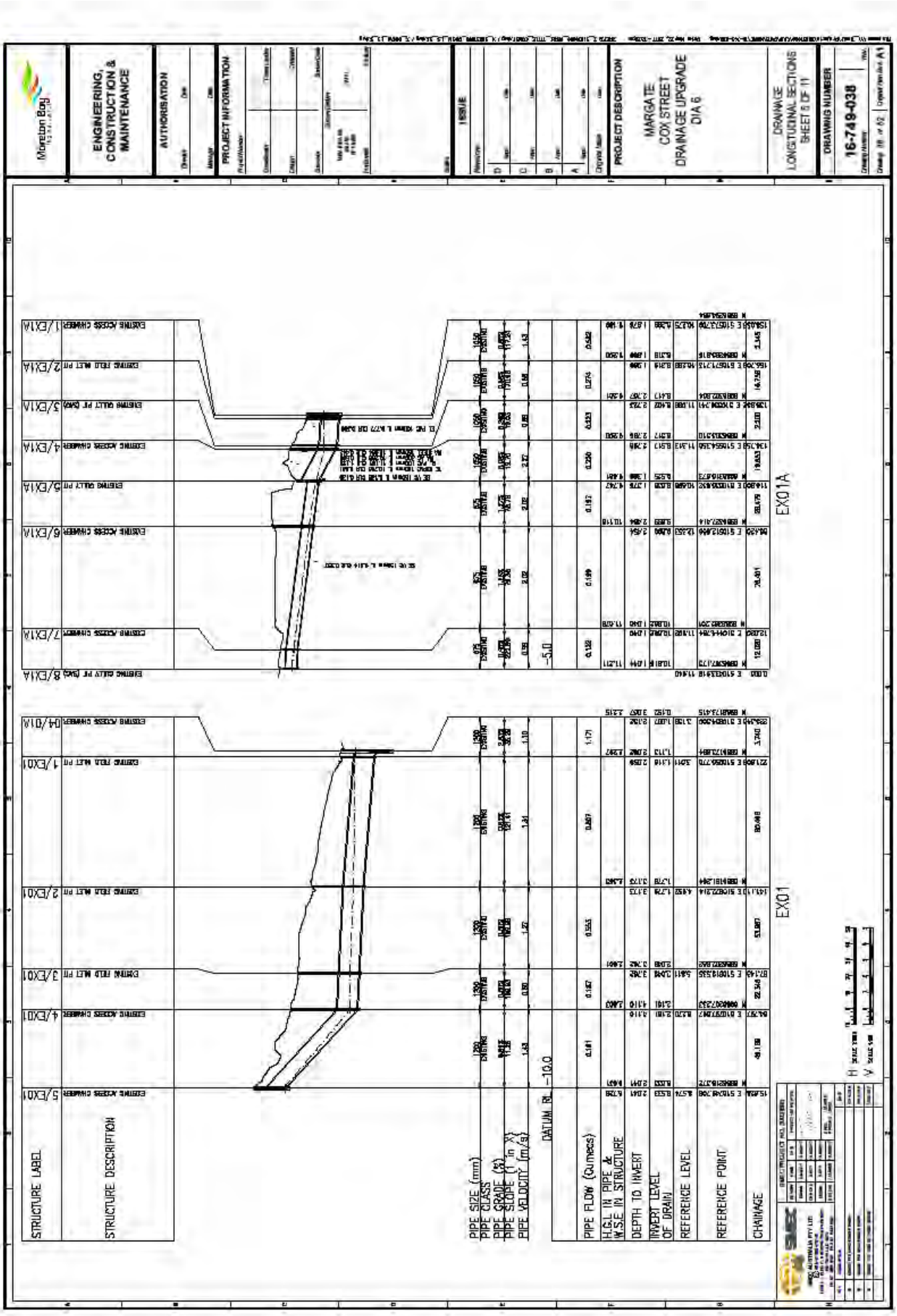
SHEET # OF 11
DRAWING NUMBER
16-749-037
EX01
BL
BH
09
08
07B
07A
07
BASIN AND LOW FLOW OUTLET
BASIN AND HIGH FLOW OUTLET
STRUCTURE LABEL
STRUCTURE DESCRIPTION
DATUM RL -4.0
PIPE SIZE (mm)
PIPE CLASS
PIPE GRADE (%)
PIPE SLOPE (1 in X)
PIPE VELOCITY (m/s)
PIPE FLOW (cumecs)
H.G.L IN PIPE &
W.S.E IN STRUCTURE
DEPTH TO INVERT
INVERT LEVEL
OF DRAIN
REFERENCE LEVEL
REFERENCE POINT
CHAINAGE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MARGATE
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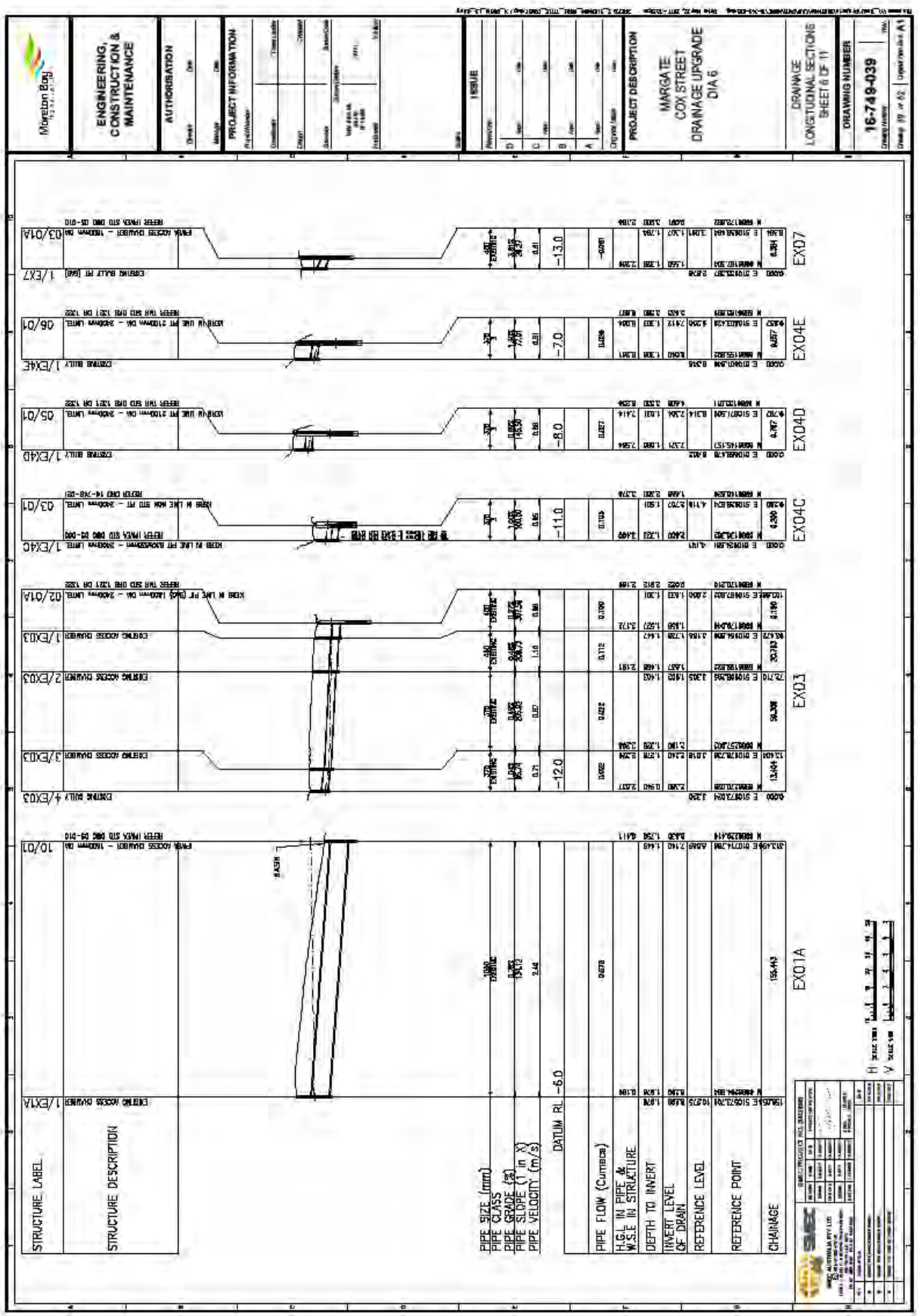
DRAINAGE UPGRADE
DIA 6
DRAWING NUMBER
16-749-038
DRAINAGE
LONGITUDINAL SECTIONS
SHEET 6 OF 11
EX01A
EX01
STRUCTURE LABEL
STRUCTURE DESCRIPTION
PIPE SIZE (mm)
PIPE CLASS
PIPE GRADE (%)
PIPE SLOPE (1 in X)
PIPE VELOCITY (m/s)
DATUM RL -10.0
PIPE FLOW (Qumecs)
H.G.L IN PIPE & W.S.E IN STRUCTURE
DEPTH TO INVERT
INVERT LEVEL OF DRAIN
REFERENCE LEVEL
REFERENCE POINT
CHAINAGE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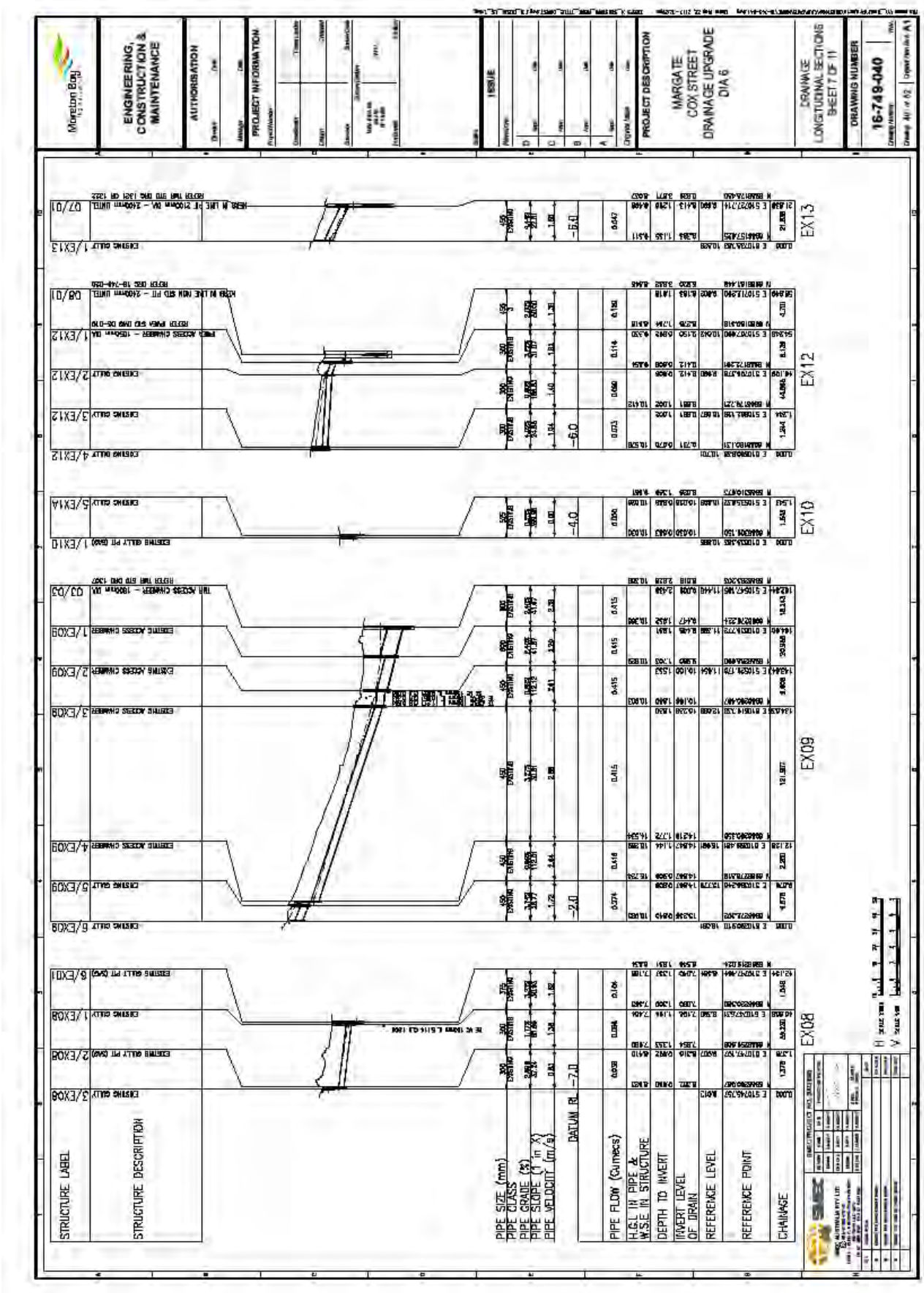
DRAWING NUMBER
16-748-039
EX07
EX04E
EX04D
EX04C
EX03
EX01A
STRUCTURE LABEL
STRUCTURE DESCRIPTION
PIPE SIZE (mm)
PIPE CLASS
PIPE GRADE (%)
PIPE SLOPE (1 in X)
PIPE VELOCITY (m/s)
DATUM RL -6.0
PIPE FLOW (Cumecs)
H.G.L IN PIPE & W.S.L IN STRUCTURE
DEPTH TO INVERT
INVERT LEVEL OF DRAIN
REFERENCE LEVEL
REFERENCE POINT
CHAINAGE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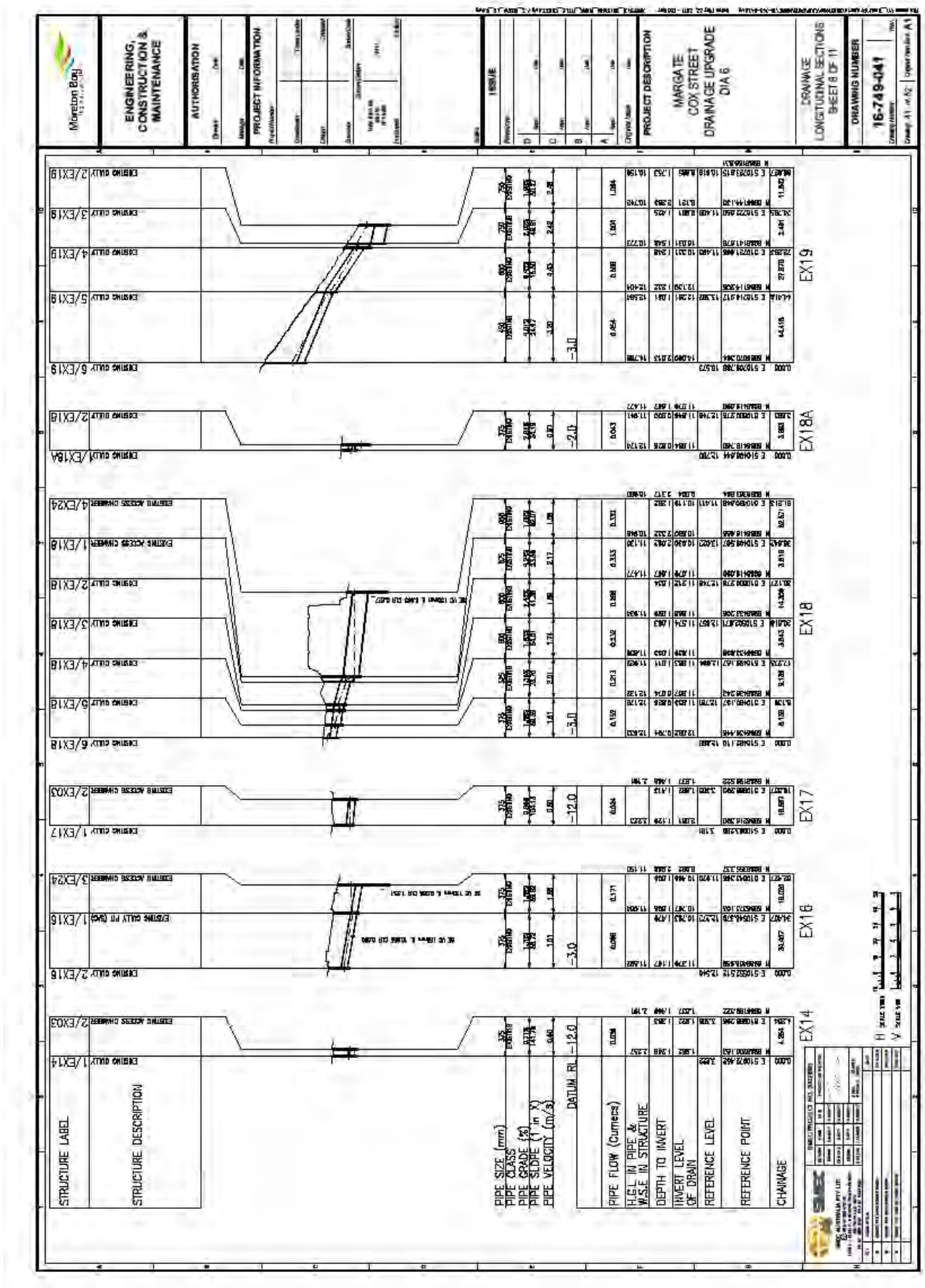
MARGATE COX STREET DRAINAGE UPGRADE DIA 6
DRAINAGE LONGITUDINAL SECTIONS SHEET 7 OF 11
DRAWING NUMBER
16-749-040
EX13
EX12
EX10
EX09
EX08
STRUCTURE LABEL
STRUCTURE DESCRIPTION
PIPE SIZE (mm)
PIPE CLASS
PIPE GRADE (%)
PIPE SLOPE (1 in X)
PIPE VELOCITY (m/s)
DATUM RL −7.0
PIPE FLOW (cumecs)
H.G.L IN PIPE & W.S.E IN STRUCTURE
DEPTH TO INVERT
INVERT LEVEL OF DRAIN
REFERENCE LEVEL
REFERENCE POINT
CHAINAGE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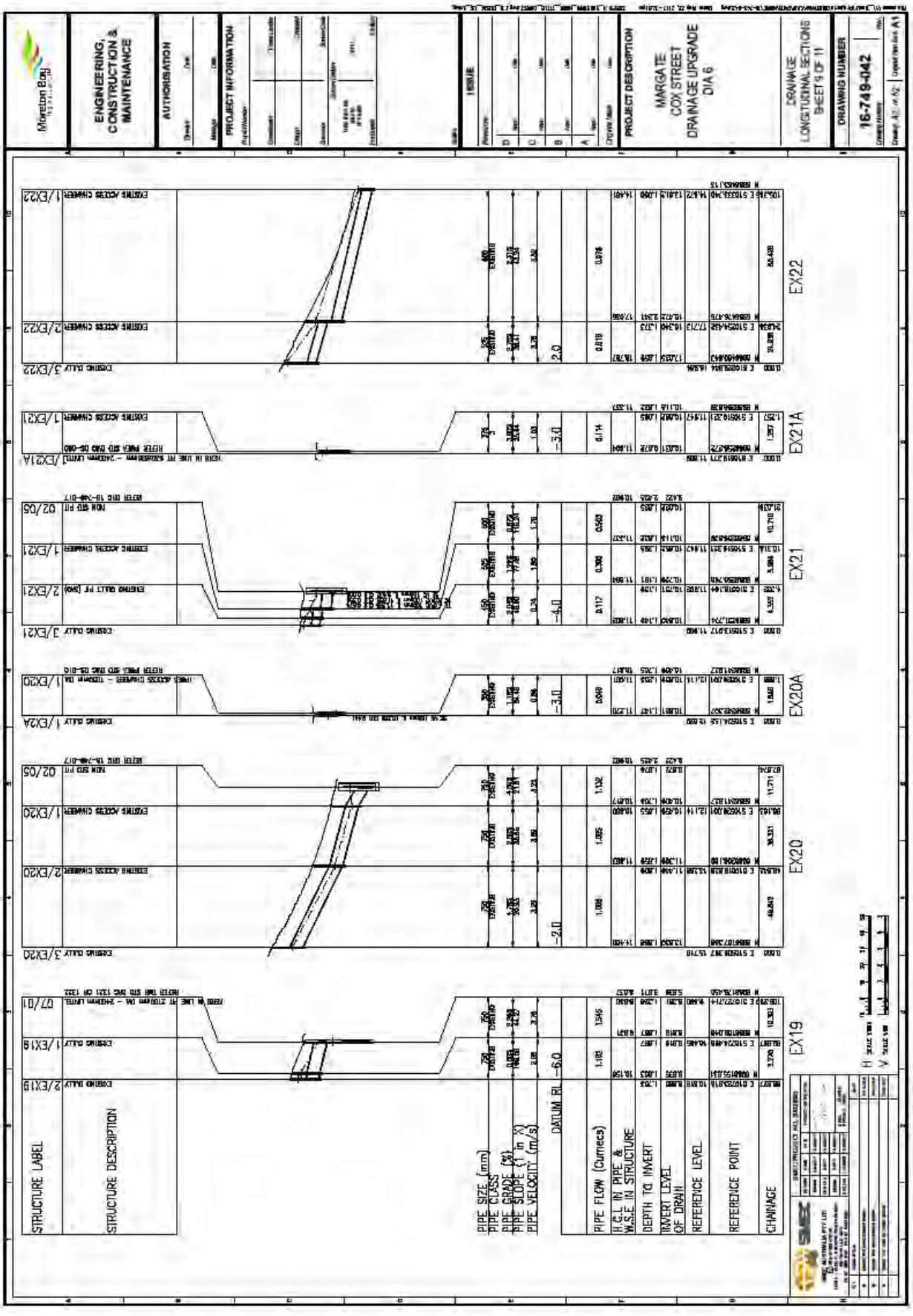
MARGATE COX STREET DRAINAGE UPGRADE DIA 6
DRAINAGE LONGITUDINAL SECTIONS SHEET 8 OF 11
DRAWING NUMBER
16-749-041
STRUCTURE LABEL
STRUCTURE DESCRIPTION
PIPE SIZE (mm)
PIPE CLASS
PIPE GRADE (%)
PIPE SLOPE (1 in X)
PIPE VELOCITY (m/s)
DATUM RL
PIPE FLOW (Cumecs)
H.G.L IN PIPE & W.S.E IN STRUCTURE
DEPTH TO INVERT
INVERT LEVEL OF DRAIN
REFERENCE LEVEL
REFERENCE POINT
CHAINAGE
EX14
EX16
EX17
EX18
EX18A
EX19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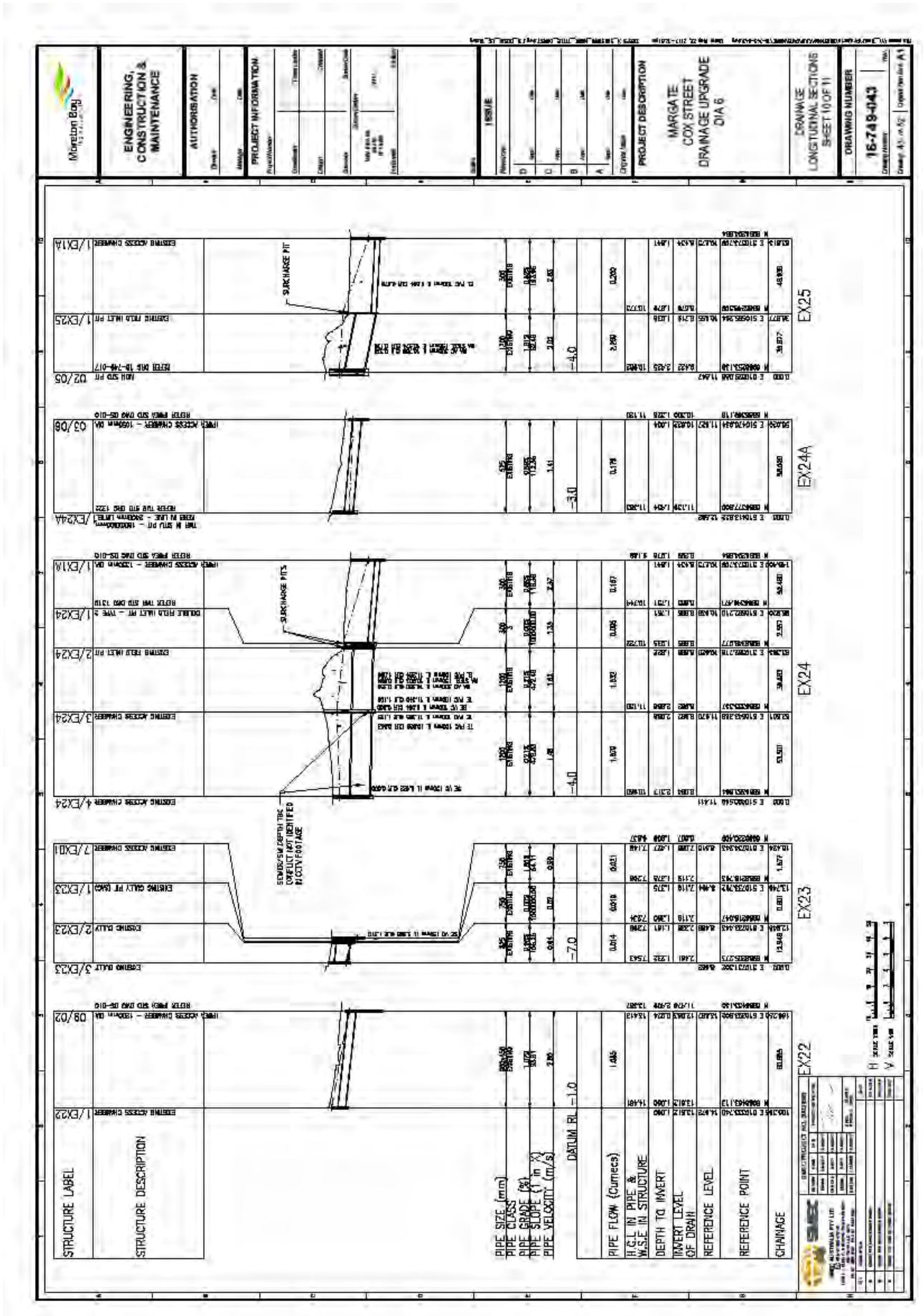
MARGATE COX STREET DRAINAGE UPGRADE DIA 6
DRAWING LONGITUDINAL SECTIONS SHEET 9 OF 11
DRAWING NUMBER
16-749-042
EX22
EX21A
EX21
EX20A
EX20
EX19
STRUCTURE LABEL
STRUCTURE DESCRIPTION
PIPE SIZE (mm)
PIPE CLASS
PIPE GRADE (%)
PIPE SLOPE (1 in X)
PIPE VELOCITY (m/s)
DATUM RL -6.0
PIPE FLOW (Cumecs)
H.G.L IN PIPE & W.S.E IN STRUCTURE
DEPTH TO INVERT
INVERT LEVEL OF DRAIN
REFERENCE LEVEL
REFERENCE POINT
CHAINAGE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MARGATE
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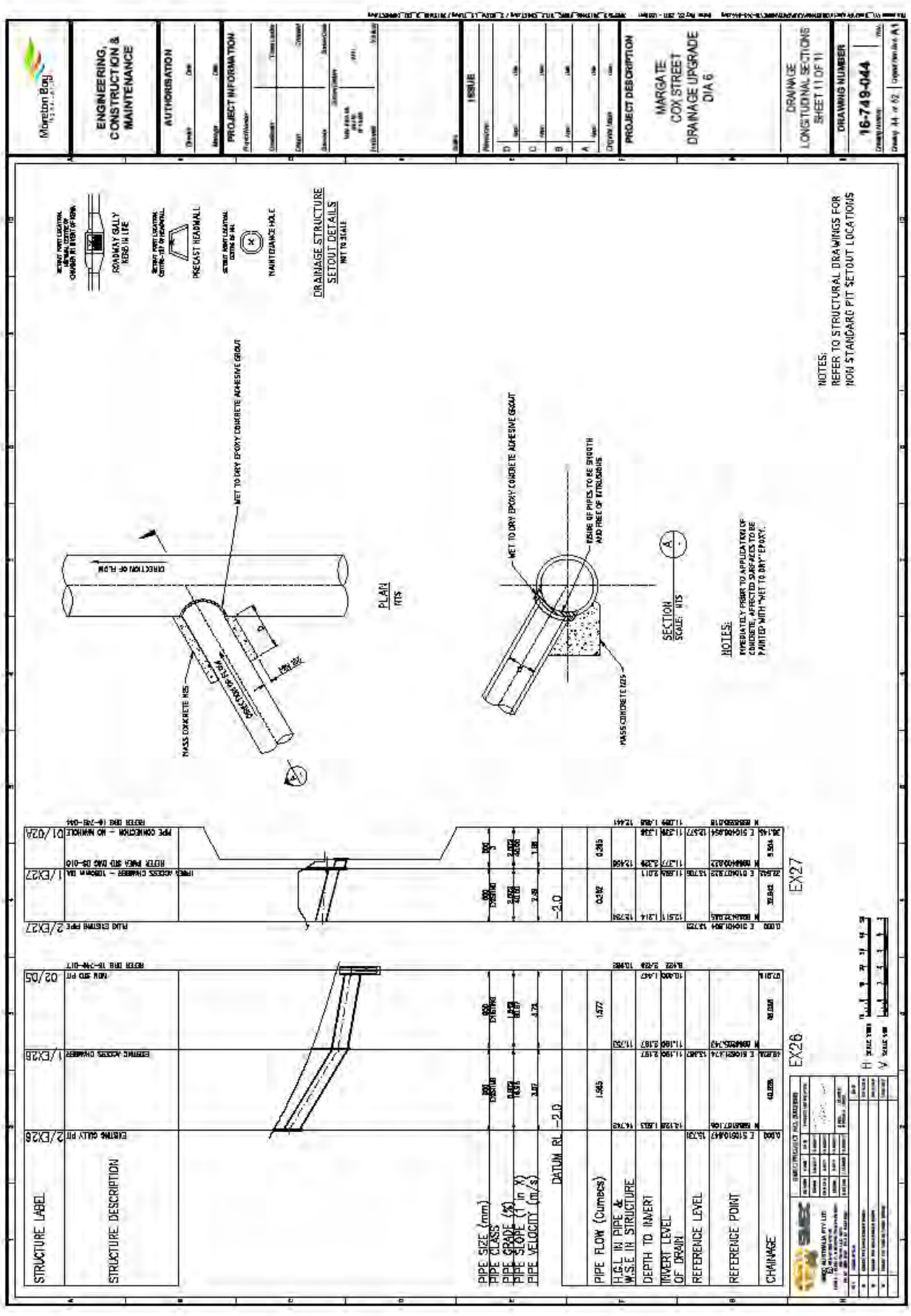
DRAINAGE UPGRADE
DIA 6
DRAWING NUMBER
16-749-043
DRAINAGE
LONGITUDINAL SECTIONS
SHEET 10 OF 11
EX25
EX24A
EX24
EX23
EX22
STRUCTURE LABEL
STRUCTURE DESCRIPTION
PIPE SIZE (mm)
PIPE CLASS
PIPE GRADE (%)
PIPE SLOPE (1 in X)
PIPE VELOCITY (m/s)
DATUM RL -1.0
PIPE FLOW (Cumecs)
H.G.L IN PIPE & W.S.E IN STRUCTURE
DEPTH TO INVERT
INVERT LEVEL OF DRAIN
REFERENCE LEVEL
REFERENCE POINT
CHAINAGE
SURCHARGE PIT
SURCHARGE PITS
-4.0
-3.0
-4.0
-7.0
-1.0



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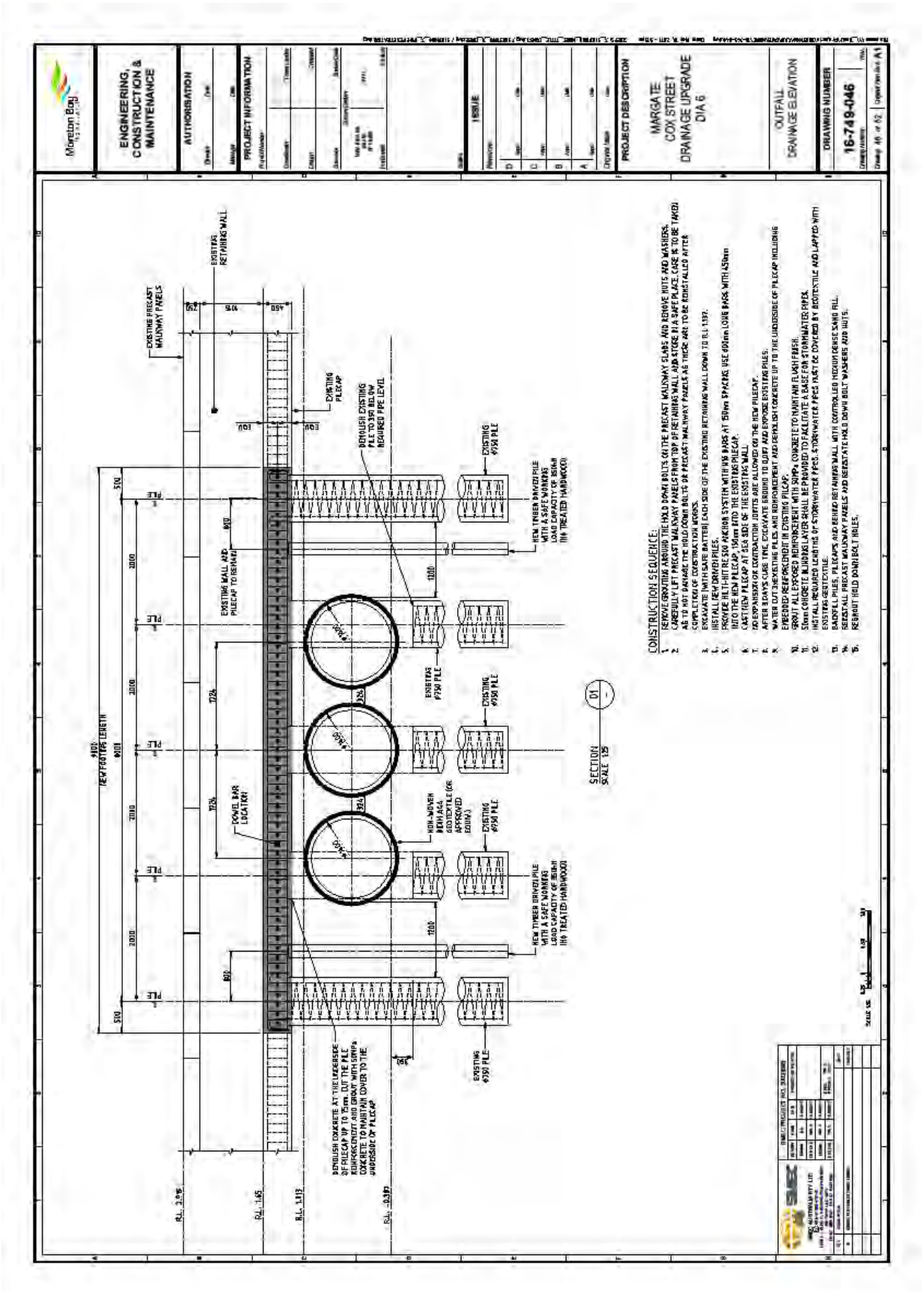
MARGATE COX STREET DRAINAGE UPGRADE DIA 6
OUTFALL PLAN VIEW DRAINAGE
DRAWING NUMBER
16-749-045
DESIGN DATA:
DESIGN LOADS:
NOTE:
TP1 AND TP2 ARE NEW TIMBER DRIVEN PILES WITH A SAFE WORKING LOAD CAPACITY OF 350 kN
LOCALITY PLAN
SCALE NTS
PILE AND PILECAP LAYOUT PLAN
SCALE 1:25
PILE SETOUT TABLE
PILE & PIPE SETOUT TABLE
EXISTING PILES TO REMAIN
NEW TIMBER DRIVEN PILES
EXISTING PILES TO BE CUT BACK NUMAS CONSTRUCTION SHOWN HATCHED
NEW 300/600mm DIA. POLYLES PE STORMWATER PIPES
NEW PILECAP
EXISTING PILE TO REMAIN
EXISTING BOARDWALK PANELS
SPECIAL DRAINAGE STRUCTURE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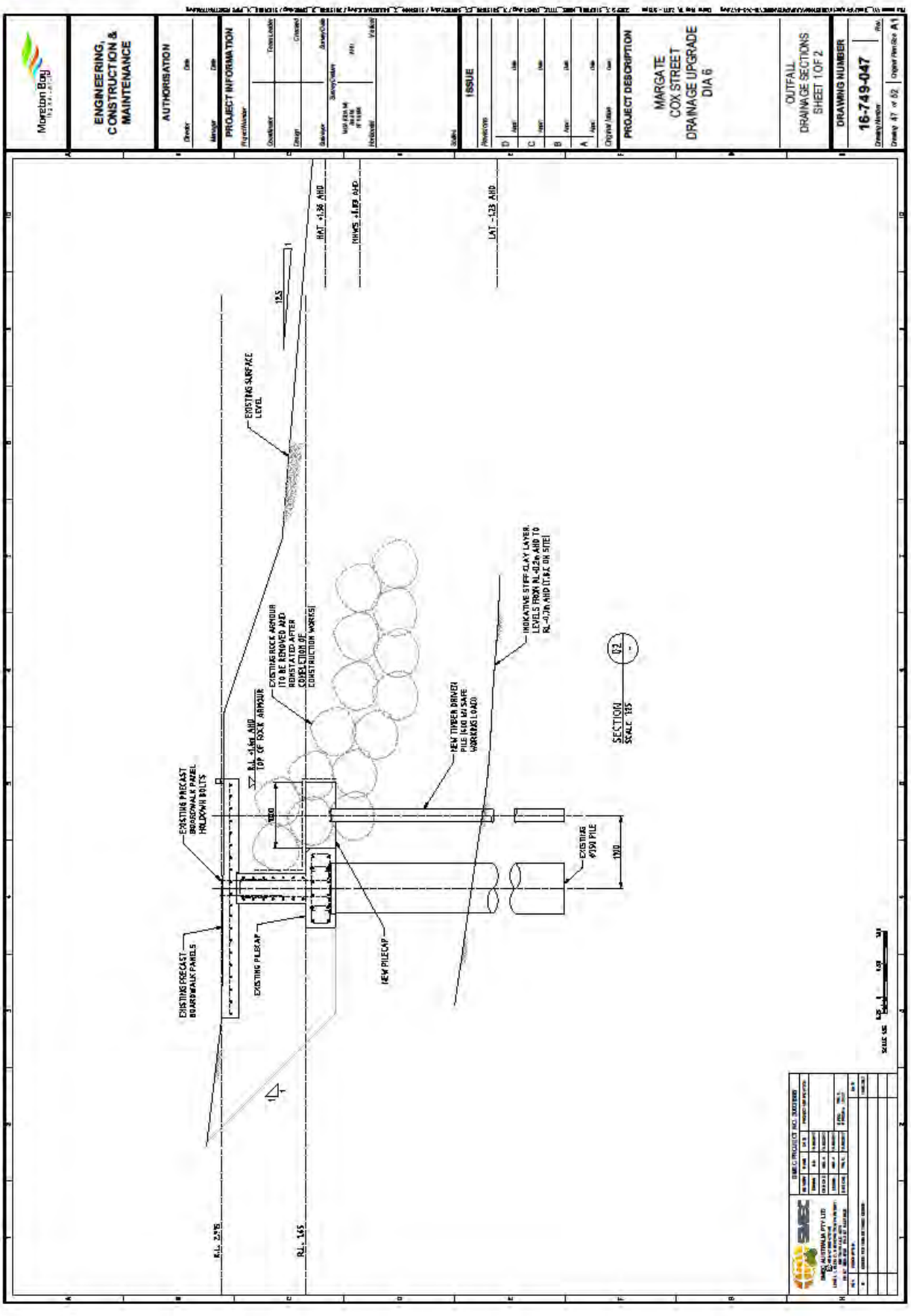
MARGATE COX STREET DRAINAGE UPGRADE DIA 6
OUTFALL DRAINAGE ELEVATION
DRAWING NUMBER
16-749-046
CONSTRUCTION SEQUENCE:
1. REMOVE GROUTING AROUND THE HOLD DOWN BOLTS ON THE PRECAST WALKWAY SLABS AND REMOVE NUTS AND WASHERS.
2. CAREFULLY LIFT PRECAST WALKWAY PANELS FROM TOP OF RETAINING WALL AND STORE IN A SAFE PLACE. CARE IS TO BE TAKEN AS TO NOT DAMAGE THE HOLD DOWN BOLTS OR PRECAST WALKWAY PANELS AS THESE ARE TO BE REINSTALLED AFTER COMPLETION OF CONSTRUCTION WORKS.
3. EXCAVATE (WITH SAFE BATTER) EACH SIDE OF THE EXISTING RETAINING WALL DOWN TO RL 1.393.
4. INSTALL NEW DRIVEN PILES.
5. PROVIDE HILTI HIT-RE 500 ANCHOR SYSTEM WITH N16 BARS AT 150mm SPACING. USE 600mm LONG BARS WITH 450mm INTO THE NEW PILECAP, 150mm INTO THE EXISTING PILECAP.
6. CAST NEW PILECAP AT SEA SIDE OF THE EXISTING WALL.
7. NO EXPANSION OR CONTRACTION JOINTS ARE ALLOWED ON THE NEW PILECAP.
8. AFTER 3 DAYS CURE TIME, EXCAVATE AROUND TO DUFF AND EXPOSE EXISTING PILES.
9. WATER OUT SHEXISTING PILES AND REINFORCEMENT AND DEMOLISH CONCRETE UP TO THE UNDERSIDE OF PILECAP INCLUDING EMBEDDED REINFORCEMENT IN EXISTING PILECAP.
10. GROUT ALL EXPOSED REINFORCEMENT WITH SIKPa (CONCRETE TO MAINTAIN FLUSH FINISH.
11. 50mm CONCRETE BLINDING LAYER SHALL BE PROVIDED TO FACILITATE A BASE FOR STORMWATER PIPES.
12. INSTALL REQUIRED LENGTHS OF STORMWATER PIPES. STORMWATER PIPES MUST BE COVERED BY GEOTEXTILE AND LAPPED WITH EXISTING GEOTEXTILE.
13. BACKFILL PILES, PILECAPS AND BEHIND RETAINING WALL WITH CONTROLLED MEDIUM DENSE SAND FILL.
14. REINSTALL PRECAST WALKWAY PANELS AND RESTATE HOLD DOWN BOLT WASHERS AND NUTS.
15. REGROUT HOLD DOWN BOLT HOLES.
EXISTING RETAINING WALL
EXISTING PRECAST WALKWAY PANELS
EXISTING PILECAP
DEMOLISH EXISTING PILE TO 300 BELOW REQUIRED PIPE LEVEL
EXISTING WALL AND PILECAP TO REMAIN
NEW FOOTING LENGTH
DOWEL BAR LOCATION
NON-WOVEN WEM A64 GEOTEXTILE (OR APPROVED EQUIV.)
NEW TIMBER DRIVEN PILE WITH A SAFE WORKING LOAD CAPACITY OF 350kN (H6 TREATED HARDWOOD)
EXISTING Φ750 PILE
DEMOLISH CONCRETE AT THE UNDERSIDE OF PILECAP UP TO 75mm, CUT THE PILE REINFORCEMENT AND GROUT WITH SIKPa CONCRETE TO MAINTAIN COVER TO THE UNDERSIDE OF PILECAP
SECTION 01
SCALE 1:25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MARGATE
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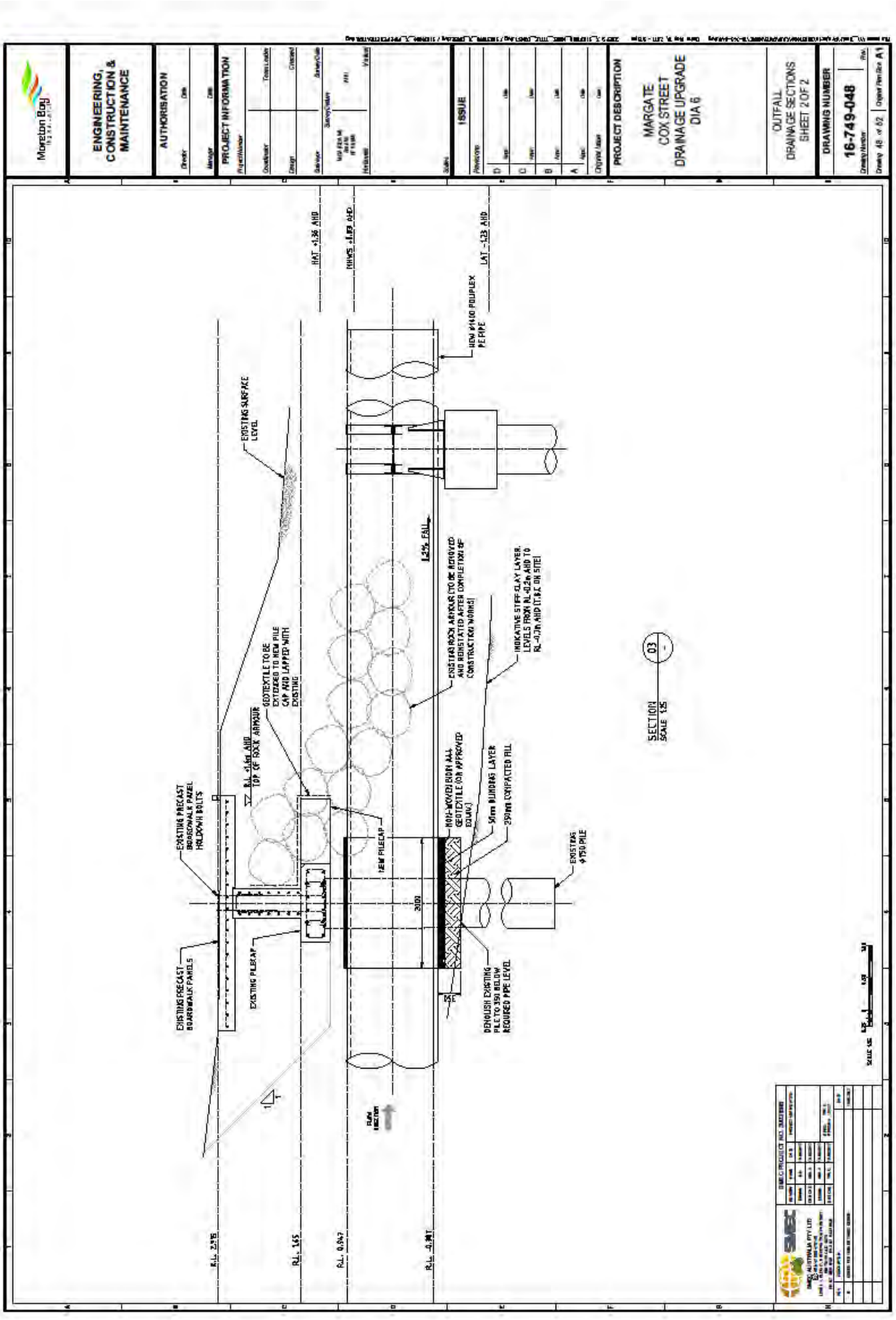
DRAINAGE UPGRADE
DIA 6
OUTFALL
DRAINAGE SECTIONS
SHEET 1 OF 2
DRAWING NUMBER
16-749-047
HAT +1.36 AHD
MHWS +1.03 AHD
LAT -1.23 AHD
EXISTING SURFACE LEVEL
EXISTING ROCK ARMOUR ITO BE REMOVED AND REINSTATED AFTER COMPLETION OF CONSTRUCTION WORKS
NEW TIMBER DRIVEN PILE (140 kN SAFE WORKING LOAD)
INDICATIVE STIFF CLAY LAYER LEVELS FROM RL -0.2m AHD TO RL -4.0m AHD (TYP. ON SITE)
SECTION
SCALE: 1:25
EXISTING PRECAST BOARDWALK PANEL HALDOWN BOLTS
EXISTING PRECAST BOARDWALK PANELS
EXISTING PILE CAP
NEW PILECAP
EXISTING Ø150 PILE
1200
1000
1:2
1:4
R.L. 2.75
R.L. 1.65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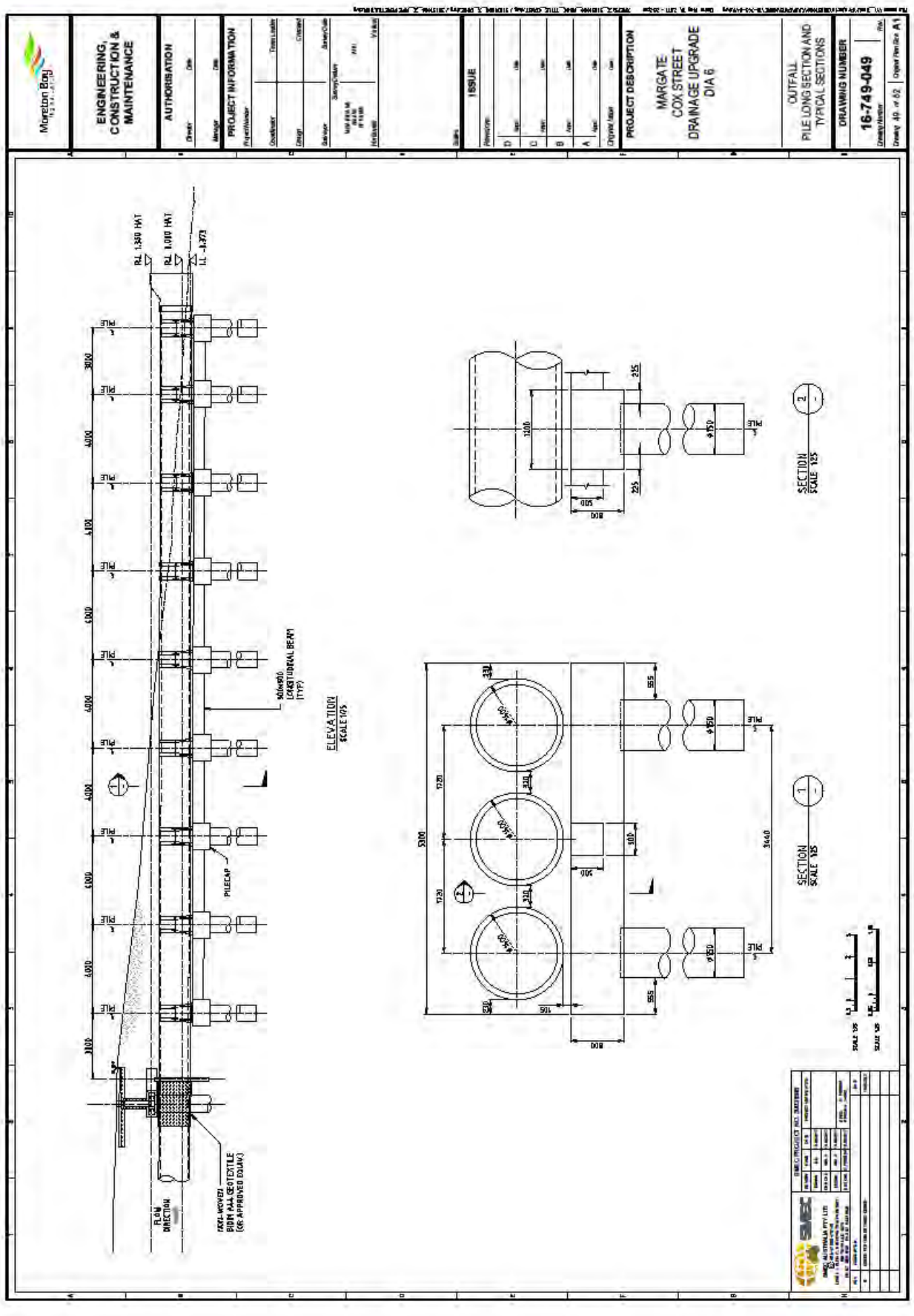
MARGATE
COX STREET
DRAINAGE UPGRADE
DIA 6
OUTFALL
DRAINAGE SECTIONS
SHEET 2 OF 2
DRAWING NUMBER
16-749-048
HAT +1.36 AHD
MHWS +1.03 AHD
LAT -1.23 AHD
NEW 1400 POLIPLEX PE PIPE
EXISTING SURFACE LEVEL
1.25% FALL
EXISTING PRECAST BOARDWALK PANEL HOLDOWN BOLTS
EXISTING PRECAST BOARDWALK PANELS
EXISTING PILECAP
NEW PILECAP
GEOTEXTILE TO BE EXTENDED TO NEW PILE CAP AND LAPPED WITH EXISTING
EXISTING ROCK ARMOUR (TO BE REMOVED AND REINSTATED AFTER COMPLETION OF CONSTRUCTION WORKS)
INDICATIVE STIFF CLAY LAYER. LEVELS FROM RL -0.2m AHD TO RL -0.7m AHD (T.B.C ON SITE)
NON-WOVEN GEOTEXTILE (FOR APPROVED EQUAL)
50mm BUNDING LAYER
250mm COMPACTED FILL
EXISTING Ø750 RCP
DEMOLISH EXISTING PILE TO 350 BELOW REQUIRED PIPE LEVEL
2000
SECTION 03
SCALE 1:25
RAW SECTION
R.L. 2.75
R.L. 1.45
R.L. 0.847
R.L. -0.847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DIA 6
OUTFALL
PILE LONG SECTION AND TYPICAL SECTIONS
DRAWING NUMBER
16-749-049
RL 1.350 HAT
RL 1.000 HAT
ELEVATION
SCALE 1:75
SECTION
SCALE 1:25
PILECAP
FLOW DIRECTION

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MARGATE COX STREET DRAINAGE UPGRADE DIA 6
OUTFALL PILE SETOUT TABLE AND TYPICAL SECTIONS
DRAWING NUMBER
16-749-050
PILE SCHEDULE - CAST IN PLACE PILES
NOTES
1. STEEL LAYER TO BE GRADE 250 TO AS/NZS 3678.
2. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO CONFIRM THE STEEL LAYER DETAILS INCLUDING WALL AND DRIVING SHOE THICKNESS TO SUIT THE GROUND CONDITIONS AND PLANT USED. REFER TO NOTE 4.5.
3. ULTIMATE WAVE LOADS ARE CALCULATED BASED ON 500 YEAR ARI
4. SERVICE LIMIT WAVE LOADS ASSUMED TO BE 0.5.0.7.5
PILE MARK
PILE SIZE
ESTIMATED TOE OF PILE Ht 'A'
TOP OF PILE Ht 'B'
PILE LENGTH 'L1' (m)
ULS LOADS
COMPRESSION (Cd) (kN)
TENSION (kN)
LATERAL LOAD AT TOP OF PILE (kN)
MOMENT AT TOP OF PILE (kNm)
SLS LOADS
COMPRESSION (Cd) (kN)
TENSION (kN)
LATERAL LOAD AT TOP OF PILE (kN)
MOMENT AT TOP OF PILE (kNm)
FOUNDING MATERIAL
A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12 A13 A14 A15 A16 A17 A18
750 DIA
-10.0
-1.335 8.665
-1.335 8.665
-1.843 9.557
-1.843 9.557
-1.351 8.548
-1.351 8.548
-1.26 8.540
-1.26 8.540
-1.288 8.532
-1.288 8.532
-1.278 8.524
-1.278 9.224
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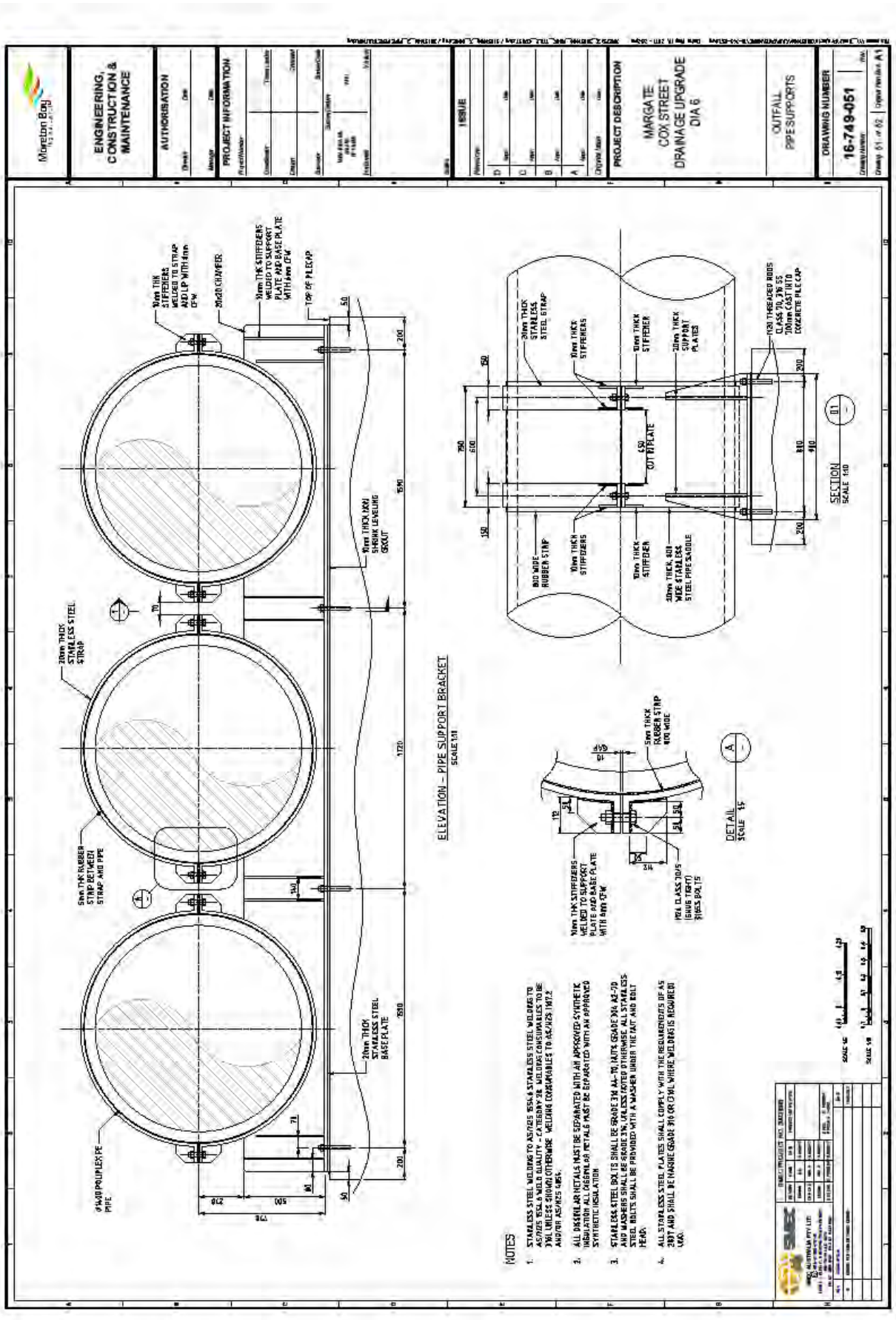
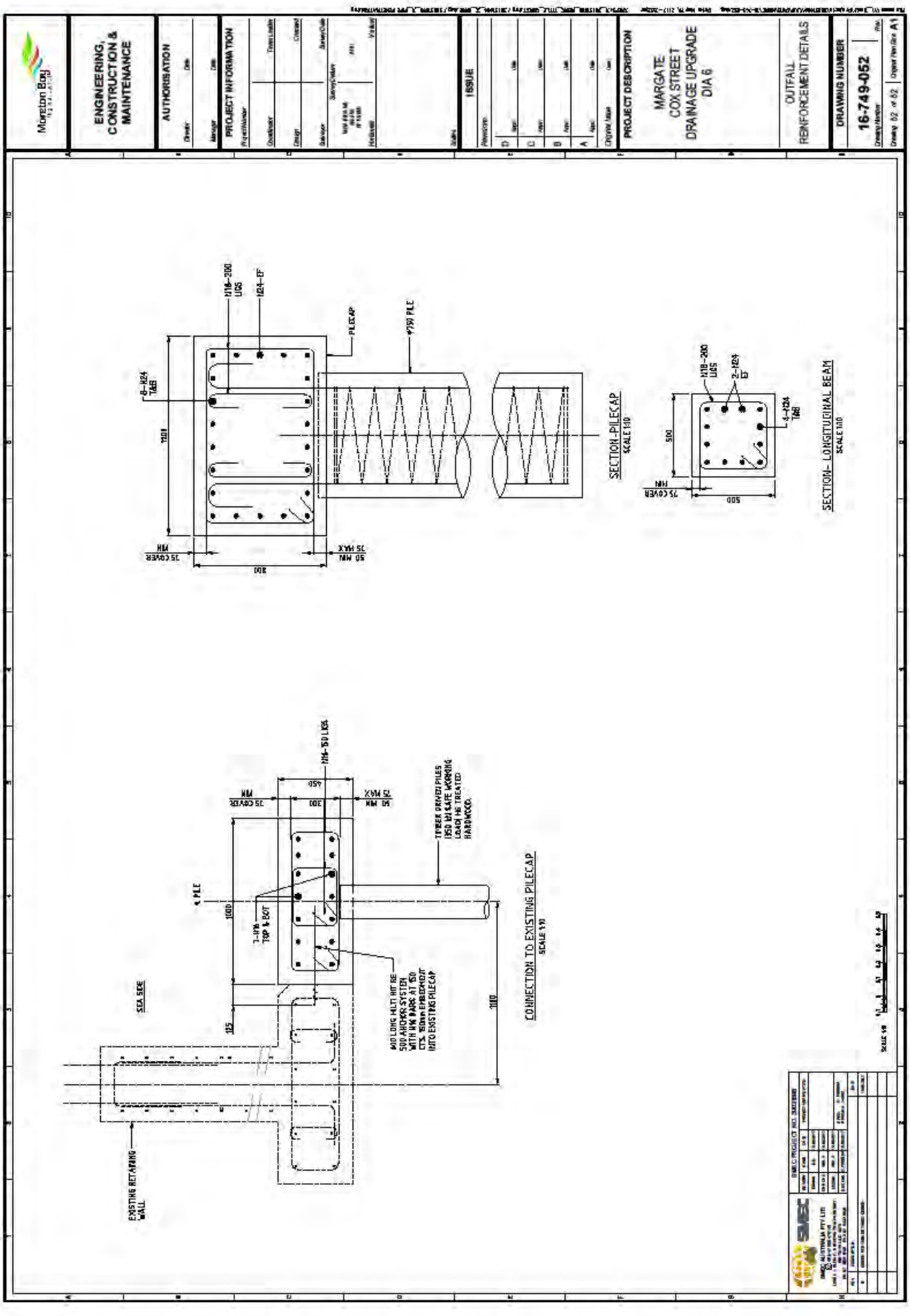
1400
650
2100
300
400
135
200
STIFF CLAY
NOTE ALL SPIRAL BARS ARE TO BE CLOSED WITH ONE AND A HALF TURNS AT EACH END
8mm THICK PERMANENT STEEL LINER TO BE CONFIRMED BY CONTRACTOR TO SUIT GROUND CONDITIONS AND DRAWABILITY
16-H28
H16 SPIRAL 150 PITCH
SECTION SCALE 1:20
PILE
TOP OF PILE RL 'B' REFER NOTE 2
UNDERSIDE OF PILECAP
8mm THICK PERMANENT STEEL LINER
750 CIP PILE
16-H28
1150 LAP
TOE OF PILE ESTIMATED FOUNDING LEVEL RL 'A' REFER NOTE 2
H16 SPIRAL 150 PITCH
BORED PILE LENGTH (L1)
750 DIA CAST-IN-PLACE PILE
SCALE 1:20


Moreton Bay
ENGINEERING, CONSTRUCTION & MAINTENANCE
AUTHORISATION
PROJECT INFORMATION
ISSUE
PROJECT DESCRIPTION
MARGATE COX STREET DRAINAGE UPGRADE DIA 6
OUTFALL PIPE SUPPORTS
DRAWING NUMBER
16-749-051
ELEVATION - PIPE SUPPORT BRACKET
SCALE 1:10
SECTION
SCALE 1:10
DETAIL
SCALE 1:5
NOTES
1. STAINLESS STEEL WELDING TO AS/NZS 5554 & STAINLESS STEEL WELDING TO AS/NZS 5554 & WELD QUALITY - CATEGORY SP. WELDING CONSUMABLES TO BE 316L UNLESS 5804/0 OTHERWISE WELDING CONSUMABLES TO AS/NZS 1987.2 AND/OR AS/NZS 4854.
2. ALL DISSIMILAR METALS MUST BE SEPARATED WITH AN APPROVED SYNTHETIC INSULATION. ALL ASSEMBLED METALS MUST BE SEPARATED WITH AN APPROVED SYNTHETIC INSULATION.
3. STAINLESS STEEL BOLTS SHALL BE GRADE 316 AA-70, NUTS GRADE 316 A2-70 AND WASHERS SHALL BE GRADE 316, UNLESS NOTED OTHERWISE ALL STAINLESS STEEL BOLTS SHALL BE PROVIDED WITH A WASHER UNDER THE NUT AND BOLT HEAD.
4. ALL STAINLESS STEEL PLATES SHALL COMPLY WITH THE REQUIREMENTS OF AS 2837 AND SHALL BE MARINE GRADE 316 OR 316L WHERE WELDING IS REQUIRED (CAT).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OUTFALL REINFORCEMENT DETAILS
DRAWING NUMBER
16-749-052
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SCALE 1:10
SECTION- LONGITUDINAL BEAM
SCALE 1:10
CONNECTION TO EXISTING PILECAP
SCALE 1:10
SEA SIDE
EXISTING RETAINING WALL
TIMBER DRIVEN PILES
SEA WATER
SCALE 1:10

DRAINAGE MASTER PLAN

DRAINAGE INVESTIGATION AREA 11b, SCARBOROUGH

DRAINAGE MASTER PLAN FOR DRAINAGE INVESTIGATION AREA 11b

1 INTRODUCTION

1.1 Introduction and Purpose of Drainage Master Plan

This Drainage Master Plan (DMP) applies to Drainage Investigation Area (DIA) 11b identified in Figure 8.2.2.6 of the Flood Hazard Overlay Code. This DMP has been prepared by the Moreton Bay Regional Council in accordance with section 3.6 of the Planning Scheme Policy – Flood Hazard, Coastal Hazard and Overland Flow.

The purpose of the DMP is to identify:

(a) the flood and drainage constraints affecting DIA 11B;

(b) the flood mitigation strategy for DIA 11b that achieves overall outcome d. of the Flood Hazard Overlay Code in a way intended to facilitate development outcomes in the DIA consistent with the Next Generation Neighbourhood Precinct and Urban Neighbourhood Precinct of the General Residential Zone (overall outcomes of the zone for both reconfiguring a lot and material change of use);

(c) the particular components of the flood mitigation strategy that will be undertaken by the Council; and

(d) the particular components and applicable standards of the flood mitigation strategy that are required to be undertaken by applicants as part of carrying out assessable development.

The DMP contains the following sections:

- Section 1 (this section) – providing an introduction and confirming when the DMP applies to assessable development;
- Section 2 – Providing an overview and description of the DIA, a summary of the flood issues relevant to the DIA and summary of the planning context/intent;
- Section 3 – Providing a description of the flood risk mitigation strategy and the different components of the strategy;
- Section 4 – Identifying the preferred implementation and sequencing of the flood mitigation strategy; and
- Section 5 – The design standards and requirements for works for all aspects of development (i.e. material change of use, reconfiguring a lot, building work and operational work) in addition to the requirements otherwise required by the MBRC Planning Scheme.

1.2 Application of DMP

This DMP applies to development carried out in DIA 11b where required in accordance with the Flood Hazard Overlay Code.

This DMP identifies standards for carrying out development in addition to the applicable planning scheme codes.

This DMP does not apply to development identified as exempt in Part 5.10.2 Levels of Assessment for the Flood Hazard Overlay.

2 DIA DESCRIPTION

2.1 Overview/Description of DIA

DIA 11b is located in the suburb of Scarborough, located in the northern area of the Redcliffe Peninsula of the Moreton Bay Region. Refer to Figure 1 identifying the location of DIA 11b in Scarborough.

Figure 1: DIA Location Map

Source: MBRC Interactive Mapping, 2016

DIA 11b comprises an area of approximately 45,500m^2 and spans between Anderson Street to the north (including part of the park opposite Scarborough Beach) to Donkin Street to the south. Properties along Landsborough Avenue, Hanlon Street, Murphy Street, Woodcock Street and Philip Street are included in DIA 11b. Refer to Figure 2 for a map of the DIA 11b.

Figure 6 - DIA 11b

Source: MBRC Interactive Mapping, 2016.

DIA 11b contains residential housing in the form of single detached dwellings and multiple dwelling units. DIA 11b is in proximity to an existing neighbourhood hub located on Landsborough Avenue containing a number of small-scale non-residential uses. The area is accessible to a number of open space areas, beaches and local parks.

The land included in DIA 11b slopes downwards towards Scarborough Beach located in the north-eastern portion of DIA 11b, ranging from approximately 11mAHD to 2mAHD. Refer to Figure 3 below for a contour map of the area.

Figure 7 - Contour Map

Source: MBRC Contours (2016)

2.2 Summary of Flood Issues affecting the DIA

The flooding issues affecting DIA 11b are characterised by overland flows through private property caused by:

- Broad, relatively shallow flows through natural gullies that are not well aligned with the road network;
- private properties that are very similar in elevation to the surrounding road network; and
- the limited capacity of the existing drainage system to cater for minor storm events.

In the 1% Annual Exceedance Probability (AEP) flood event it is estimated the majority of properties within the DIA are inundated to some degree (i.e. prior to the implementation of the flood risk mitigation strategy contained in this DMP).

Refer to Figure 4 identifying the 1% AEP flood map for DIA 11b.

Figure 4: 1% AEP Flood Map

Source: MBRC Flood Explorer, 2016

2.3 Planning Context and Intent

DIA 11b is included in the Next Generation Neighbourhood Precinct and Urban Neighbourhood Precinct of the General Residential Zone. Accordingly development outcomes expected by the DMP are those identified in the purpose and overall outcomes of the General Residential Zone Code. In summary this includes:

- a diverse mix of dwellings types at a density higher than traditional suburban areas in the Next Generation Neighbourhood Precinct; and
- a minimum density of 45 dwellings per hectare in the Urban Neighbourhood Precinct to facilitates efficient land use patterns and support compact, walkable and sustainable communities that are well connected.

Outcomes for other aspects of development not addressed by the zone code (e.g. reconfiguring a lot, operational work etc) are expressed in the relevant planning scheme codes and continue to apply to development in the DIA.

Development outcomes in DIA 11b prior to the implementation of the flood risk mitigation strategy in this DMP are constrained due to the flood impacts affecting the area. The DMP supports the intended uplift in dwelling density (consistent with the zone outcomes) in conjunction with the implementation of the DMP.

Refer to Figure 5 identifying the planning scheme zone applying to DIA 11b.

Figure 5: Planning Scheme Zone

Source: MBRC Interactive Mapping, 2016

3 FLOOD RISK MITIGATION STRATEGY

3.1 Overview/Summary

The general approach to the flood risk mitigation strategy in DIA 11b is to increase the capacity of the drainage system to allow for filling of allotments to achieve appropriate flood immunity levels. Increasing the drainage capacity has the effect of reducing the known flood risk determined at the date of adoption of the planning scheme. In turn this allows the filling of all allotments in the DIA to flood immunity levels over time without exacerbating flood risks (as determined at the date of adoption of the planning scheme).

The flood risk mitigation strategy for DIA 11b therefore comprises:

(a) The flood risk mitigation to be undertaken by Council – Additional drainage works in the DIA to augment the capacity of the drainage network; and

(b) Flood risk mitigation to be undertaken by applicants - Filling of all allotments within the DIA to the required flood immunity level.

Each of these components of the flood risk mitigation strategy are described in sections 3.2 and 3.3.

The flood risk mitigation strategy will reduce flood inundation across private properties within the DIA thereby substantially improving the development potential of the area.

3.2 Flood Risk Mitigation to be undertaken by Council

The drainage upgrade works to be undertaken by the Moreton Bay Regional Council involve augmenting the capacity of the existing drainage network by providing additional drainage infrastructure along Woodcock Street, Landsborough Avenue and Kennedy Esplanade to the Scarborough beach groyne South West outlet. Details of the proposed work are included in *Appendix A - Flood Risk Mitigation to be undertaken by Council - Detailed Design DIA 11b*.

The Council can be contacted to confirm the expected timing for commencement/completion of the drainage works to be undertaken by Council.

3.3 Flood Risk Mitigation to be undertaken by Applicants

The flood risk mitigation to be undertaken by applicants is to fill all allotments in the DIA to the Flood Planning Level (Defined Flood Event + required freeboard for the Flood Planning Area). It is noted that the ground level of some or parts of allotments in the DIA may already meet the required fill levels for flood immunity.

Filling required in accordance with the standards identified in Section 5 is required not only to achieve flood immunity for individual properties but to specifically direct flood waters to the street and drainage network away from surrounding properties. Filling is a fundamental part of the flood mitigation strategy for the DIA as a whole and accordingly will be a mandatory condition of development across the entire development site.

The general approach to allotment filling is to provide a uniform grade with a minimum 1:100 crossfall to the street for the whole allotment/development site. Section 5 and Table 1 of the DMP identifies the detailed standards and circumstances where filling is required for all aspects of development (i.e. material change of use, reconfiguring a lot etc). Filling is required where carrying out a material change of use and/or reconfiguring a lot (other than a boundary realignment). Filling is permitted but not mandatory in other circumstances.

4 FLOOD RISK MITIGATION IMPLEMENTATION AND SEQUENCING

The drainage upgrade works to be carried out by Council as detailed in Section 3.2 must be completed before filling of allotments in accordance with the standards in Section 5 is permitted.

Filling proposed prior to the implementation of the drainage works to be carried out by Council is not in accordance with this DMP and subject to the respective performance outcomes of the Flood hazard overlay code.

5 REQUIREMENTS FOR WORKS AND DESIGN STANDARDS

The flood risk mitigation to be undertaken by applicants includes filling where required in accordance with Table 1.

Alternative approaches to the standards in this section are subject to assessment against the applicable performance outcomes of the Flood hazard overlay code.

Table 1 - Fill Requirements

Note: The drainage upgrade works to be carried out by Council as detailed in Section 3.2 must be completed before filling of allotments in accordance with the standards in Section 5 is permitted. Filling proposed prior to the implementation of the drainage works to be carried out by Council is not in accordance with this DMP and subject to the respective performance outcomes of the Flood hazard overlay code.

Aspect of Development	Filling Requirements	Minimum Fill Level	Minimum Extent of Filling	Notes
Material change of use and/or Reconfiguring a lot (other than a boundary realignment)	Filling is mandatory	Flood Planning Level	The entire allotment/development site area and meeting the following: (a) provide a minimum 1:100 uniform cross fall shaped to contains flood waters to the street and drainage network with the exception of meeting (b) and (c); (b) provide an accessible grade for vehicle access by the applicable design vehicle for the development from the street to the minimum fill level; and (c) ensure no worsening of flood impacts to other properties beyond known flood impacts at the date of adoption of the planning scheme.	The filling requirements outlined in this DMP must be considered in conjunction with the other applicable code requirements identified in the MBRC Planning Scheme. This may include consideration of, but not limited to: ▪ earthworks, drainage, filling and associated retaining walls to avoid adverse impacts on adjacent properties; and ▪ flood immunity requirements for building work and other components of development where not achieved by filling alone.

Aspect of Development	Filling Requirements	Minimum Fill Level	Minimum Extent of Filling	Notes
Reconfiguring a lot where for a boundary realignment	Filling is permitted but not mandatory	N/A	N/A	Filling is permitted and minimum fill levels are not regulated by the DMP for this aspect of development. Note: Maximum fill to DMP levels is encouraged. Where filling occurs, other applicable code requirements apply in the MBRC Planning Scheme. This may include consideration of, but not limited to: ▪ earthworks, drainage, filling and associated retaining walls to avoid adverse impacts on adjacent properties; and ▪ flood immunity requirements for building work and other components of development where not achieved by filling alone.

Aspect of Development	Filling Requirements	Minimum Fill Level	Minimum Extent of Filling	Notes
Operational work (filling or excavation only)	Filling is mandatory	Flood Planning Level	The entire allotment/development site area and meeting the following: (a) provide a minimum 1:100 uniform cross fall shaped to contains flood waters to the street and drainage network with the exception of meeting (b) and (c); (b) provide an accessible grade for vehicle access by the applicable design vehicle for the development from the street to the minimum fill level; and (c) ensure no worsening of flood impacts to other properties beyond known flood impacts at the date of adoption of the planning scheme.	The filling requirements outlined in this DMP must be considered in conjunction with the other applicable code requirements identified in the MBRC Planning Scheme. This may include consideration of, but not limited to: ▪ earthworks, drainage, filling and associated retaining walls to avoid adverse impacts on adjacent properties; and ▪ flood immunity requirements for building work and other components of development where not achieved by filling alone.

Aspect of Development	Filling Requirements	Minimum Fill Level	Minimum Extent of Filling	Notes
All other operational work where not associated with a material change of use or reconfiguring a lot	Filling is permitted but not mandatory	N/A	N/A	Filling is permitted and minimum fill levels are not regulated by the DMP for this aspect of development. The filling requirements outlined in this DMP must be considered in conjunction with the other applicable code requirements identified in the MBRC Planning Scheme. This may include consideration of, but not limited to: ▪ earthworks, drainage filling and associated retaining walls to avoid adverse impacts on adjacent properties; and ▪ flood immunity requirements for building work and other components of development where not achieved by filling alone.
Building work where not associated with a material change of use	Filling is permitted but not mandatory	N/A	N/A	Filling is permitted and minimum fill levels are not regulated by the DMP for this aspect of development. The filling requirements outlined in this DMP must be considered in conjunction with the other applicable code requirements identified in the MBRC Planning Scheme. This may include consideration of, but not limited to: ▪ earthworks, filling and associated retaining walls to avoid adverse impacts on adjacent properties; and ▪ flood immunity requirements for building work and other components of development where not achieved by filling alone.

Appendix A - Flood Risk Mitigation to be undertaken by Council

Detailed Design DIA11B

SCARBOROUGH - HANLON STREET DRAINAGE UPGRADE DIA 11B

LOCALITY PLAN
NTS

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16-750-002	GENERAL NOTES
16-750-003	OVERALL SITE LAYOUT AND CATCHMENT PLAN
16-750-004	SURVEY CONTROL AND SERVICE LOCALITY PLAN SHEET 1
16-750-005	SURVEY CONTROL AND SERVICE LOCALITY PLAN SHEET 2
16-750-006	SURVEY CONTROL AND SERVICE LOCALITY PLAN SHEET 3
16-750-007	SURVEY CONTROL AND SERVICE LOCALITY PLAN SHEET 4
16-750-008	SURVEY CONTROL AND SERVICE LOCALITY PLAN SHEET 5
16-750-009	DRAINAGE LAYOUT PLAN SHEET 1
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16-750-012	DRAINAGE LAYOUT PLAN SHEET 4
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16-750-014	STRUCTURAL NOTES
16-750-015	DRAINAGE STRUCTURES SHEET 1
16-750-016	DRAINAGE STRUCTURES SHEET 2
16-750-017	DRAINAGE STRUCTURES SHEET 3
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16-750-020	DRAINAGE STRUCTURES SHEET 6
16-750-021	DRAINAGE STRUCTURE TYPICAL DETAILS
16-750-022	DRAINAGE LONGITUDINAL SECTIONS SHEET 1
16-750-023	DRAINAGE LONGITUDINAL SECTIONS SHEET 2
16-750-024	DRAINAGE LONGITUDINAL SECTIONS SHEET 3
16-750-025	DRAINAGE LONGITUDINAL SECTIONS SHEET 4
16-750-026	DRAINAGE LONGITUDINAL SECTIONS SHEET 5
16-750-027	DRAINAGE LONGITUDINAL SECTIONS SHEET 6
16-750-028	DRAINAGE LONGITUDINAL SECTIONS SHEET 7
16-750-029	DRAINAGE LONGITUDINAL SECTIONS SHEET 8
16-750-030	DRAINAGE CONNECTION DETAIL

STANDARD DRAWINGS

IPWEAQ D-010	STORMWATER ACCESS CHAMBER DETAILS 1050 TO 2100 DIAMETER
IPWEAQ D-015	MANHOLE PRIME, ROADWAY AND NON-ROADWAY 1050 TO 2100 DIAMETER
IPWEAQ D-016	MANHOLE STEP DETAILS (ROADWAY)
IPWEAQ D-017	MANHOLE COVER ROADWAY 1050 TO 2100 DIAMETER
IPWEAQ D-018	MANHOLE COVER NON-ROADWAY 1050 TO 2100 DIAMETER
IPWEAQ D-021	MANHOLE COVER CONCRETE PEDESTRIAN TRAFFIC 1050 TO 2100 DIAMETER
IPWEAQ D-030	EXCAVATION, BEDDING & BACKFILLING PRECAST PIPE CULVERTS
IPWEAQ R-049	VEHICLE CROSSING RESIDENTIAL MINI ENTRY PLAN 1 OF 2
IPWEAQ R-050	VEHICLE CROSSING RESIDENTIAL MINI ENTRY PLAN 2 OF 2
IPWEAQ D-040	DRAINAGE PIT - KERB INLET - KERB INLET GENERAL ARRANGEMENT
IPWEAQ D-041	DRAINAGE PIT - KERB INLET PRECAST DETAILS
IPWEAQ D-042	DRAINAGE PIT - KERB INLET GRATE AND FRAME
IPWEAQ R-045	PATHWAYS CONCRETE PATHWAY CONSTRUCTION DETAILS
IPWEAQ R-046	KERB AND CHANNEL RESIDENTIAL DRAINAGE CONSTRUCTION
IPWEAQ R-047	KERB RAMPS RAMPED PEDESTRIAN CROSSING
IPWEAQ R-047	KERB RAMPS INSTALLATION OF TGSI ON RAMPED KERB CROSSING
IPWEAQ R-048	ROAD FURNITURE TRAFFIC SIGN INSTALLATION DETAILS
IPWEAQ R-049	PAVEMENT EXTENSION TRENCHING AND BEDDING
TMR 1515	PCBU OBJECT - CONSTRUCTION OF REINFORCED CONCRETE KERB WALLS & HEADWALLS
TMR 1521	ACCESS CHAMBER - DETAILS 1050 TO 2100 DIA
TMR 1526	ACCESS CHAMBER - STEP RUNG 1050 TO 2100 DIA
TMR 1536	PCBU OBJECT - INSTALLATION OF PRECAST UNIT HEIGHT
TMR 1538	PCBU OBJECT - CONSTRUCTION OF A PIER WITH FOOTINGS & APRON
TMR 1570	PCBU OBJECT - GRATED UNIT INLET (KERB ENTRY)
TMR 1571	CONCRETE GULLY - PRECAST CONCRETE SIDE ENTRY GULLY WITH PRECAST SHAFT
TMR 1573	CONCRETE GULLY - PRECAST CONCRETE SIDE ENTRY GULLY WITH CAST IN SITU PIT
TMR 1604	CULVERTS - INSTALLATION, BEDDING AND BACKFILLING REINFORCED CULVERTS
TMR 1611	ACCESS CHAMBER - STEP RUNG

SMEC

SMEC PROJECT NO. 30031685

SMEC AUSTRALIA PTY LTD

Moreton Bay Regional Council

ENGINEERING, CONSTRUCTION & MAINTENANCE

AUTHORISATION

Director Date

Manager Date

PROJECT INFORMATION

Project Number 30031685

Coordinator Team Leader

Design Checked

Surveyor Survey Date

Survey Datum

Horizontal Vertical

Scales

ISSUE

Previous Issue

D Appd Date

C Appd Date

B Appd Date

A Appd Date

Original Issue Date

PROJECT DESCRIPTION

SCARBOROUGH HANLON STREET DRAINAGE UPGRADE DIA 11B

FOR INFORMATION NOT FOR CONSTRUCTION

LOCALITY PLAN AND DRAWING INDEX

DRAWING NUMBER

16-750-001 03

Drawing Number Rev

Drawing 1 of 1 Original Plot Size A1

Moreton Bay
ENGINEERING, CONSTRUCTION & MAINTENANCE
AUTHORISATION
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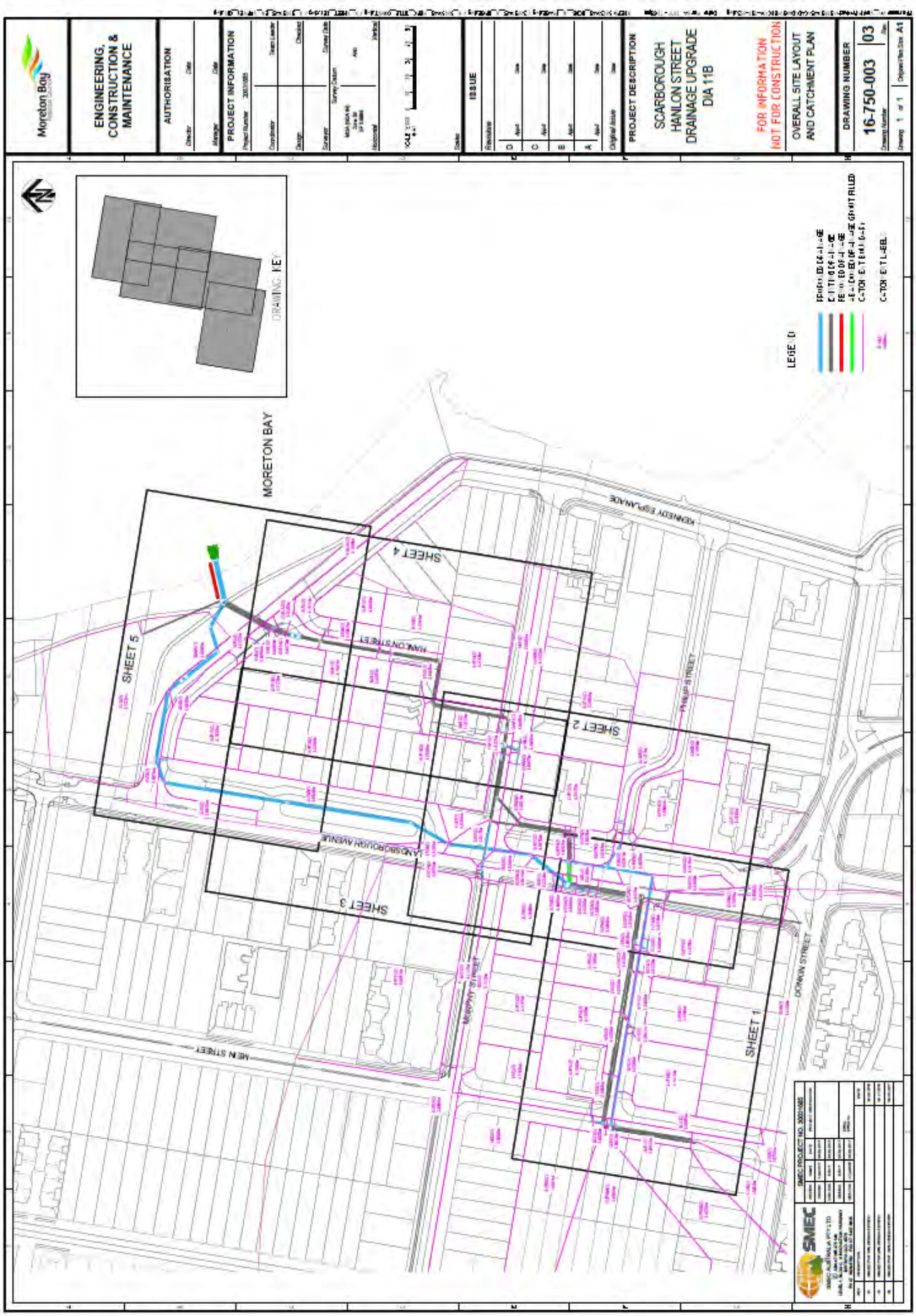
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SHEET 4
SHEET 5
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PHILIP STREET
LANDSBOROUGH AVENUE
MURPHY STREET
DONKIN STREET
MAIN STREET
SMEC


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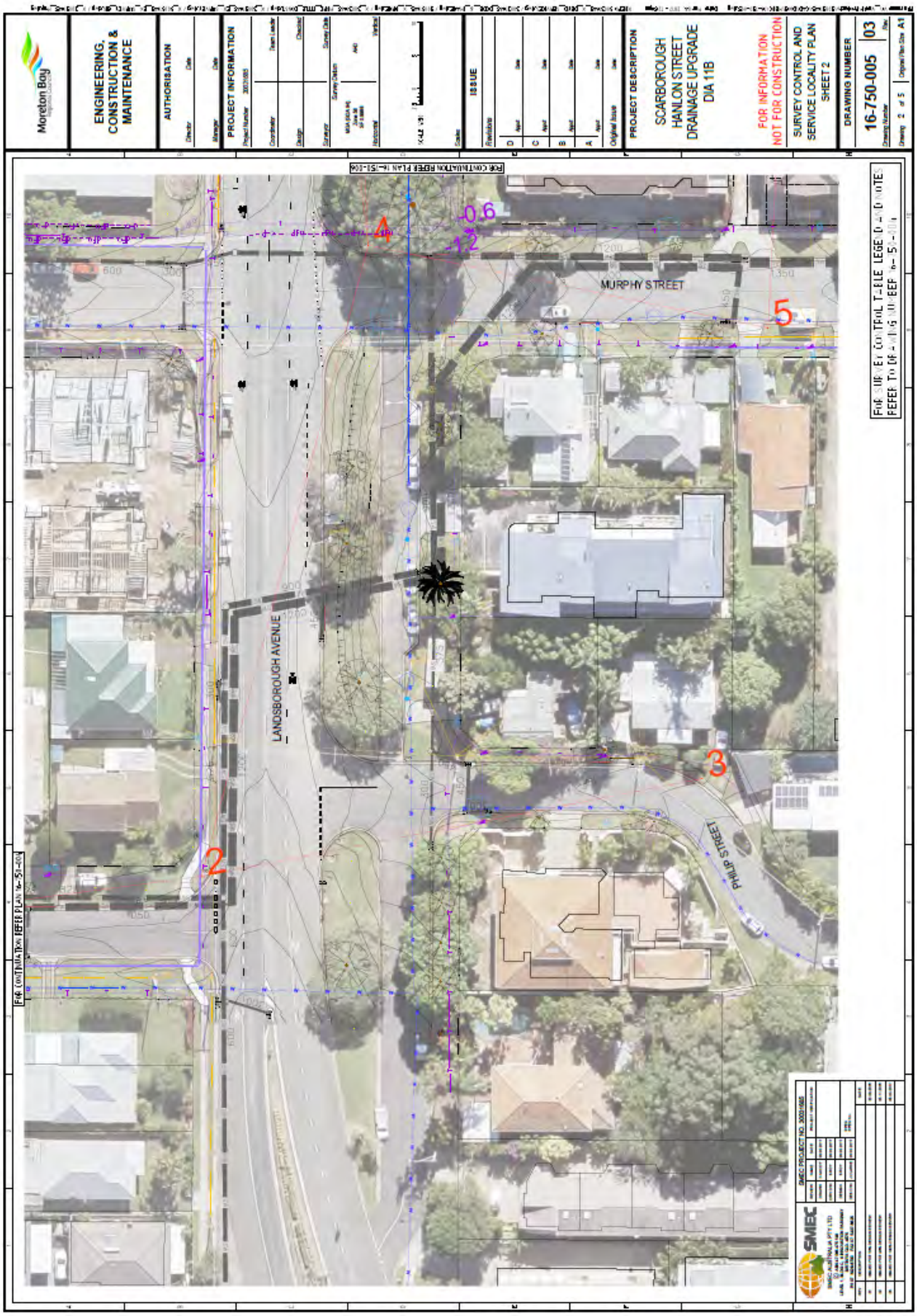
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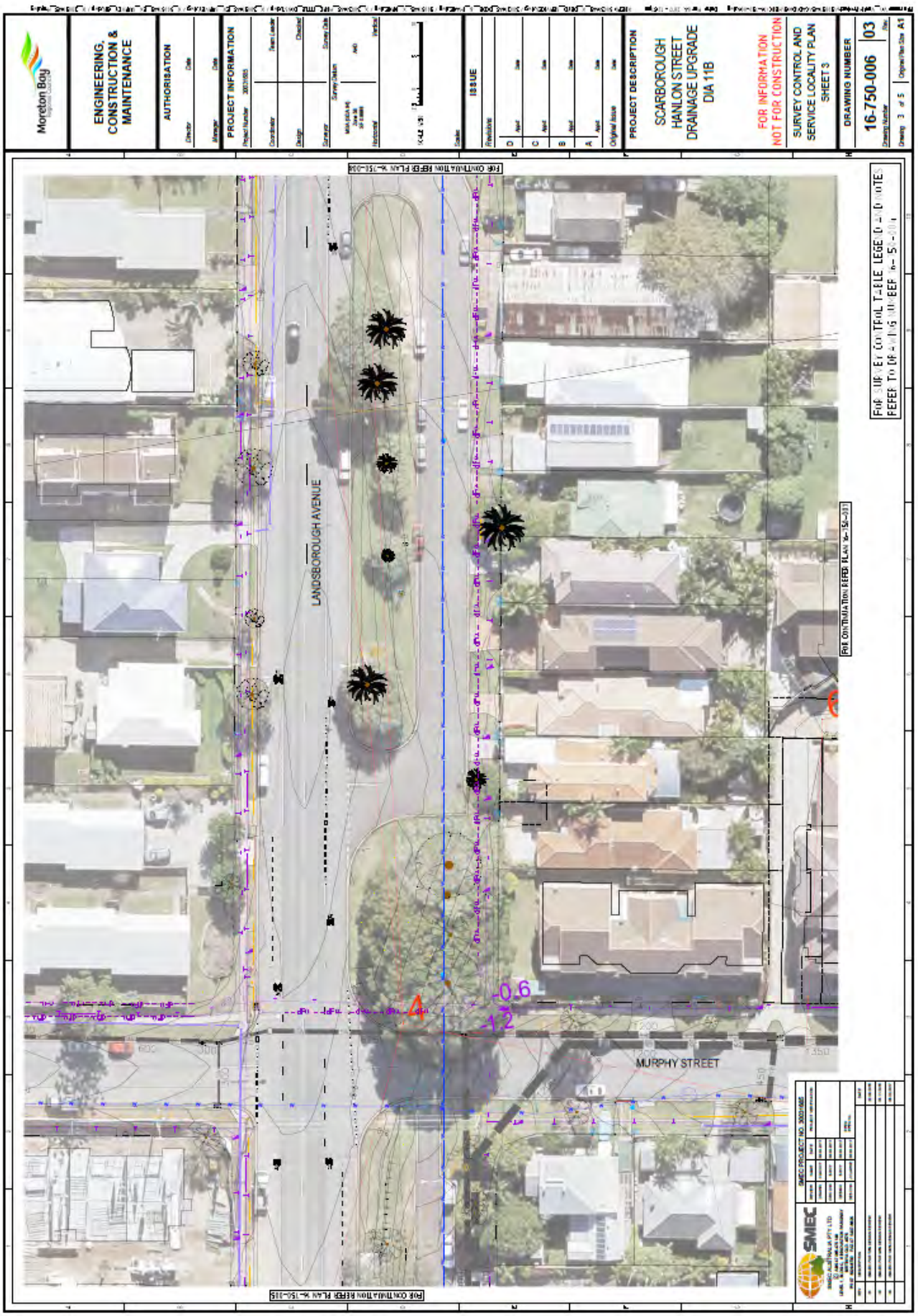
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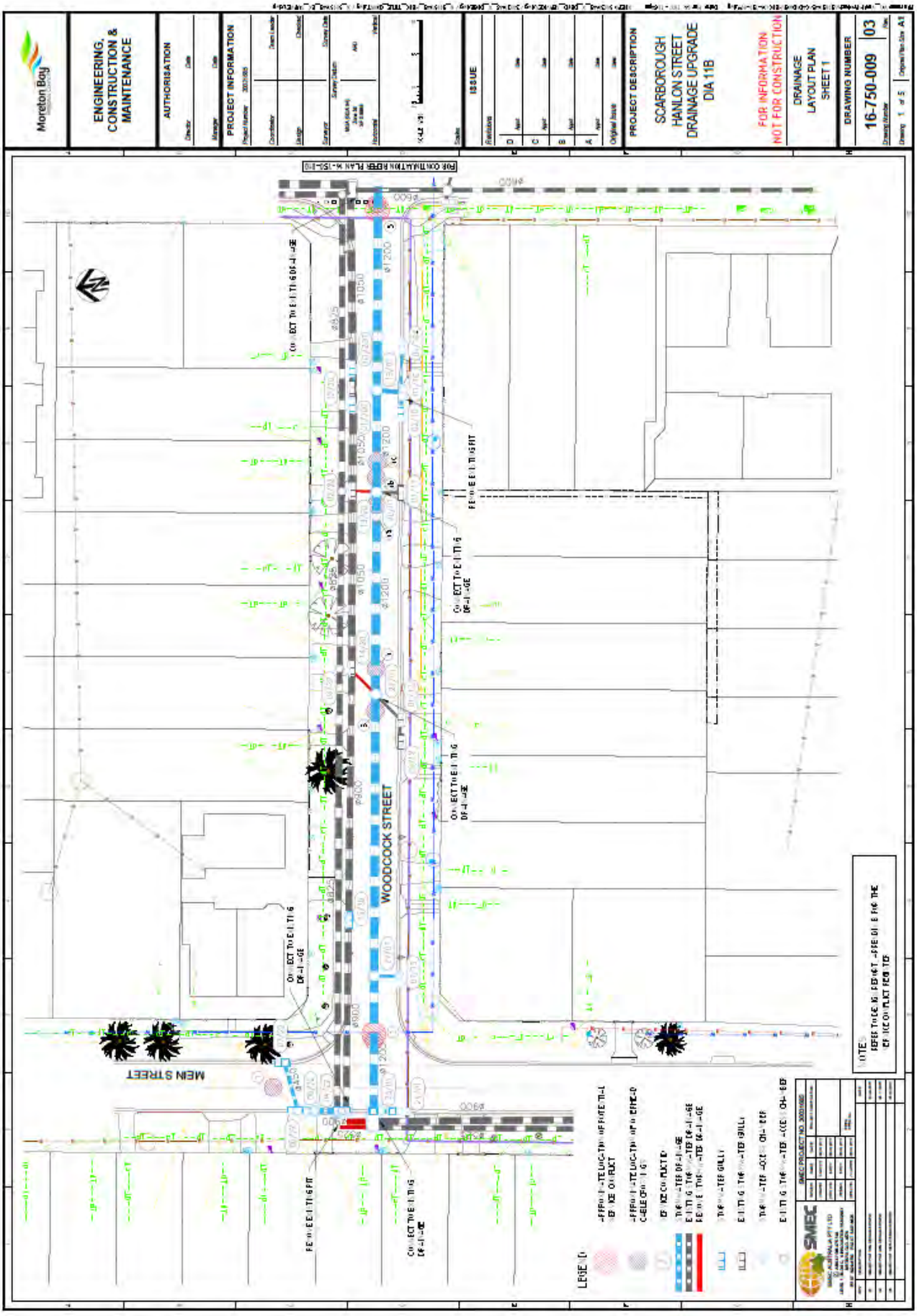
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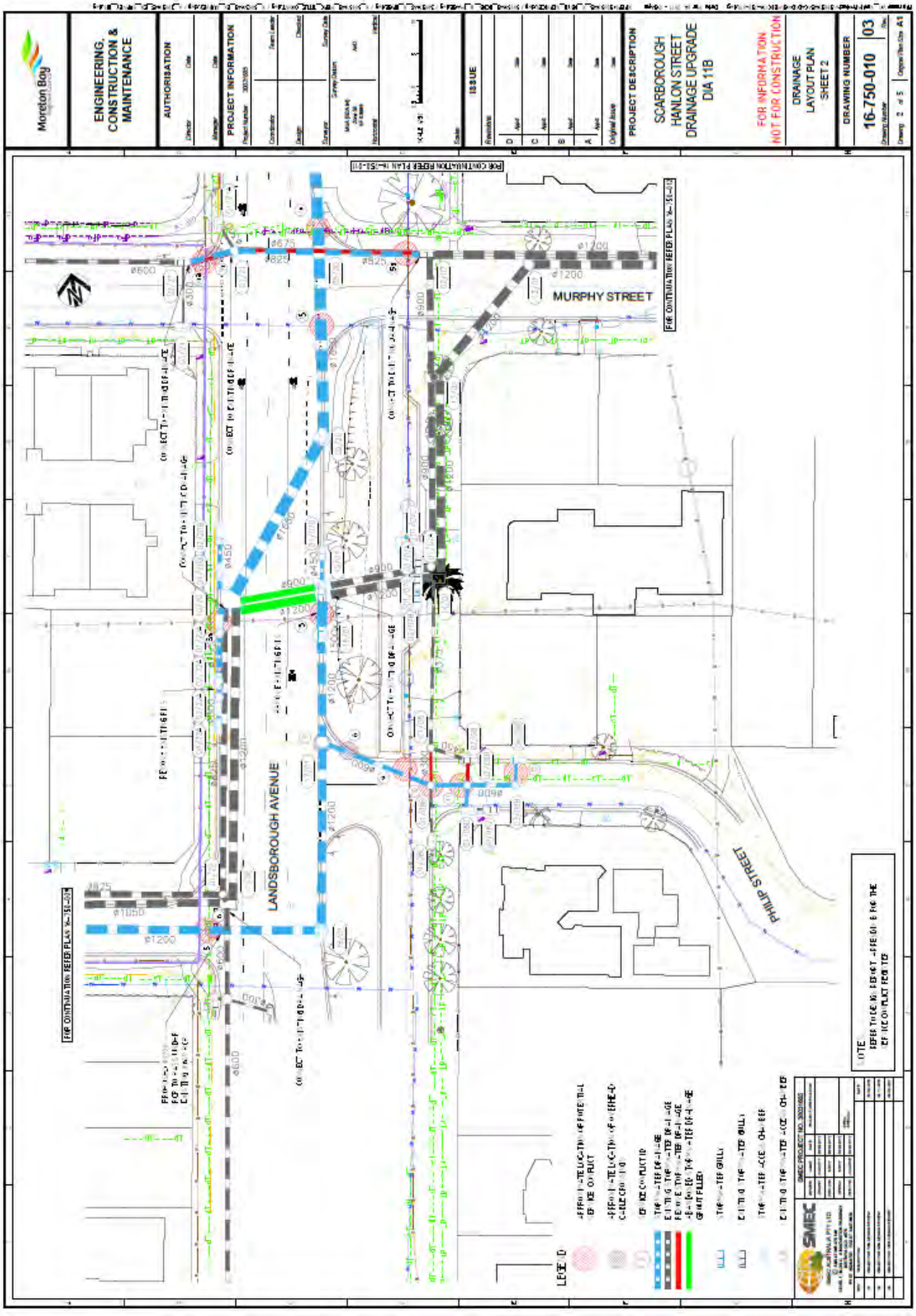
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LANDSBOROUGH AVENUE
PHILLIP STREET
NOTE
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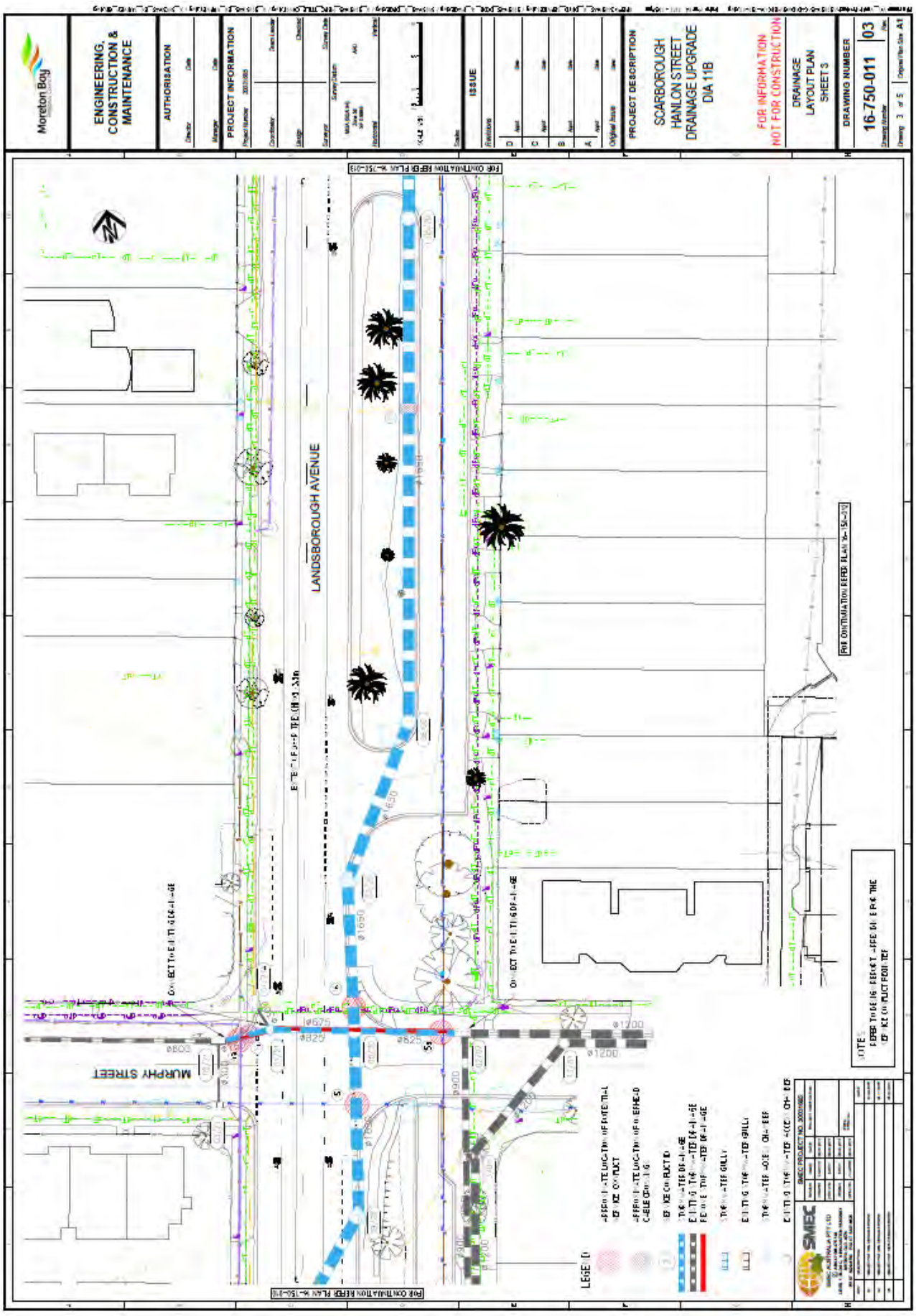
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DRAWING NUMBER
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LANDSBOROUGH AVENUE
MURPHY STREET
SMEC


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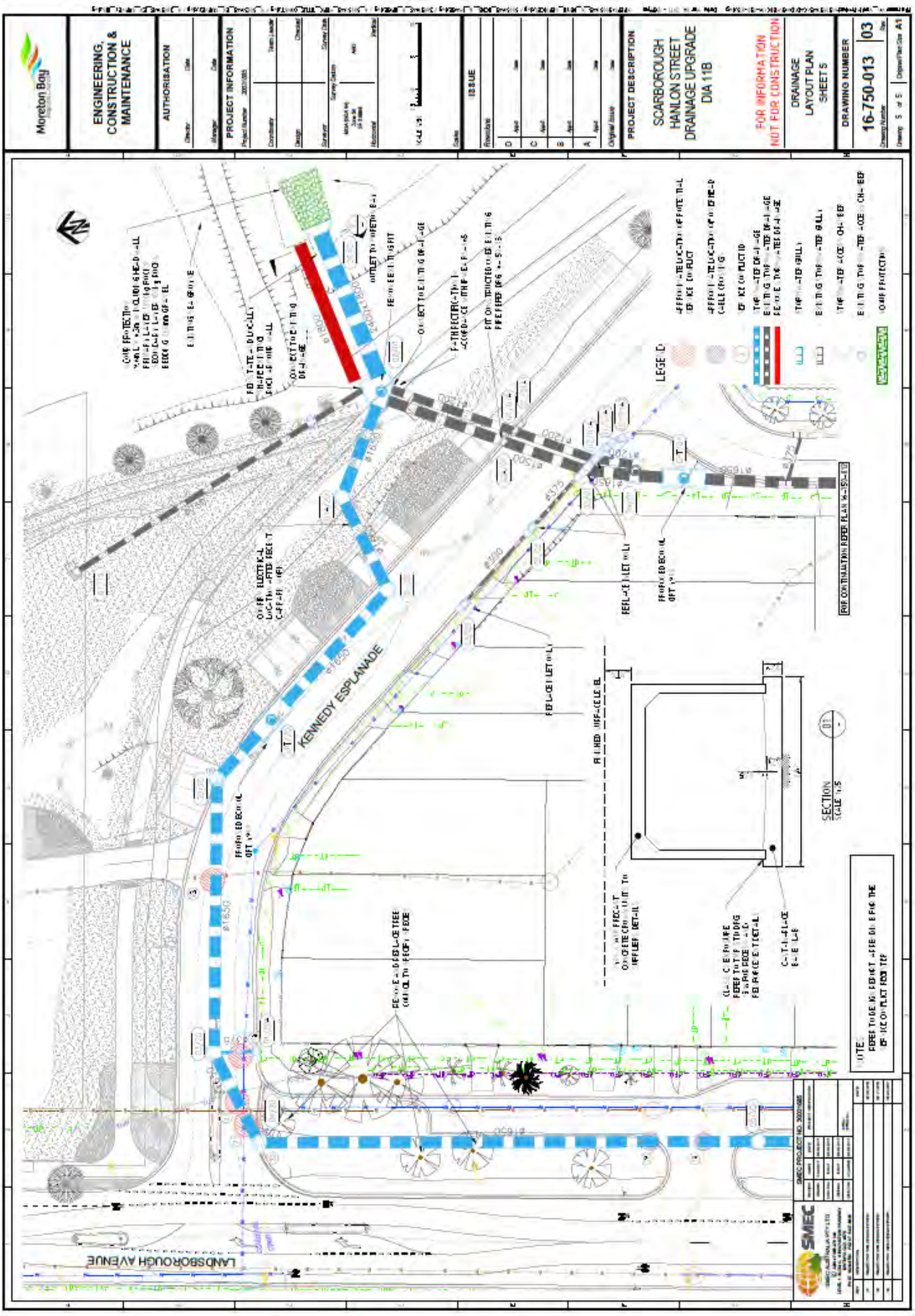
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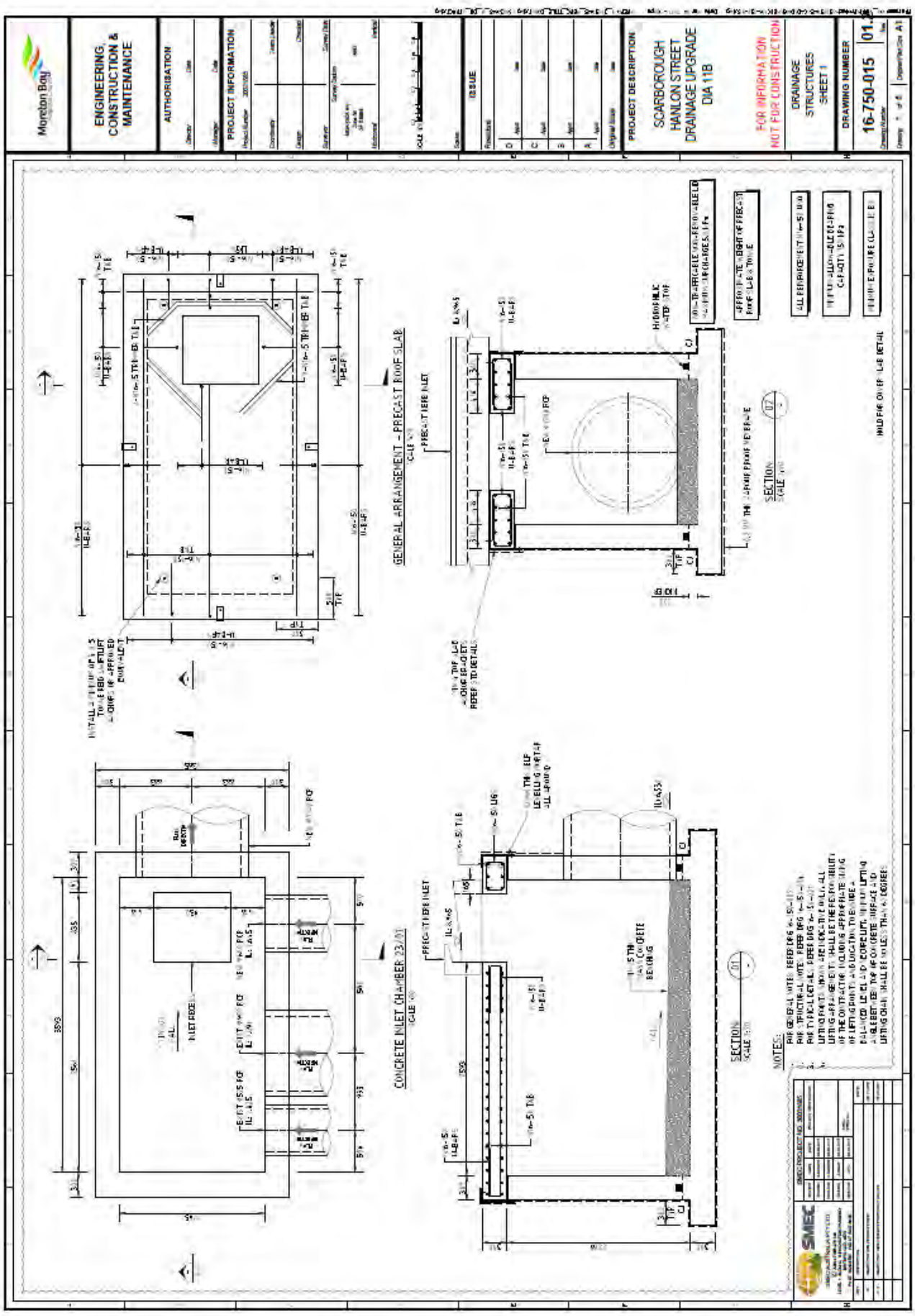
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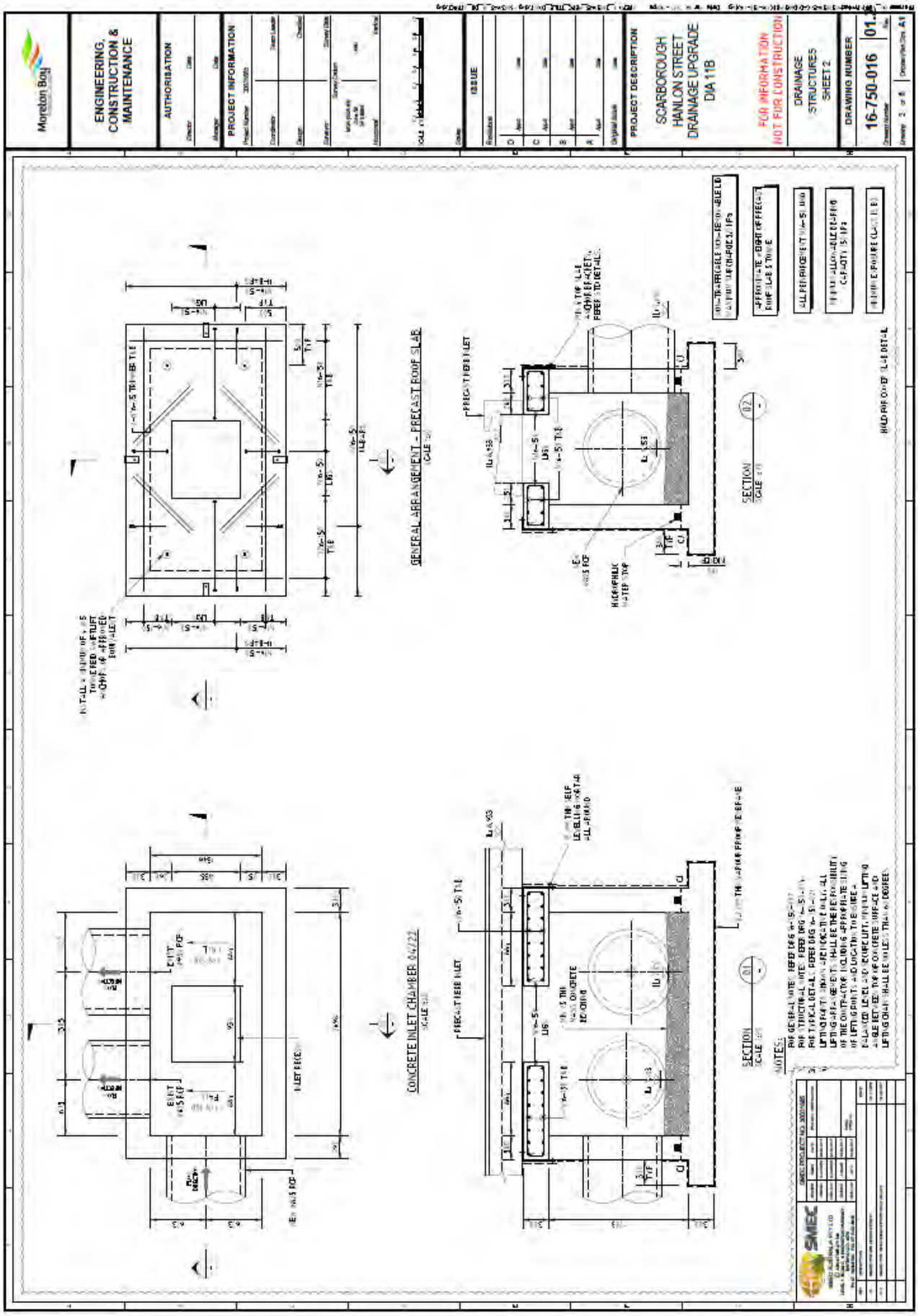
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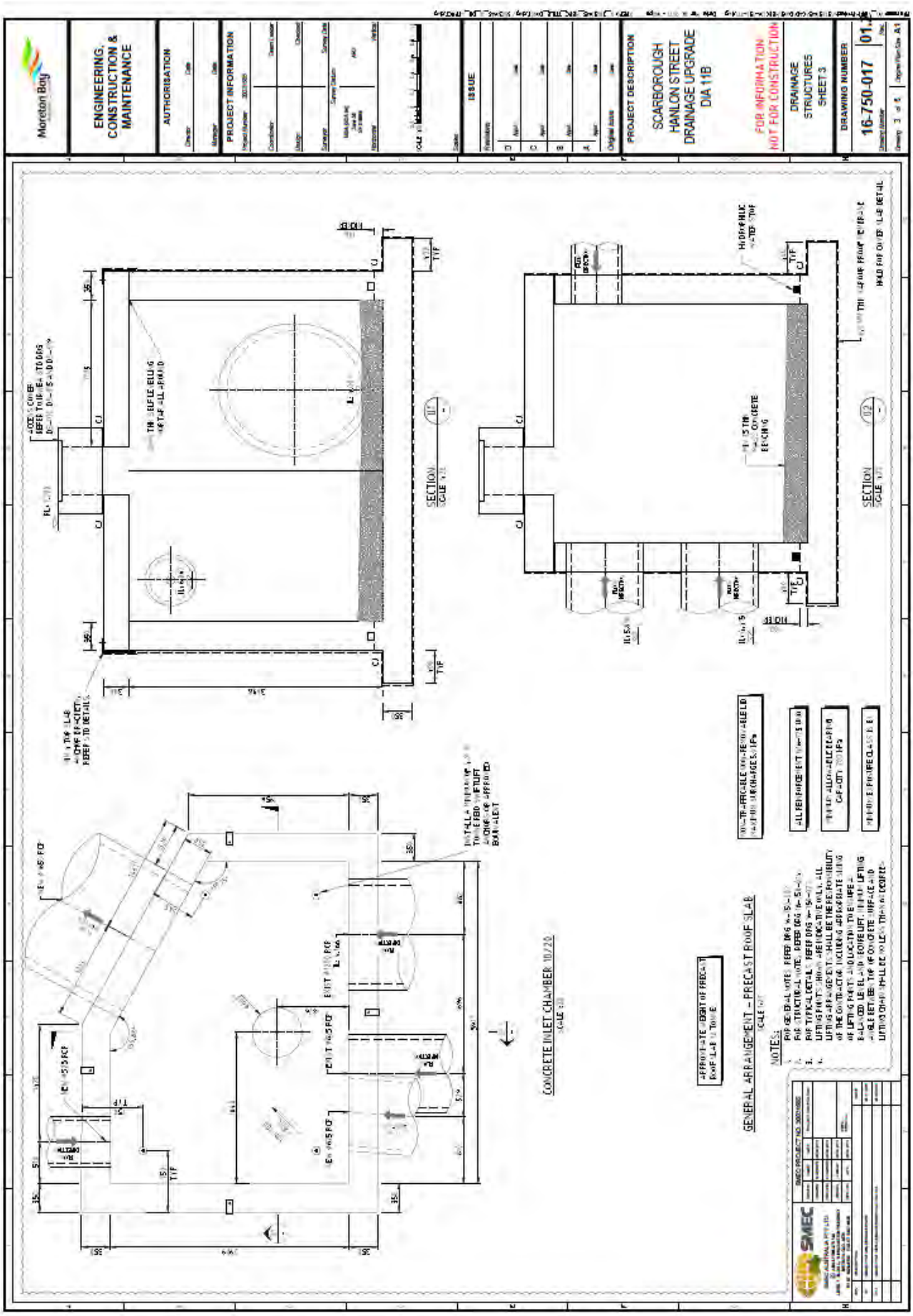
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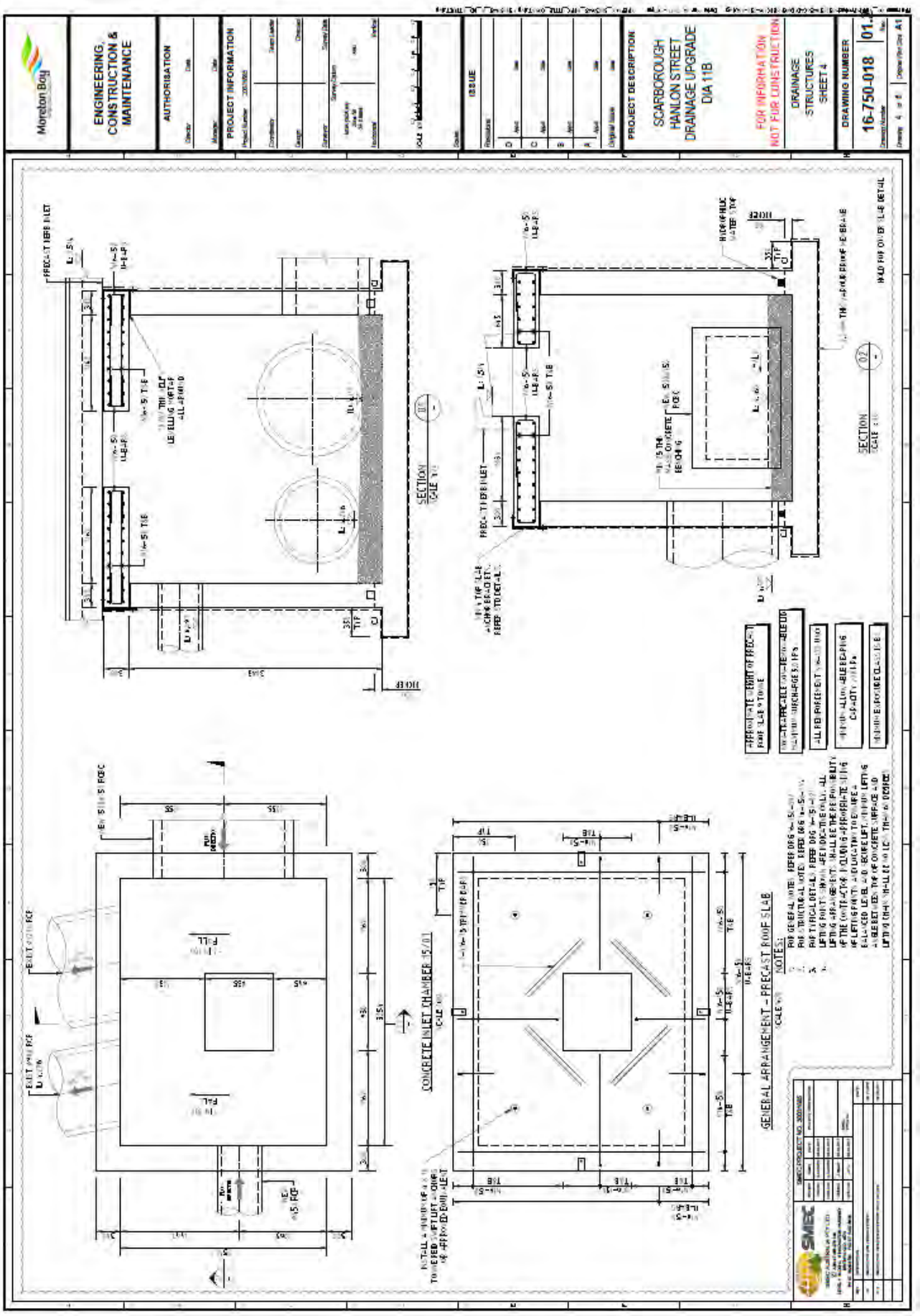
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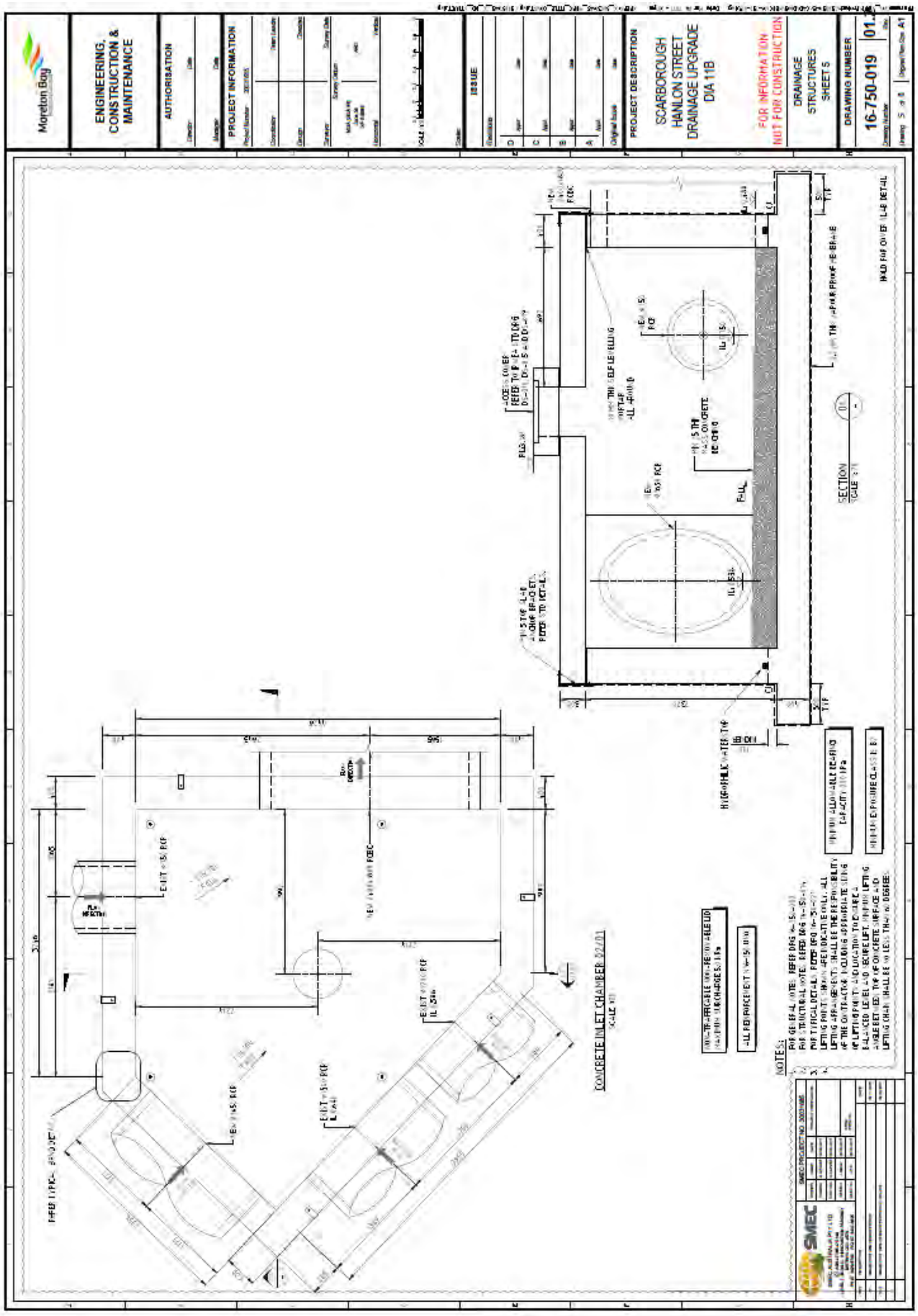
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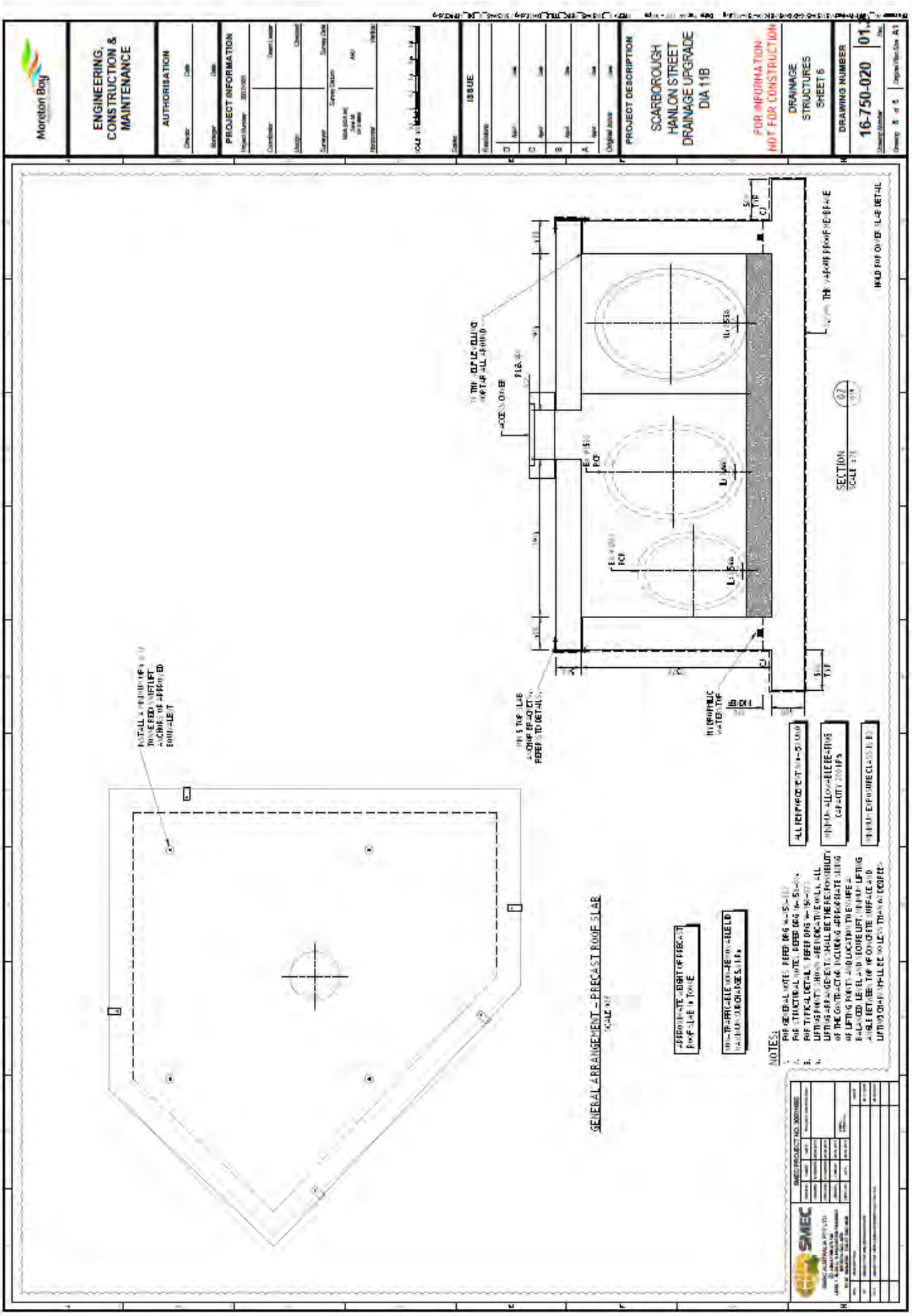
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GENERAL ARRANGEMENT – PRECAST ROOF SLAB
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TYPICAL TRIMMER DETAIL
TYPICAL CORNER DETAIL
4 POINT LIFTING DIAGRAM
TYPICAL - CAST IN PIPE DETAIL
TYPICAL - PIPE BLOCKOUT DETAIL
TOP SLAB ANCHOR BRACKET FOR USE WITH BOLT DOWN COVERS
TOP SLAB ANCHOR BRACKET
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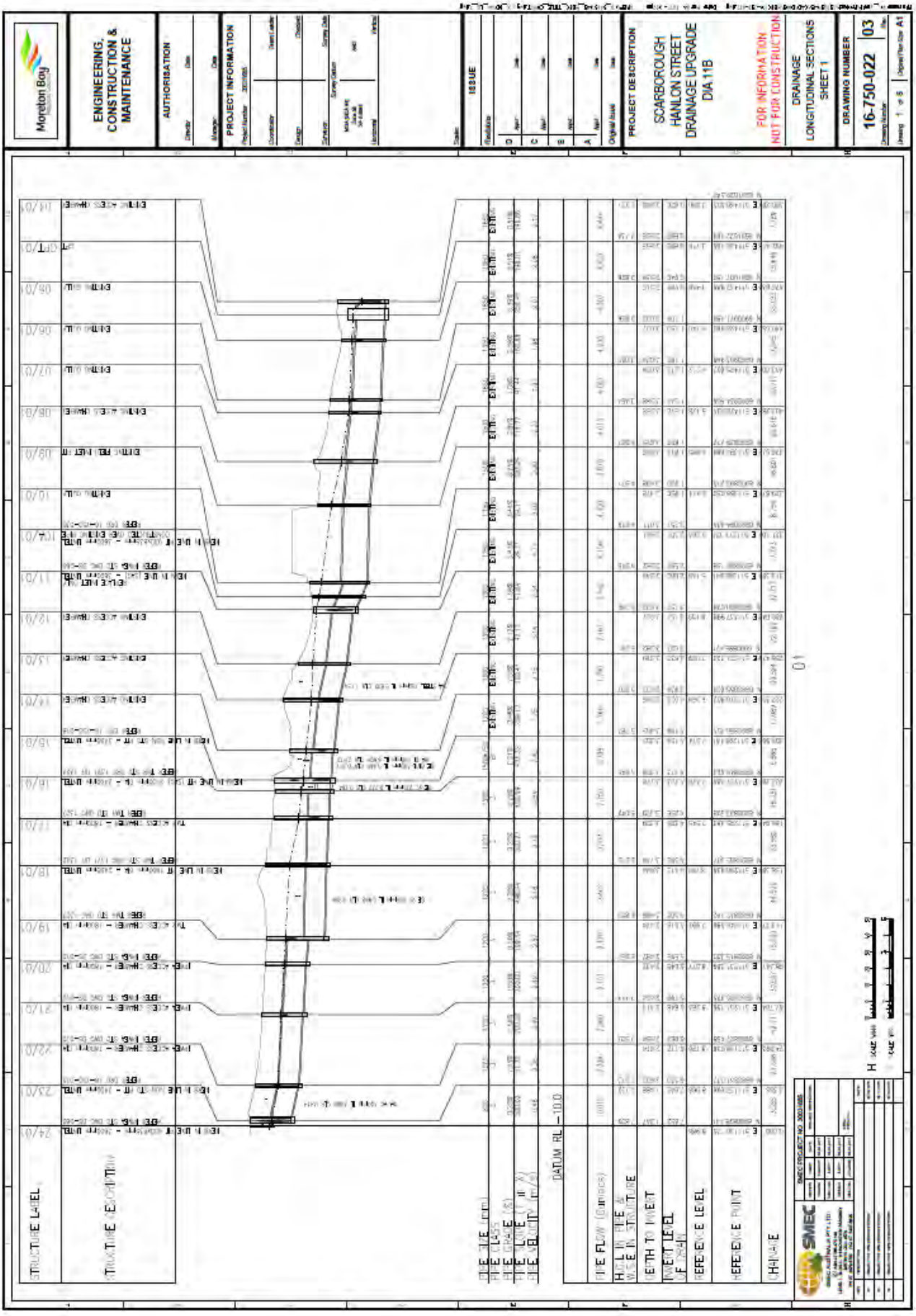
SMEC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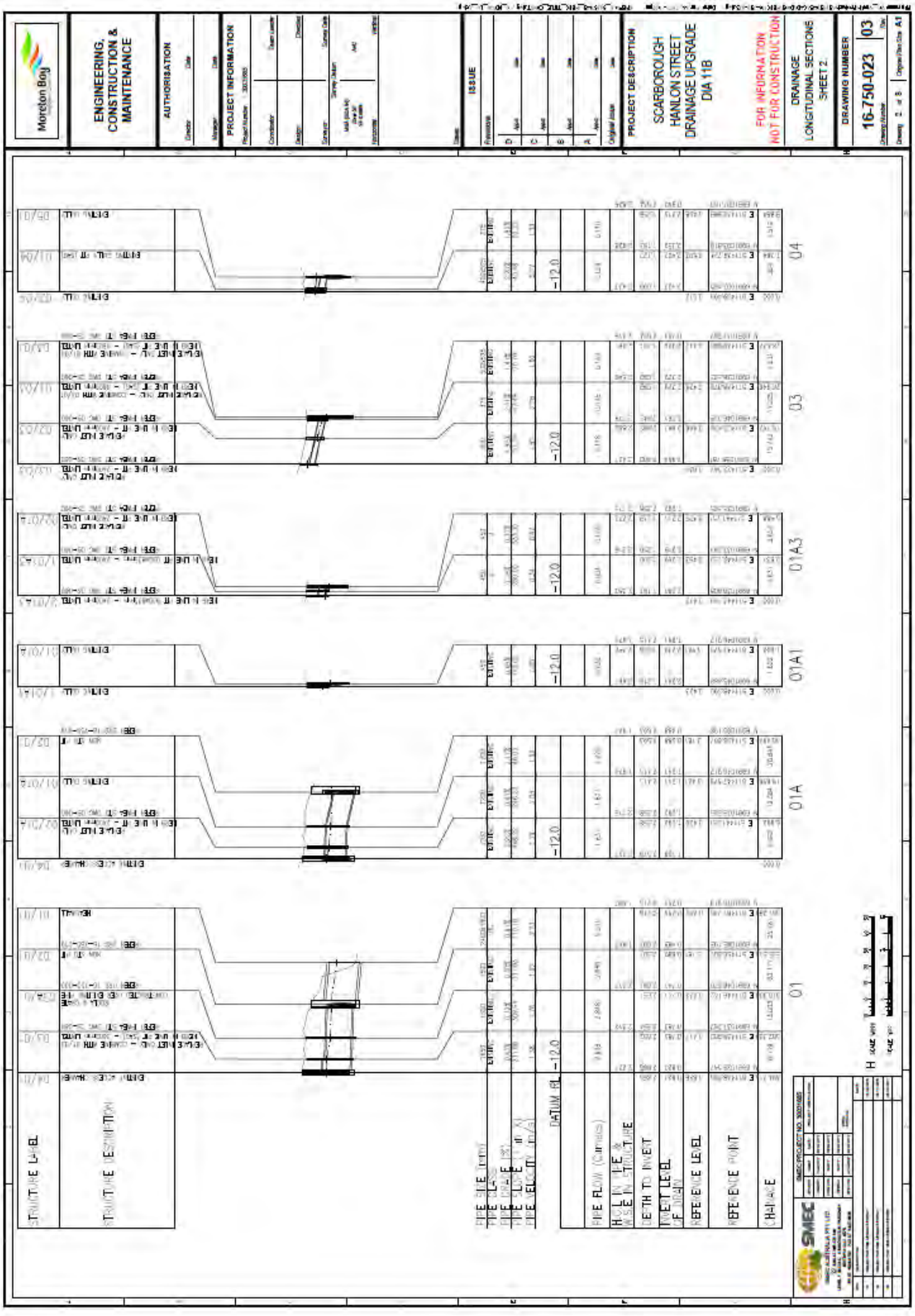
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SMEC
04
03
01A3
01A1
01A
01
-12.0
DATUM RL -12.0
STRUCTURE LABEL
STRUCTURE DESCRIPTION
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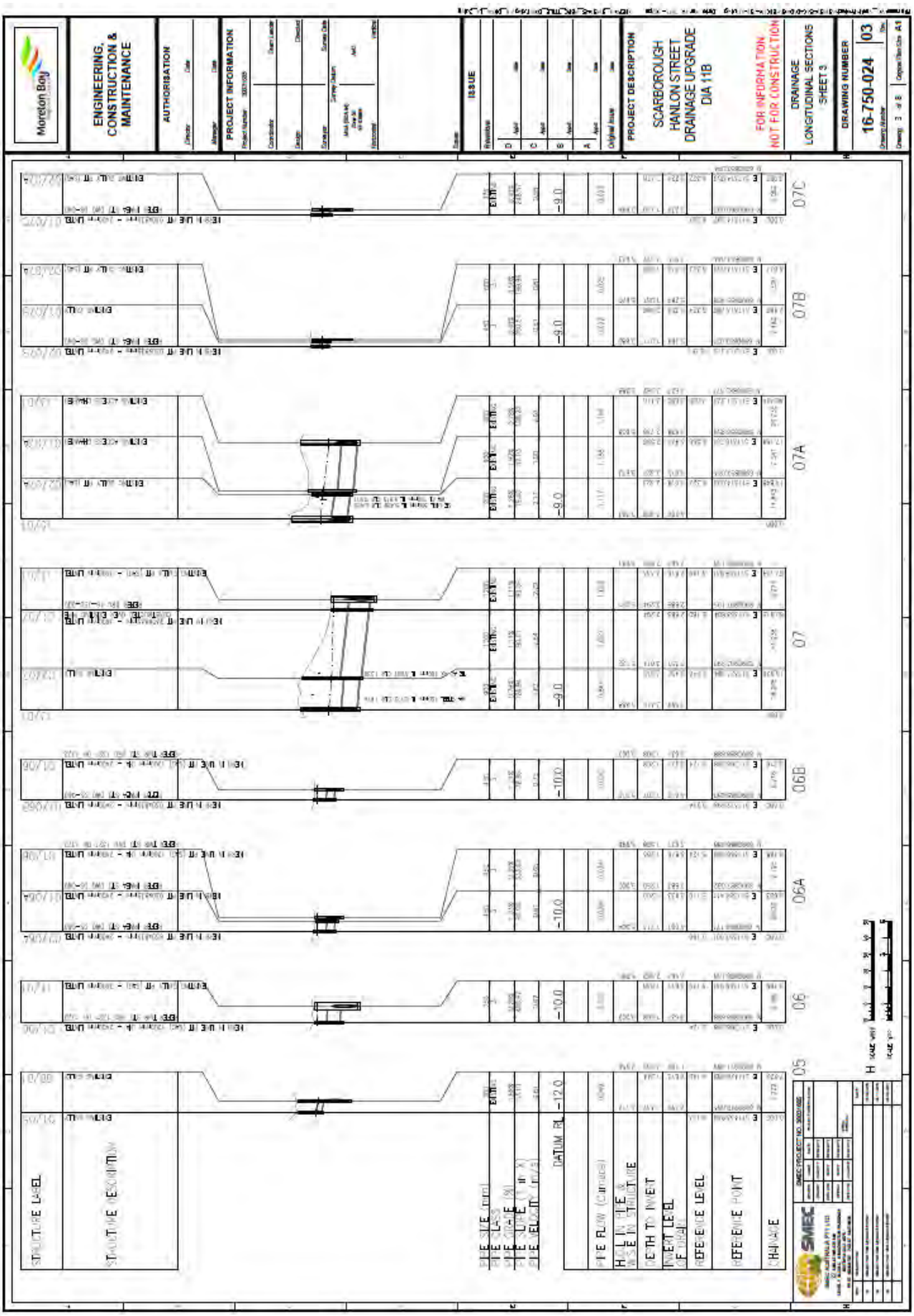
HOLE NO & ASSET STRUCTURE
DEPTH TO INVERT
INVERT LEVEL OF OUTLET
REFERENCE LEVEL
REFERENCE POINT
CHAINAGE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07C
07B
07A
07
06B
06A
06
05
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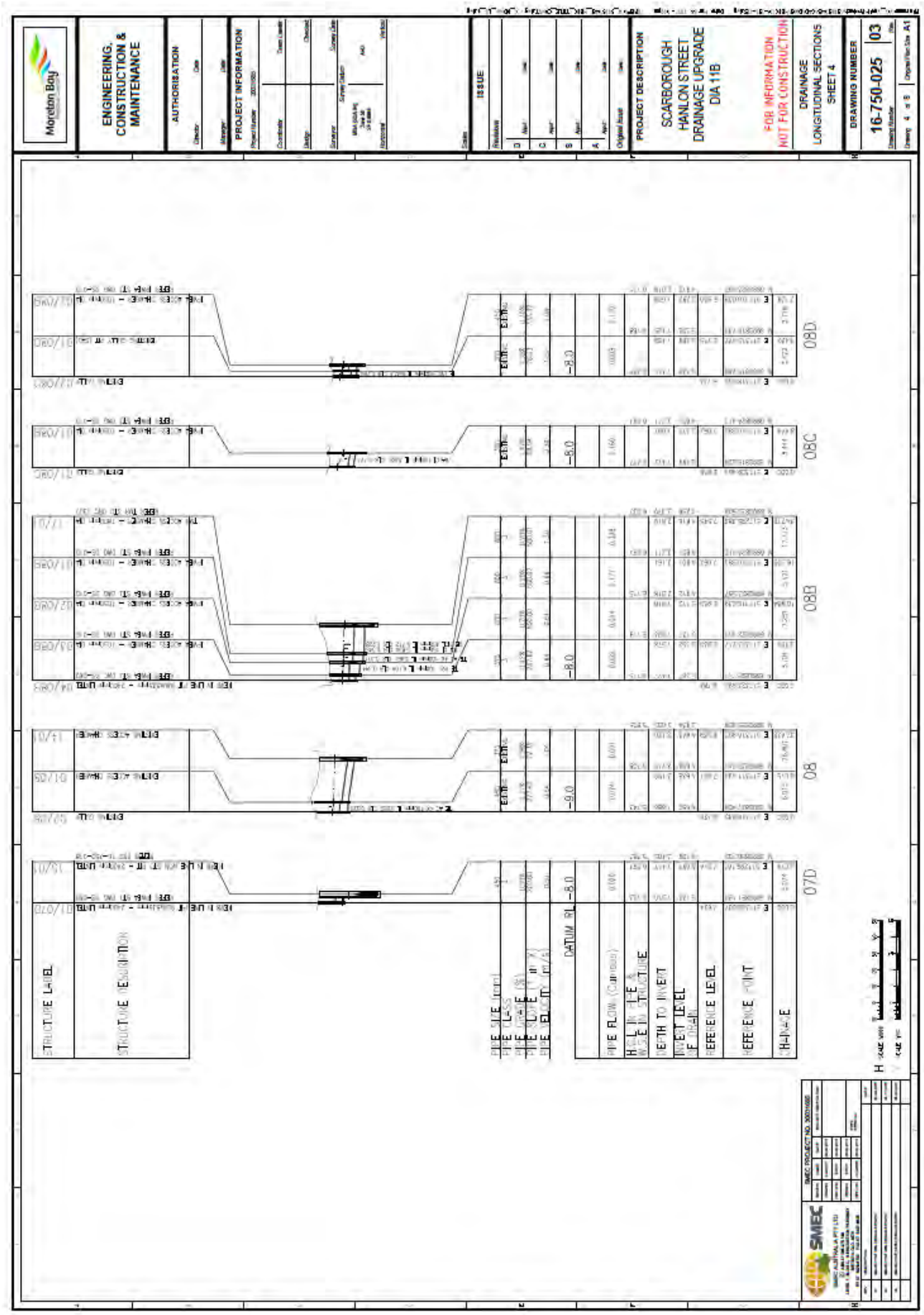
STRUCTURE EXISTING
PIPE FLOW (Current)
HOLE IN PIPE & INSIDE STRUCTURE
DEPTH TO INVERT
INVERT LEVEL OF PIPE
REFERENCE LEVEL
REFERENCE POINT
CHAINAGE
DATUM RL -12.0
SMEC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08D
08C
08B
08
07D
STRUCTURE LABEL
STRUCTURE DESIGNATION
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DEPTH TO INVERT
INVERT LEVEL
REFERENCE LEVEL
REFERENCE POINT
CHAINAGE
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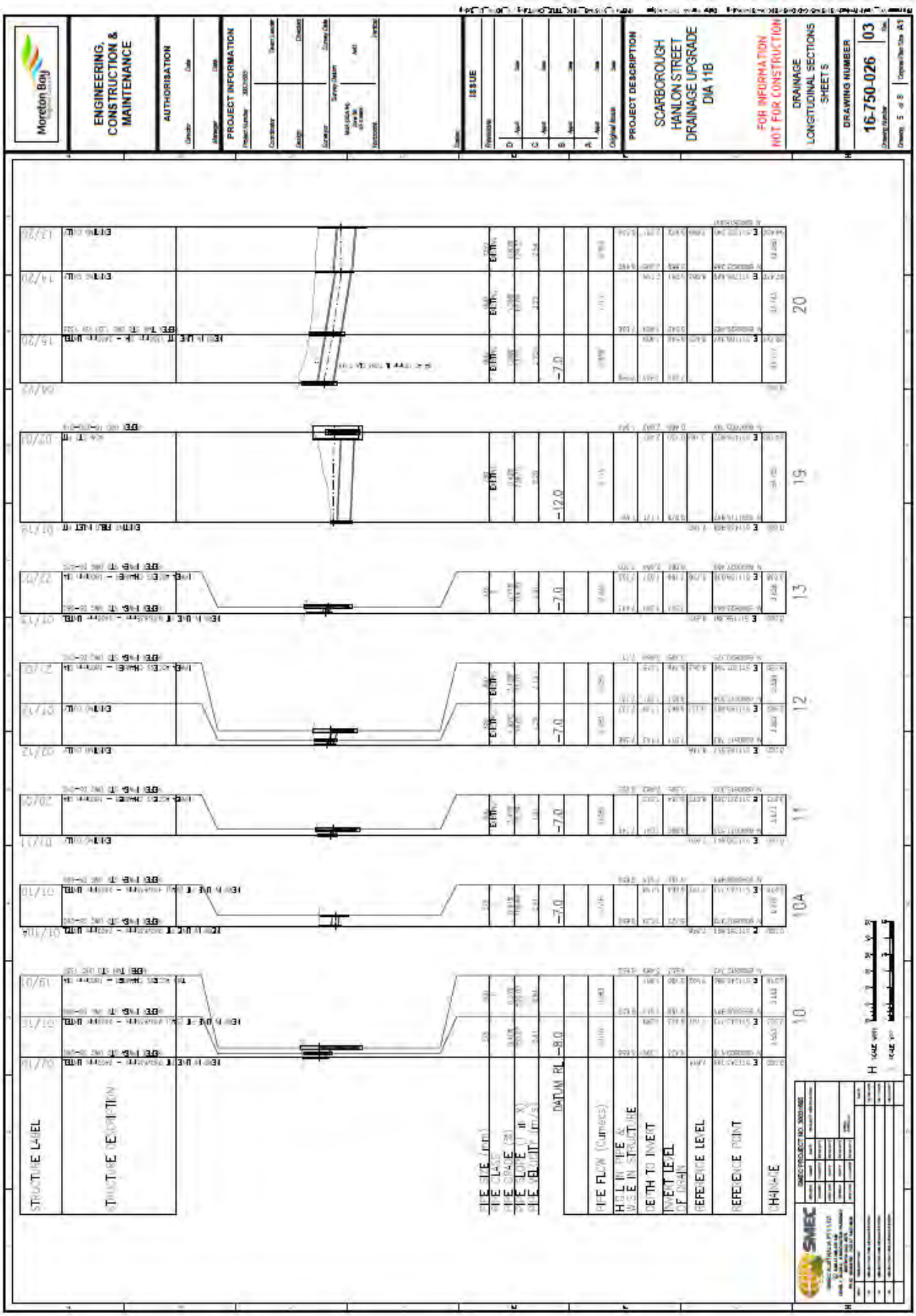
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FOR INFORMATION NOT FOR CONSTRUCTION
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STRUCTURE DESCRIPTION
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PIPE CLASS
PIPE GRADE (%)
PIPE VELOCITY (m/s)
DATUM RL -8.0
PIPE FLOW (Cumecs)
HGL IN PIPE & WATER IN STRUCTURE
DEPTH TO INVERT
INVERT LEVEL OF PIPE/S
REFERENCE LEVEL
REFERENCE POINT
CHAINAGE
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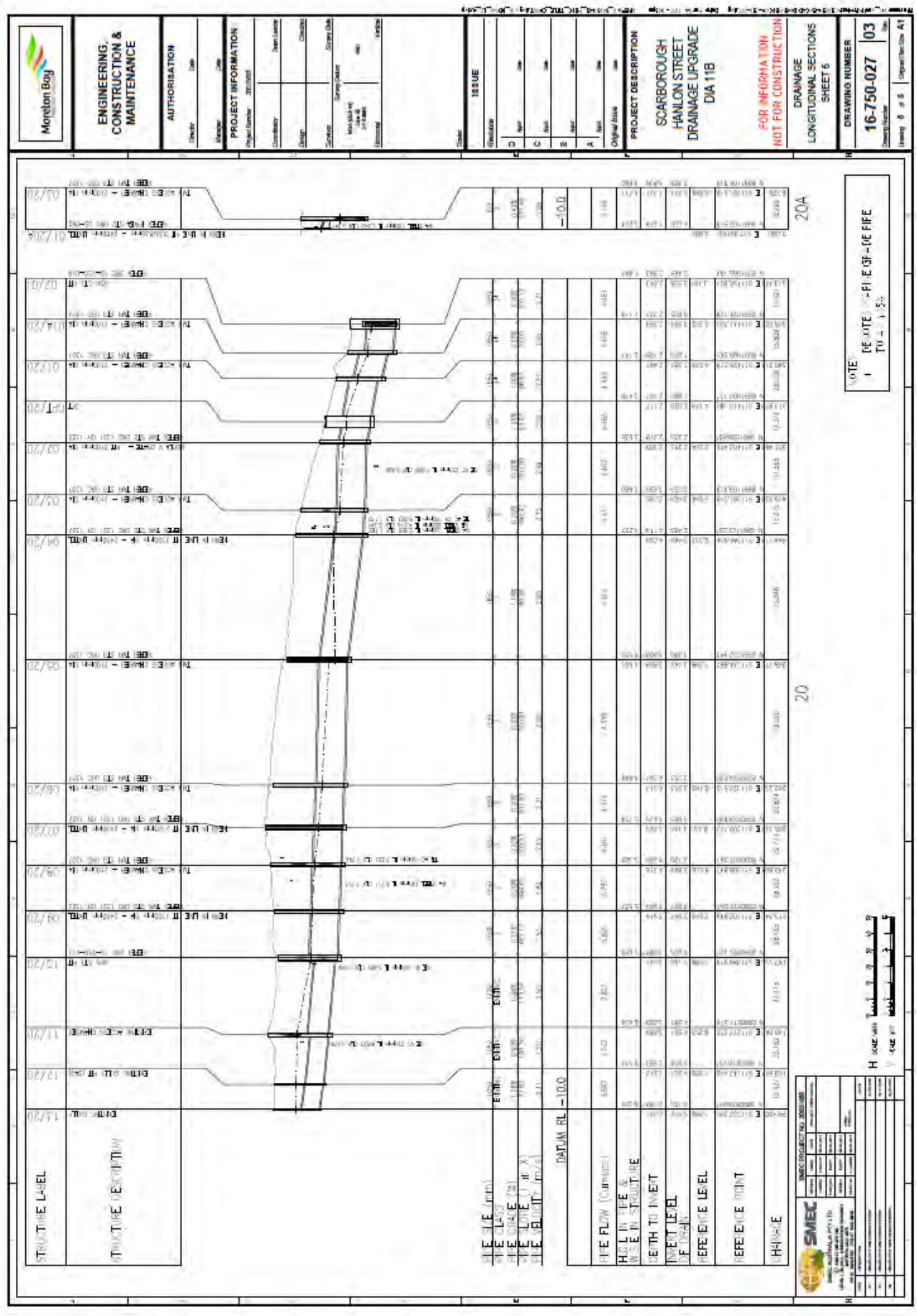
19
13
12
11
10A
10
-7.0
-12.0
-8.0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20A
20
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DEPTH TO INVERT
INVERT LEVEL OF DRAIN
REFERENCE LEVEL
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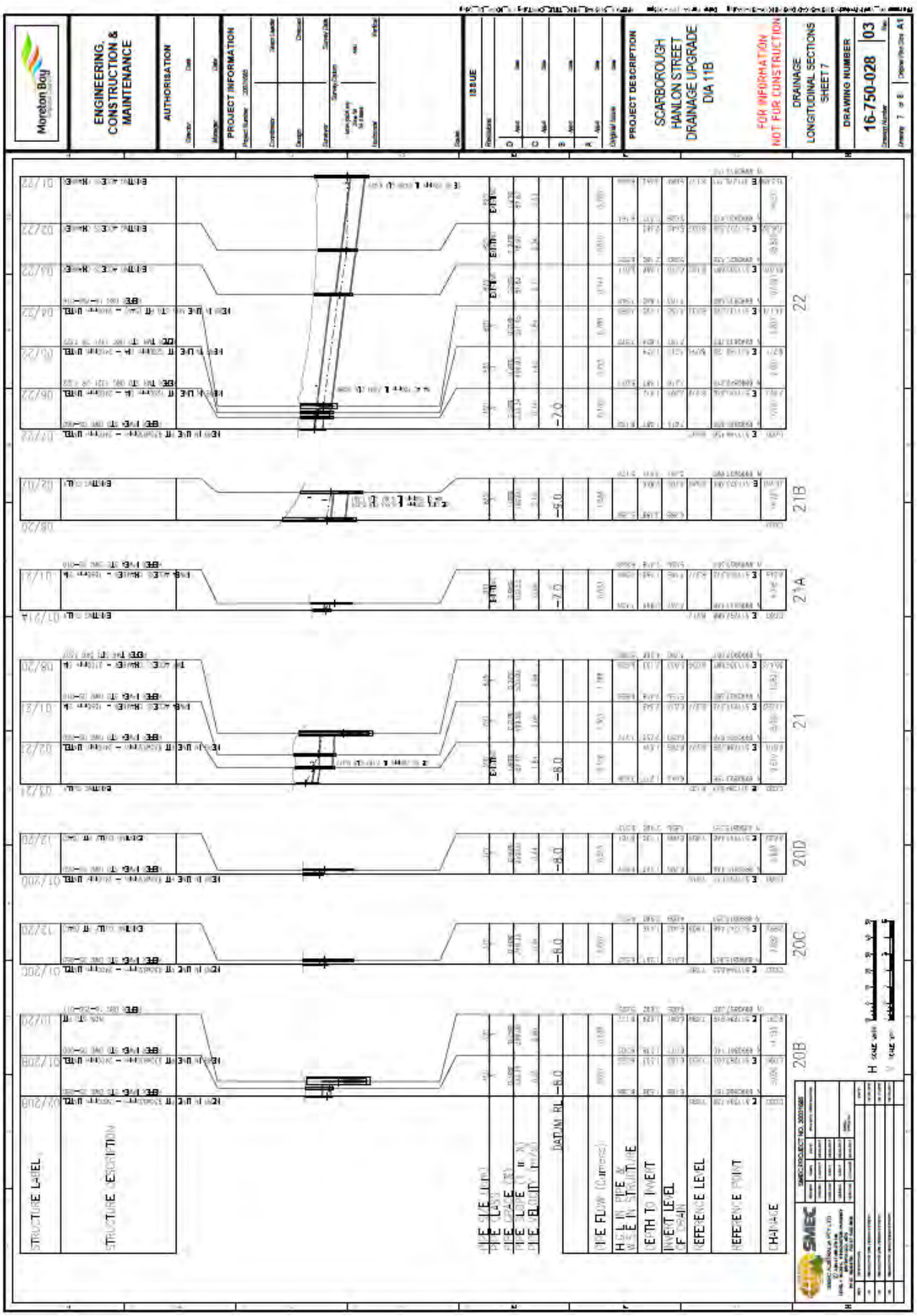
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21B
21A
21
20D
20C
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STRUCTURE DESCRIPTION
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HEIGHT IN STRUCTURE
DEPTH TO INVERT
INVERT LEVEL
REFERENCE LEVEL
REFERENCE POINT
CHAINAGE
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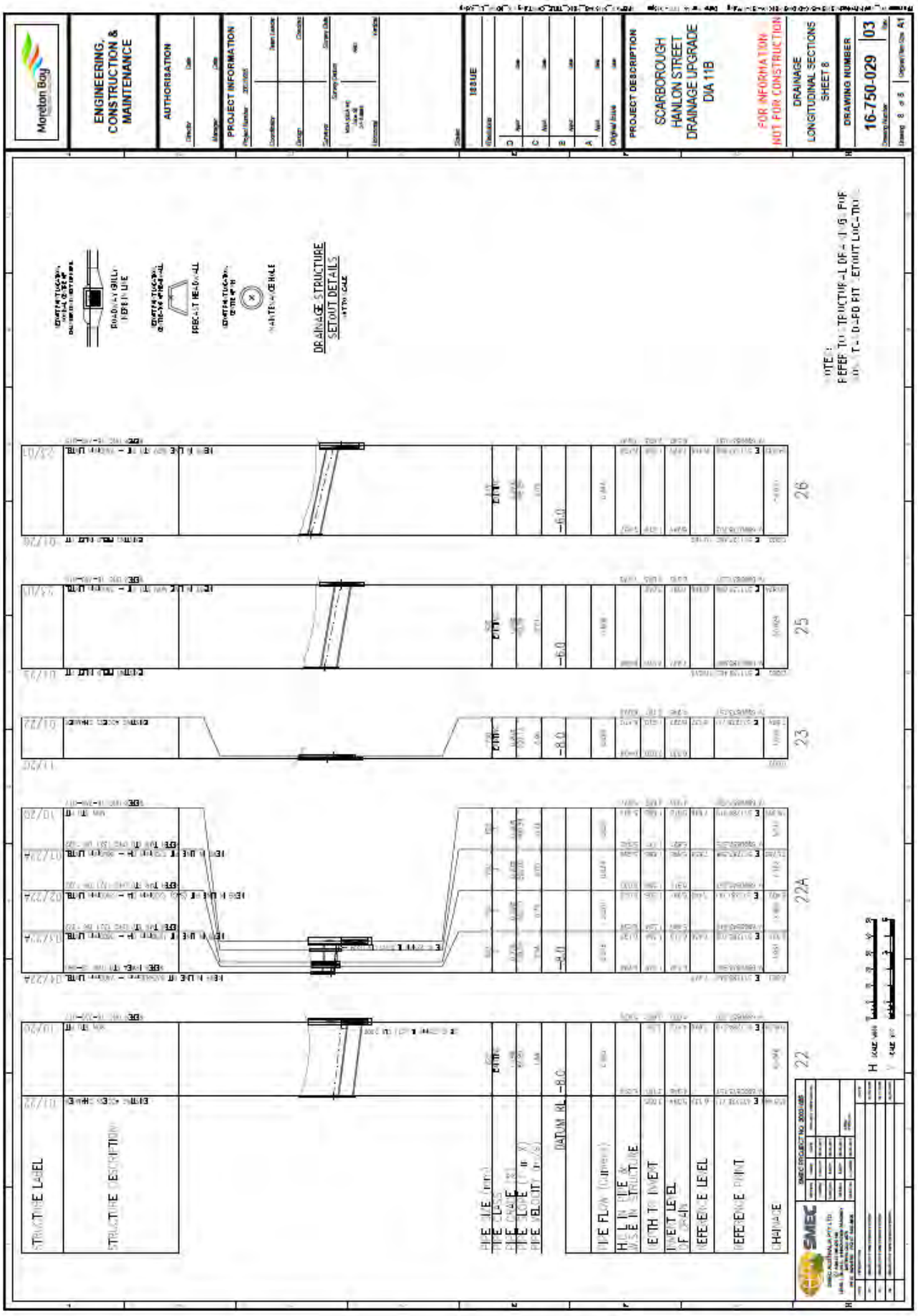
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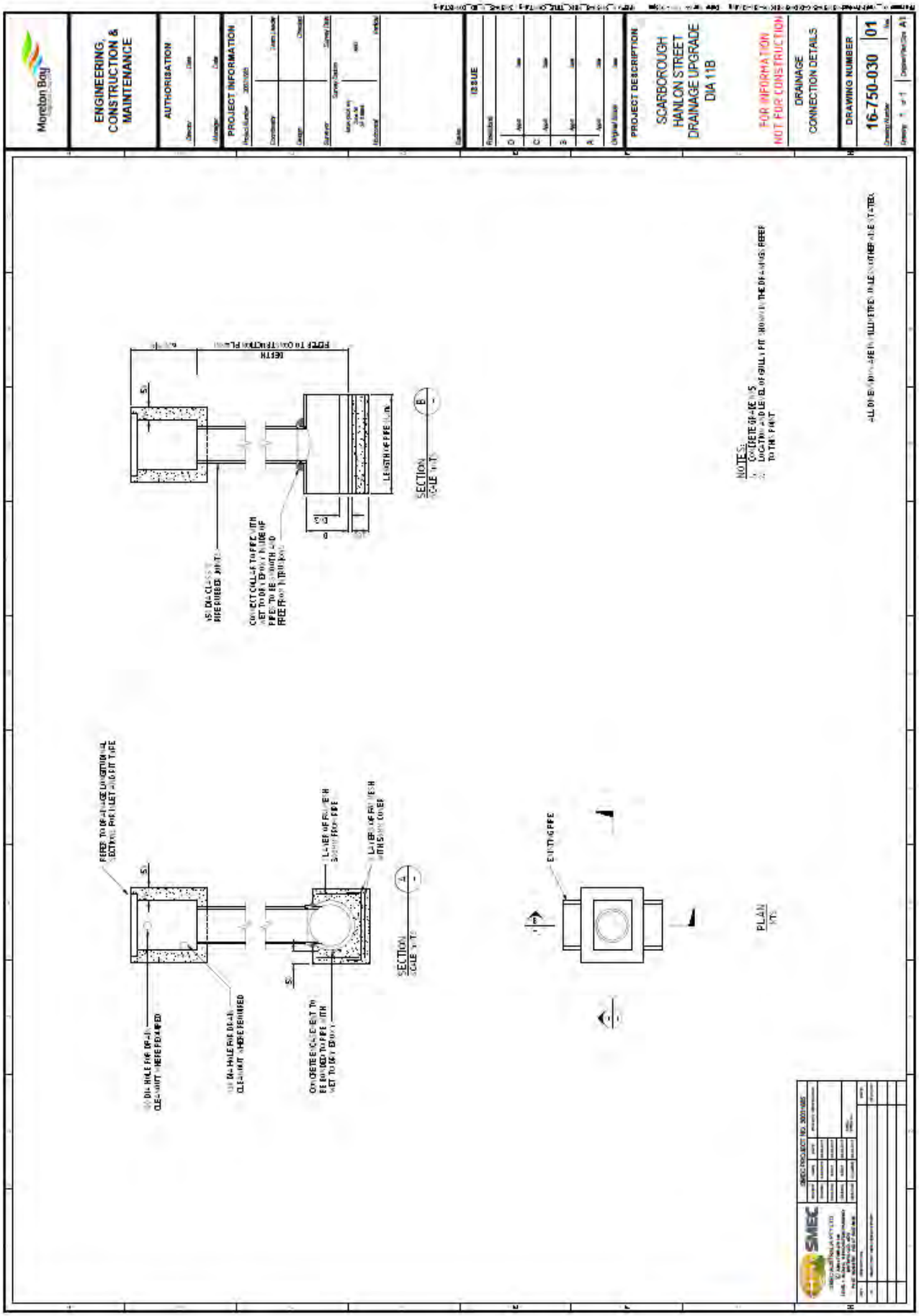
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PLAN
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DRAINAGE MASTER PLAN

DRAINAGE INVESTIGATION AREA 12, SCARBOROUGH

DRAINAGE MASTER PLAN FOR DRAINAGE INVESTIGATION AREA 12

1 INTRODUCTION

1.1 Introduction and Purpose of Drainage Master Plan

This Drainage Master Plan (DMP) applies to Drainage Investigation Area (DIA) 12 identified in Figure 8.2.2.6 of the Flood Hazard Overlay Code. This DMP has been prepared by the Moreton Bay Regional Council in accordance with section 3.6 of the Planning Scheme Policy – Flood Hazard, Coastal Hazard and Overland Flow.

The purpose of the DMP is to identify:

(a) the flood and drainage constraints affecting DIA 12;
(b) the flood mitigation strategy for DIA 12 that achieves overall outcome d. of the Flood Hazard Overlay Code in a way intended to facilitate development outcomes in the DIA consistent with the Next Generation Neighbourhood Precinct of the General Residential Zone;
(c) the particular components of the flood mitigation strategy that will be undertaken by the Council; and
(d) the particular components and applicable standards of the flood mitigation strategy that are required to be undertaken by applicants as part of carrying out assessable development.

The DMP contains the following sections:

- Section 1 (this section) – providing an introduction and confirming when the DMP applies to assessable development;
- Section 2 – Providing an overview and description of the DIA, a summary of the flood issues relevant to the DIA and summary of the planning context/intent;
- Section 3 – Providing a description of the flood risk mitigation strategy and the different components of the strategy;
- Section 4 – Identifying the preferred implementation and sequencing of the flood mitigation strategy; and
- Section 5 – The design standards and requirements for works for all aspects of development (i.e. material change of use, reconfiguring a lot, building work and operational work) in addition to the requirements otherwise required by the MBRC Planning Scheme.

1.2 Application of DMP

This DMP applies to development carried out in DIA 12 where required in accordance with the Flood Hazard Overlay Code.

This DMP identifies standards for carrying out development in addition to the applicable planning scheme codes.

This DMP does not apply to development identified as exempt in Part 5.10.2 Levels of Assessment for the Flood Hazard Overlay.

2 DIA DESCRIPTION

2.1 Overview/Description of DIA

DIA 12 is located in the suburb of Scarborough, located in the northern area of the Redcliffe Peninsula of the Moreton Bay Region. Refer to Figure 1 identifying the location of DIA 12 in Scarborough.

Figure 1: DIA Location Map

Source: MBRC Interactive Mapping, 2016

DIA 12 comprises an area of approximately 25,000m^2 and spans from Oyster Point Esplanade to the west to portions of land included along Jeays Street, North Quay and Thurecht Parade. Refer to Figure 2 for a map of the DIA 12.

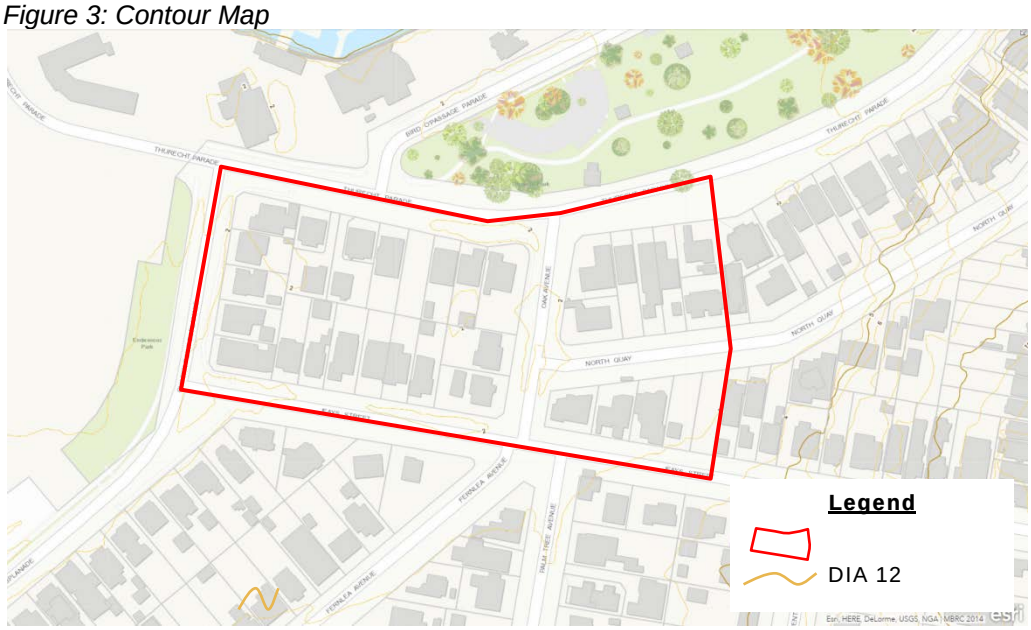
Figure 2: DIA 12

Source: MBRC Interactive Mapping, 2016.

DIA 12 predominately contains detached residential housing with some small-scale non-residential activities. DIA 12 is located in proximity to the Kippa-Ring local centre, Redcliffe seaside village, Rothwell specialised centre as well as the nearby larger centres located at Margate and North Lakes. The area is accessible to a number of open space areas, beaches and local parks, including Thurecht Park which is located opposite DIA 12.

The area including DIA 12 and surrounds is flat and low lying terrain. Refer to Figure 3 below for a contour map of the area.

Figure 3: Contour Map



Source: MBRC Aerial Photography (2015) and Contours (2016)

2.2 Summary of Flood Issues affecting the DIA

The flooding issues affecting DIA 12 are characterised by shallow surface flows through private property caused by:

- the very flat, low lying terrain;
- private properties that are very similar in elevation to the surrounding road network; and
- the limited capacity of the existing drainage system to cater for minor storm events.

In the 1% AEP flood event it is estimated the majority of properties within the DIA are inundated to some degree (i.e. prior to the implementation of the flood risk mitigation strategy contained in this DMP).

Refer to Figure 4 identifying the 1% AEP flood map for DIA 12.

Figure 4: 1% AEP Flood Map

Source: MBRC Flood Explorer, 2016

2.3 Planning Context and Intent

DIA 12 is entirely included in the Next Generation Neighbourhood Precinct of the General Residential Zone. Accordingly development outcomes expected by the DMP are those identified in the purpose and overall outcomes of the General Residential Zone Code. In summary this includes a diverse mix of dwellings types at a density moderately higher than traditional suburban areas.

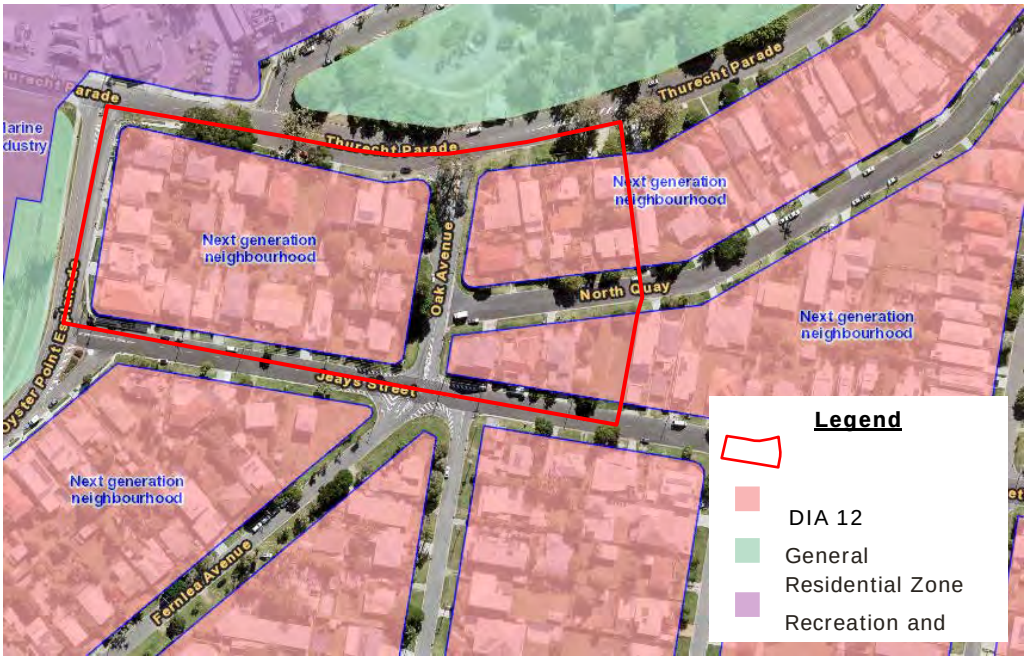
Outcomes for other aspects of development not addressed by the zone code (e.g. reconfiguring a lot, operational work etc) are expressed in the relevant planning scheme codes and continue to apply to development in the DIA.

Development outcomes in DIA 12 prior to the implementation of the flood risk mitigation strategy in this DMP are constrained due to the flood impacts affecting the area. The implementation of the DMP

and development standards supports the intended uplift in dwelling density (consistent with the zone outcomes) in conjunction with the implementation of the DMP.

Refer to Figure 5 identifying the planning scheme zone applying to DIA 12.

Figure 5: Planning Scheme Zone



Source: MBRC Interactive Mapping, 2016

3 FLOOD RISK MITIGATION STRATEGY

3.1 Overview/Summary

The general approach to the flood risk mitigation strategy in DIA 12 is to increase the capacity of the drainage system to allow for filling of allotments to achieve appropriate flood immunity levels. Increasing the drainage capacity has the effect of reducing the known flood risk determined at the date of adoption of the planning scheme. In turn this allows the filling of all allotments in the DIA to flood immunity levels over time without exacerbating flood risks (as determined at the date of adoption of the planning scheme).

The flood risk mitigation strategy for DIA 12 therefore comprises:

(a) The flood risk mitigation to be undertaken by Council - Drainage upgrade works in Thurecht Parade and Thurecht Park; and
(b) The flood risk mitigation to be undertaken by applicants - Filling of all allotments within the DIA to the required flood immunity level.

Each of these components of the flood risk mitigation strategy are described in sections 3.2 and 3.3.

The flood risk mitigation strategy will reduce flood inundation across private properties within the DIA thereby substantially improving the development potential of the area. The implementation of the

flood risk mitigation strategy will ensure that in the post-mitigation case for the 1% AEP flood event no properties are inundated.

3.2 Flood Risk Mitigation to be undertaken by Council

The drainage upgrade works to be undertaken by the Moreton Bay Regional Council involve upgrading the capacity of part of the existing drainage network in Thurecht Parade and Thurecht Park. Details of the proposed work are included in *Appendix A - Flood Risk Mitigation to be undertaken by Council - Detailed Design DIA 12*.

The Council can be contacted to confirm the expected timing for commencement/completion of the drainage works to be undertaken by Council.

3.3 Flood Risk Mitigation to be undertaken by Applicants

The flood risk mitigation to be undertaken by applicants is to fill all allotments in the DIA to the Flood Planning Level (Defined Flood Event + required freeboard for the Flood Planning Area). The Defined Flood Event at this location is dictated by coastal hazard flooding due to the low lying nature of the land.

Filling required in accordance with the standards identified in section 5 is required not only to achieve flood immunity for individual properties but to specifically direct flood waters to the street and drainage network away from surrounding properties. Filling is a fundamental part of the flood mitigation strategy for the DIA as a whole and accordingly will be a mandatory condition of development.

The general approach to allotment filling is to provide a uniform grade with a minimum 1:100 crossfall to the street for the whole allotment/development site. Section 5 and Table 1 of the DMP identifies the detailed standards and circumstances where filling is required for all aspects of development (i.e. material change of use, reconfiguring a lot, building work and operational work). Filling is required where carrying out a material change of use and/or reconfiguring a lot (other than a boundary realignment). Filling is permitted but not mandatory in other circumstances.

4 FLOOD RISK MITIGATION IMPLEMENTATION AND SEQUENCING

The drainage upgrade works to be carried out by Council as detailed in Section 3.2 must be completed before filling of allotments in accordance with the standards in Section 5 is permitted.

Filling proposed prior to the implementation of the drainage works to be carried out by Council is not in accordance with this DMP and subject to the respective performance outcomes of the Flood hazard overlay code.

5 REQUIREMENTS FOR WORKS AND DESIGN STANDARDS

The flood risk mitigation to be undertaken by applicants includes filling where required in accordance with Table 1.

Alternative approaches to the standards in this section are subject to assessment against the applicable performance outcomes of the Flood hazard overlay code.

Table 1 - Fill Requirements

Note: The drainage upgrade works to be carried out by Council as detailed in Section 3.2 must be completed before filling of allotments in accordance with the standards in Section 5 is permitted. Filling proposed prior to the implementation of the drainage works to be carried out by Council is not in accordance with this DMP and subject to the respective performance outcomes of the Flood hazard overlay code.

Aspect of Development	Filling Requirements	Minimum Fill Level	Minimum Extent of Filling	Notes
Material change of use and/or Reconfiguring a lot (other than a boundary realignment)	Filling is mandatory	Flood Planning Level	The entire allotment/development site area and meeting the following: (a) provide a minimum 1:100 uniform cross fall shaped to contains flood waters to the street and drainage network with the exception of meeting (b) and (c); (b) provide an accessible grade for vehicle access by the applicable design vehicle for the development from the street to the minimum fill level; and (c) ensure no worsening of flood impacts to other properties beyond known flood impacts at the date of adoption of the planning scheme.	The filling requirements outlined in this DMP must be considered in conjunction with the other applicable code requirements identified in the MBRC Planning Scheme. This may include consideration of, but not limited to: ▪ earthworks, drainage, filling and associated retaining walls to avoid adverse impacts on adjacent properties; and ▪ flood immunity requirements for building work and other components of development where not achieved by filling alone.

Aspect of Development	Filling Requirements	Minimum Fill Level	Minimum Extent of Filling	Notes
Reconfiguring a Lot where for a boundary realignment	Filling is permitted but not mandatory	N/A	N/A	Filling is permitted and minimum fill levels are not regulated by the DMP for this aspect of development. Note: Maximum fill to DMP levels is encouraged. Where filling occurs, other applicable code requirements apply in the MBRC Planning Scheme. This may include consideration of, but not limited to: ▪ earthworks, drainage, filling and associated retaining walls to avoid adverse impacts on adjacent properties; and ▪ flood immunity requirements for building work and other components of development where not achieved by filling alone.

Aspect of Development	Filling Requirements	Minimum Fill Level	Minimum Extent of Filling	Notes
Operational work (filling or excavation only)	Filling is mandatory	Flood Planning Level	The entire allotment/development site area and meeting the following: (a) provide a minimum 1:100 uniform cross fall shaped to contains flood waters to the street and drainage network with the exception of meeting (b) and (c); (b) provide an accessible grade for vehicle access by the applicable design vehicle for the development from the street to the minimum fill level; and (c) ensure no worsening of flood impacts to other properties beyond known flood impacts at the date of adoption of the planning scheme.	The filling requirements outlined in this DMP must be considered in conjunction with the other applicable code requirements identified in the MBRC Planning Scheme. This may include consideration of, but not limited to: ▪ earthworks, drainage, filling and associated retaining walls to avoid adverse impacts on adjacent properties; and ▪ flood immunity requirements for building work and other components of development where not achieved by filling alone.

Aspect of Development	Filling Requirements	Minimum Fill Level	Minimum Extent of Filling	Notes
All other operational work where not associated with a material change of use or reconfiguring a lot	Filling is permitted but not mandatory	N/A	N/A	Filling is permitted and minimum fill levels are not regulated by the DMP for this aspect of development. The filling requirements outlined in this DMP must be considered in conjunction with the other applicable code requirements identified in the MBRC Planning Scheme. This may include consideration of, but not limited to: ▪ earthworks, drainage filling and associated retaining walls to avoid adverse impacts on adjacent properties; and ▪ flood immunity requirements for building work and other components of development where not achieved by filling alone.
Building work where not associated with a material change of use	Filling is permitted but not mandatory	N/A	N/A	Filling is permitted and minimum fill levels are not regulated by the DMP for this aspect of development. The filling requirements outlined in this DMP must be considered in conjunction with the other applicable code requirements identified in the MBRC Planning Scheme. This may include consideration of, but not limited to: ▪ earthworks, filling and associated retaining walls to avoid adverse impacts on adjacent properties; and ▪ flood immunity requirements for building work and other components of development where not achieved by filling alone.

Appendix A - Flood Risk Mitigation to be undertaken by Council

Detailed Design DIA 12

THURECHT PARK, SCARBOROUGH

DRAINAGE NETWORK UPGRADE

LOCALITY PLAN
NTS

DETAIL PLAN
SCALE AS SHOWN

GENERAL NOTES

1. THESE DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL OTHER PROJECT DRAWINGS, SCHEDULE OF QUANTITIES, JOB SPECIFICATIONS AND ANY OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE WORK. ALL DISCREPANCIES SHALL BE REFERRED TO THE SUPERINTENDENT FOR DECISION BEFORE PROCEEDING WITH THE WORK.
2. SURROUNDING PROPERTY, ROAD AND ROADWAYS ARE TO BE PROTECTED FROM NUISANCE, STORMWATER AND PONDING. ANY DAMAGE INCURRED FROM THIS DURING CONSTRUCTION SHALL BE RECTIFIED BY THE CONTRACTOR AT NO COST TO THE PRINCIPAL.
3. THE CONTRACTOR SHALL NOT ENTER NEIGHBOURING PROPERTIES WITHOUT PRIOR APPROVAL, IN WRITING, FROM THE RELEVANT PROPERTY OWNER.
4. CONSTRUCTION WARNING LIGHTS & SIGNS SHALL BE MAINTAINED AT ALL TIMES.
5. THE CONTRACTOR IS TO PROVIDE SAFE PASSAGE OF TRAFFIC AND PEDESTRIANS IN ACCORDANCE WITH THE REQUIREMENTS OF THE LOCAL AUTHORITY.
6. IN ALL CASES HARD COPY DRAWINGS ARE TO TAKE PRECEDENCE OVER ELECTRONIC CAD DRAWINGS. THE SURVEYOR AND CONTRACTOR IS TO VERIFY TO DIMENSION AND DETAILS SHOWN ON HARDCOPY WHERE VARIATIONS OCCUR.
7. DURING CONSTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING EXCAVATIONS IN A STABLE CONDITION.
8. ALL CONSTRUCTION UNDERTAKEN BY THE CONTRACTOR IS TO COMPLY WITH THE REQUIREMENTS OF THE QUEENSLAND WORKPLACE HEALTH AND SAFETY ACT.
9. ALL STANDARDS (LOCAL AUTHORITY STANDARDS, AUSTRALIAN STANDARDS (TYP.)) REFERRED TO IN THESE PLANS SHALL BE THE LATEST VERSION AT THE TIME OF TENDERING.
10. THE CONTRACTOR SHALL BE REQUIRED, AT ALL TIMES, DURING THE PERIOD OF CONSTRUCTION, TO CLEAN THOSE PARTS OF THE ACCESS PORTS TO THE SITE THAT MAY BE AFFECTED BY ANY MATERIAL DROPPED, DEPOSITED OR SPILLED ON THE ROADS AS A RESULT OF THE CONSTRUCTION PROCESSES ASSOCIATED WITH THE SITE.
11. THE CONTRACTOR SHALL AMELIORATE CONSTRUCTION NOISE IN ACCORDANCE WITH THE LOCAL AUTHORITIES REQUIREMENTS.
12. THE APPROVAL FOR THE USE OF ANY ALTERNATIVES SHALL BE SOUGHT FROM THE SUPERINTENDENT BEFORE THE WORK COMMENCES.
13. LEVELS SHOWN ARE TO BE CONFIRMED ON SITE PRIOR TO COMMENCING WORK AND CONFLICTS OR DISCREPANCIES SHALL BE ADVISED TO THE SUPERINTENDENT IN WRITING IMMEDIATELY.
14. ALL REDUCE LEVELS TO BE LEVEL CHECKED BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF CONSTRUCTION.
15. NATURAL SURFACE LEVELS ARE FROM THE DIGITAL TERRAIN MODEL SUPPLIED BY PROJECT SURVEYOR. LEVELS TO A.H.D.
16. SURVEY SETOUT INFORMATION IS TO BE ESTABLISHED OR SET BY THE PRINCIPAL'S SURVEYOR TO ENABLE THE CONTRACTOR TO ACCURATELY SETOUT THE WORKS TO THE CO-ORDINATES SHOWN. SETOUT INFORMATION SHALL NOT BE OBTAINED BY SCALING FROM THESE DRAWINGS.
17. WITH RESPECT OF PROFILES SHOWN ON THESE PLANS DEPART FROM PROPERTY BOUNDARIES ARE TO TAKE PRECEDENCE OVER MATHEMATICAL NORTHINGS AND BEARINGS & DISTANCES SHOWN ON THE DRAWINGS. OFFSETS SHALL BE CHECKED PRIOR TO AND ON COMPLETION OF ALL INSTALLATIONS.
18. IT IS THE CONTRACTORS RESPONSIBILITY TO CONTACT THE RELEVANT AUTHORITIES TO ARRANGE AND CO-ORDINATE FOR ANY ADDITIONAL SERVICE RELOCATIONS OR ADJUSTMENTS NOT SHOWN ON THE DRAWINGS. THE AUTHORITY CHARGES RELATING TO THESE SHALL BE AT THE EXPENSE OF THE PRINCIPAL.
19. THE CONTRACTOR SHALL ADHERE TO LOCAL AUTHORITY AND AUSTRALIAN STANDARDS.

THE CONTRACTOR SHALL CONTACT THE RELEVANT AUTHORITIES AND ARRANGE FOR RELOCATION AND FOR PROTECTION OF EXISTING SERVICES AS REQUIRED TO ASSIT SURVEYORS WITH WORK. CONSTRUCTION LEARNING AND TO SUIT FINAL PAVEMENT SURFACE LEVELS AND GRADES.

PRIOR TO COMMENCEMENT OF ANY WORK THE CONTRACTOR SHALL CONFIRM LOCATIONS, LEVELS AND DETAILS OF EXISTING CONNECTION POINTS AND SERVICES CROSSINGS BY POT HOLING, IF A MISMATCH OCCURS CONTACT THE ENGINEER PRIOR TO CONSTRUCTION.

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DRAWING INDEX

DWG No.	REV	DESCRIPTION
001	0	COVER SHEET
002	0	SURVEY CONTROL PLAN
003	0	OVERALL DRAINAGE LAYOUT PLAN
004	0	DRAINAGE LAYOUT PLAN
005	0	DRAINAGE LONGITUDINAL SECTION - 1 OF 3
006	0	DRAINAGE LONGITUDINAL SECTION - 2 OF 3
007	0	DRAINAGE LONGITUDINAL SECTION - 3 OF 3
008	0	DRAINAGE CALCULATION TABLE - 1 OF II
009	0	DRAINAGE CALCULATION TABLE - 2 OF II
010	0	DRAINAGE CALCULATION TABLE - 3 OF II
011	0	DRAINAGE CALCULATION TABLE - II OF II
012	0	EROSION AND SEDIMENT CONTROL PLAN
013	0	EROSION AND SEDIMENT CONTROL DETAILS
014	0	REGIONAL STORMWATER CATCHMENT PLAN

MORETON BAY REGIONAL COUNCIL

Moreton Bay

ENGINEERING, CONSTRUCTION & MAINTENANCE

AUTHORISATION

Manager Date

PROJECT INFORMATION

Budget Number -

Coordinator - Team Leader -

Design - Checked -

Surveyor - Survey Date -

Survey Datum

MGA (GDA94) Zone 56 CF 0.9996 | AHD

Horizontal | Vertical

Scale

ISSUE

Revisions

	Approved	Date
D		
C		
B		
A		

Original Issue Date

PROJECT DESCRIPTION

THURECHT PARK SCARBOROUGH

DRAINAGE NETWORK UPGRADE 100% DESIGN

COVER SHEET

DRAWING NUMBER

16-751-001 | Rev

Drawing 001 of 014 | Original Plan Size A1

0	CONSTRUCTION ISSUE	JLL	17.11.17
REV	DESCRIPTION	DES	DATE

AUTHORISED:

Wood & Grieve Engineers

FOR CONSTRUCTION

MBC PROJECT No.	WGE PROJECT No.	REVISION No.
16-751	30040-BRI-C	0

Moreton Bay
ENGINEERING, CONSTRUCTION & MAINTENANCE
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FOR CONSTRUCTION
16-751
30040-BRI-C
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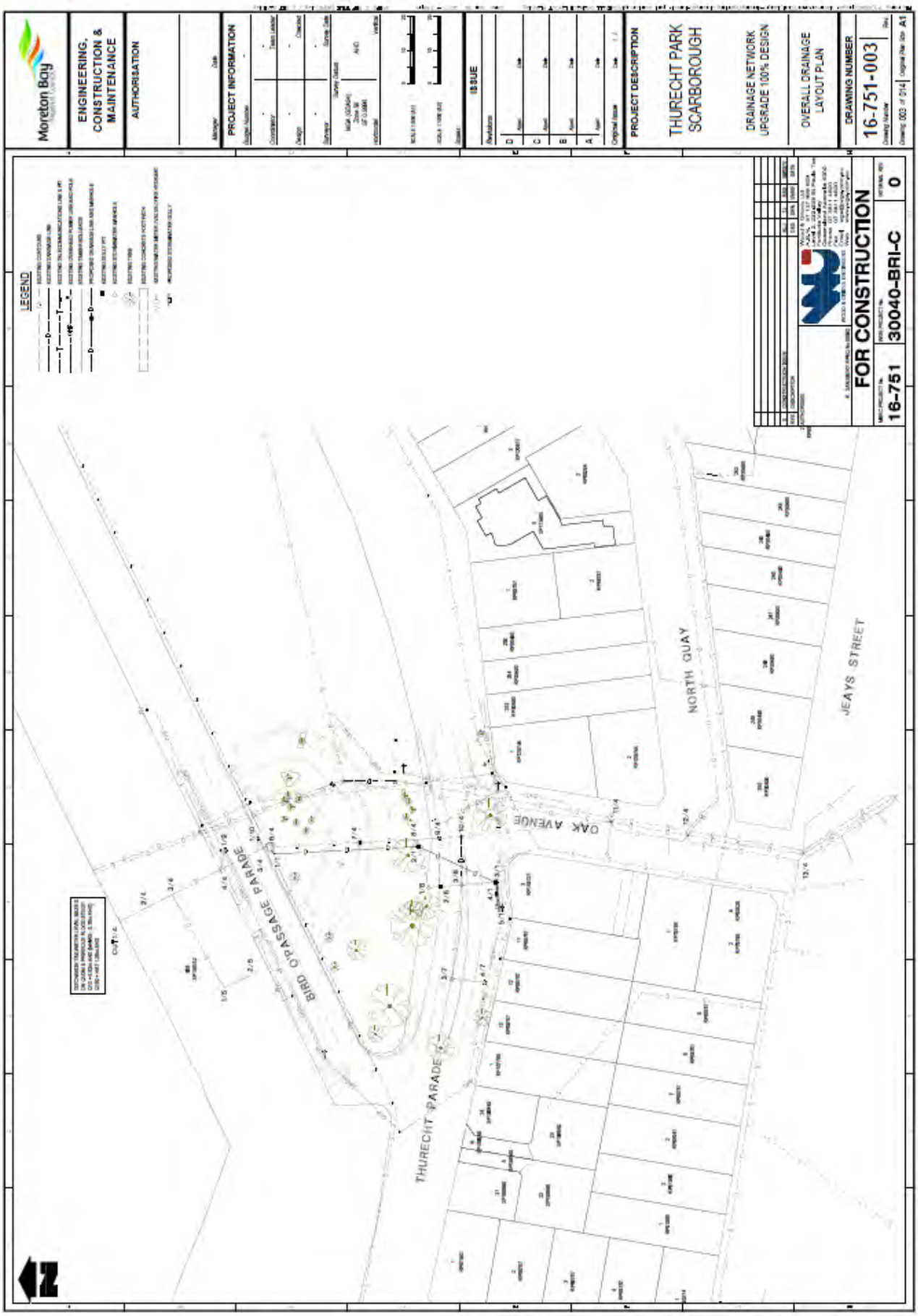
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FOR CONSTRUCTION
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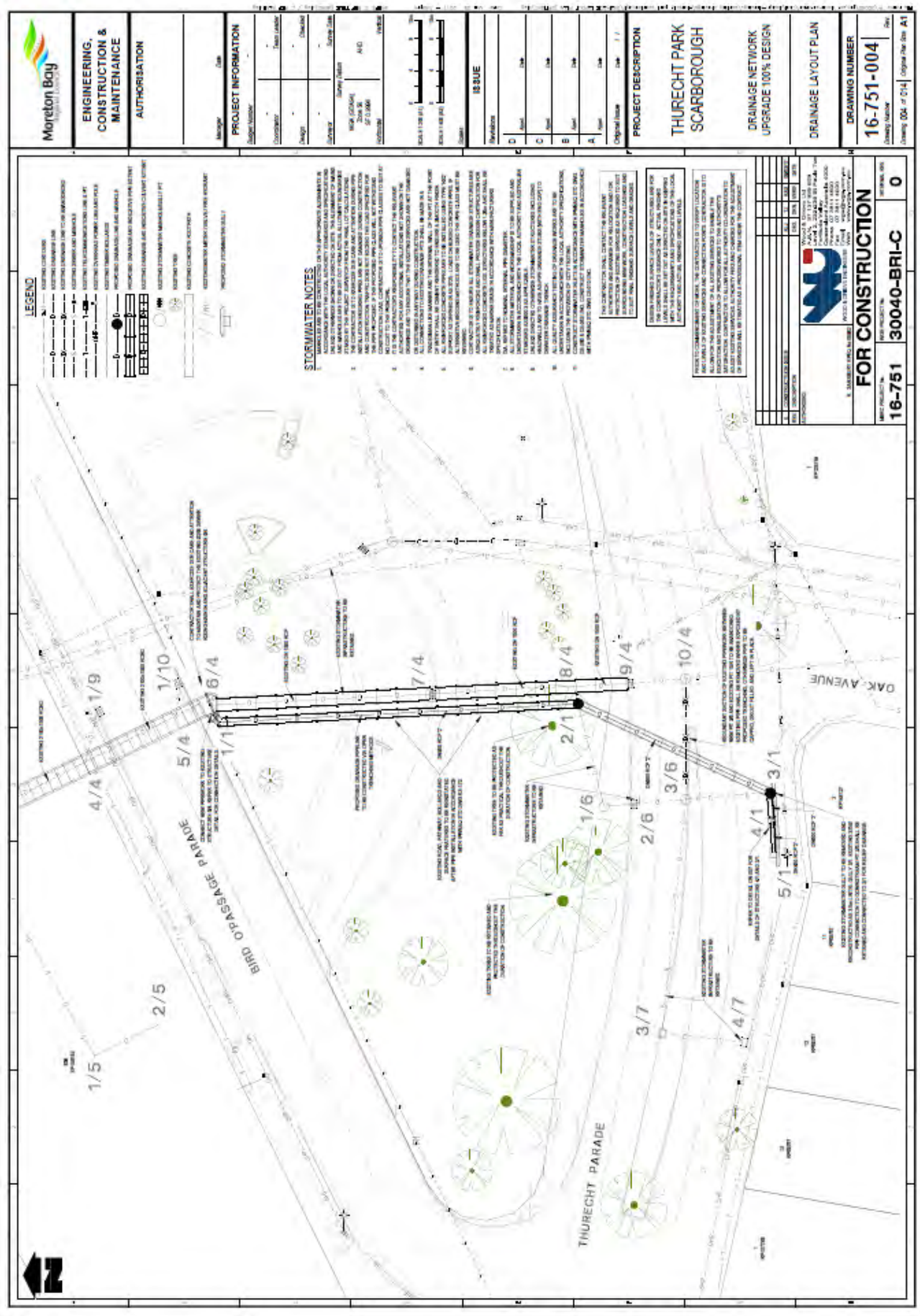
THURECHT PARADE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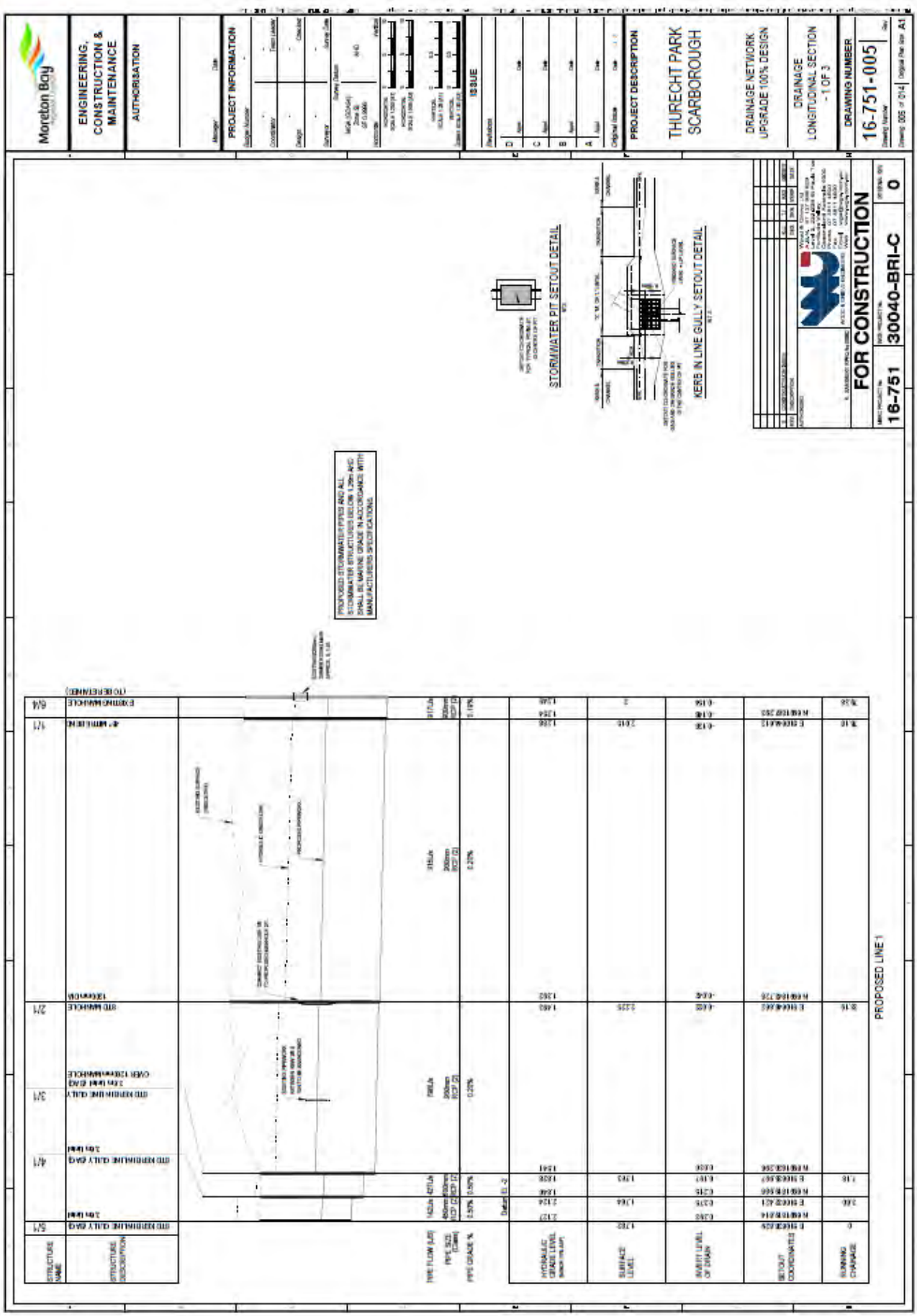
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DRAWING NUMBER
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FOR CONSTRUCTION
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30040-BRI-C
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KERB IN LINE GULLY SETOUT DETAIL
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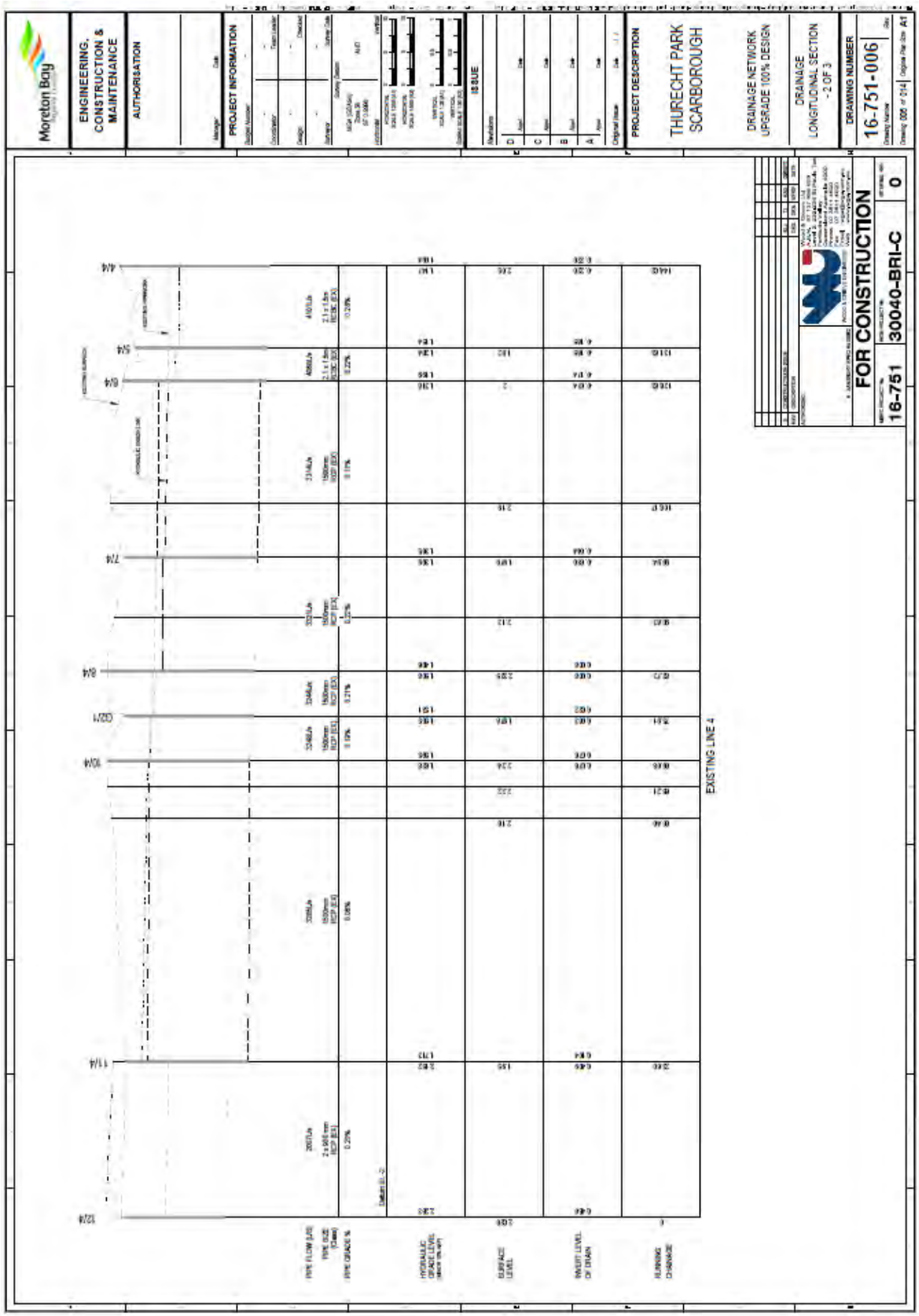
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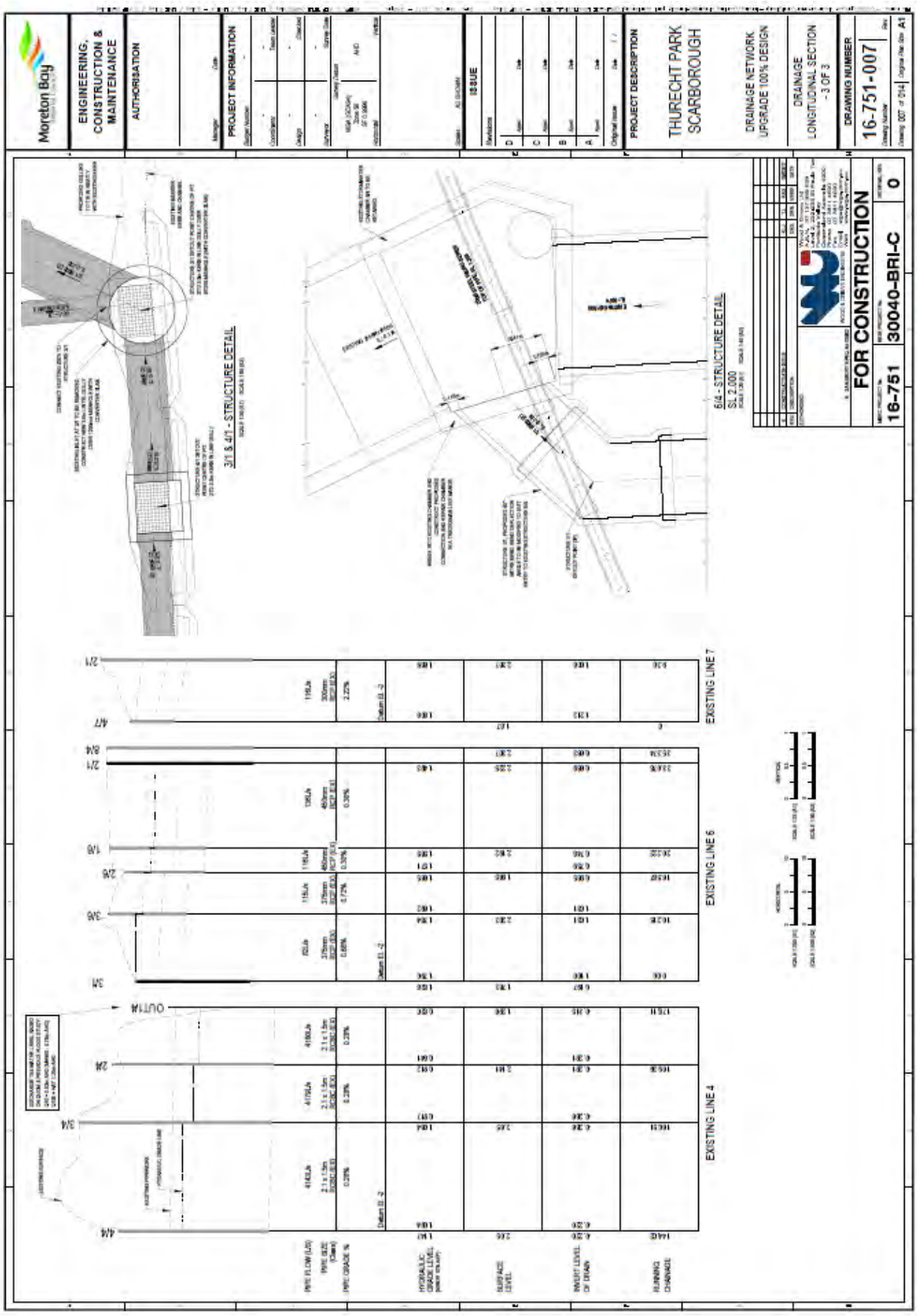
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3/1 & 4/1 - STRUCTURE DETAIL
6/4 - STRUCTURE DETAIL
SL 2.000
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EXISTING LINE 6
EXISTING LINE 4
OUT1/4
PIPE FLOW (L/s)
PIPE SIZE (mm)
PIPE GRADE %
HYDRAULIC GRADE LEVEL
SURFACE LEVEL
INVERT LEVEL OF DRAIN
RUNNING CHAINAGE

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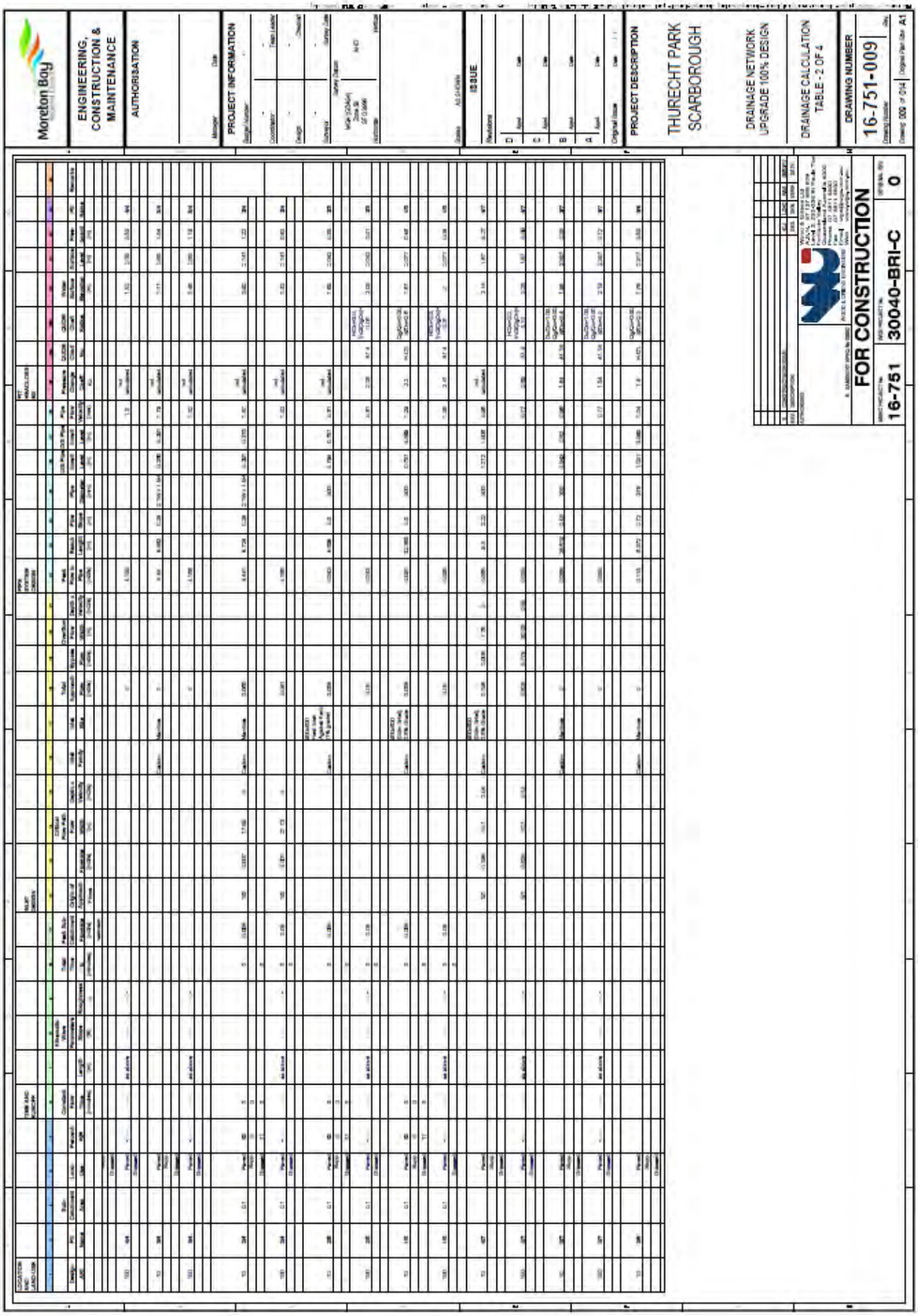
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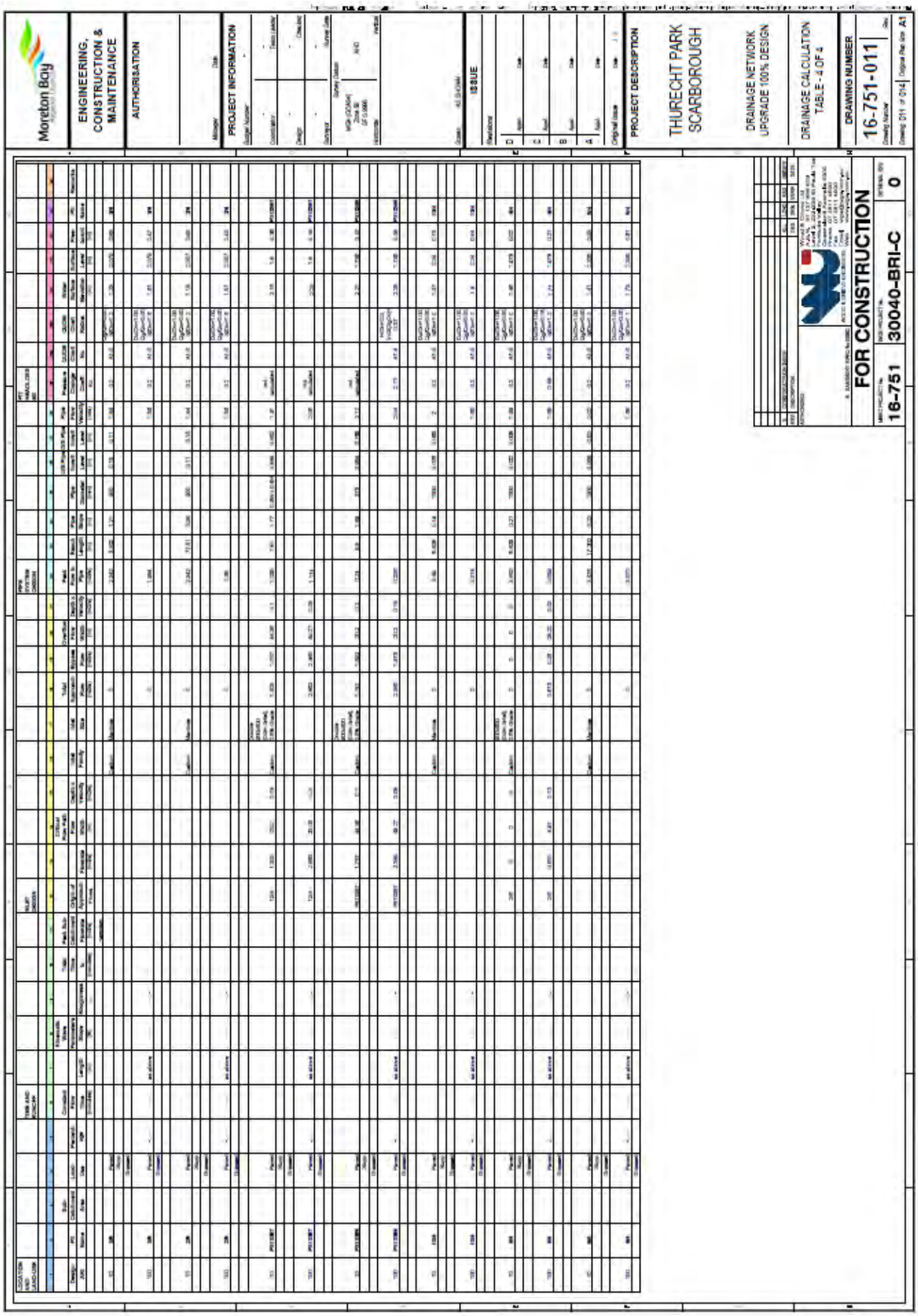
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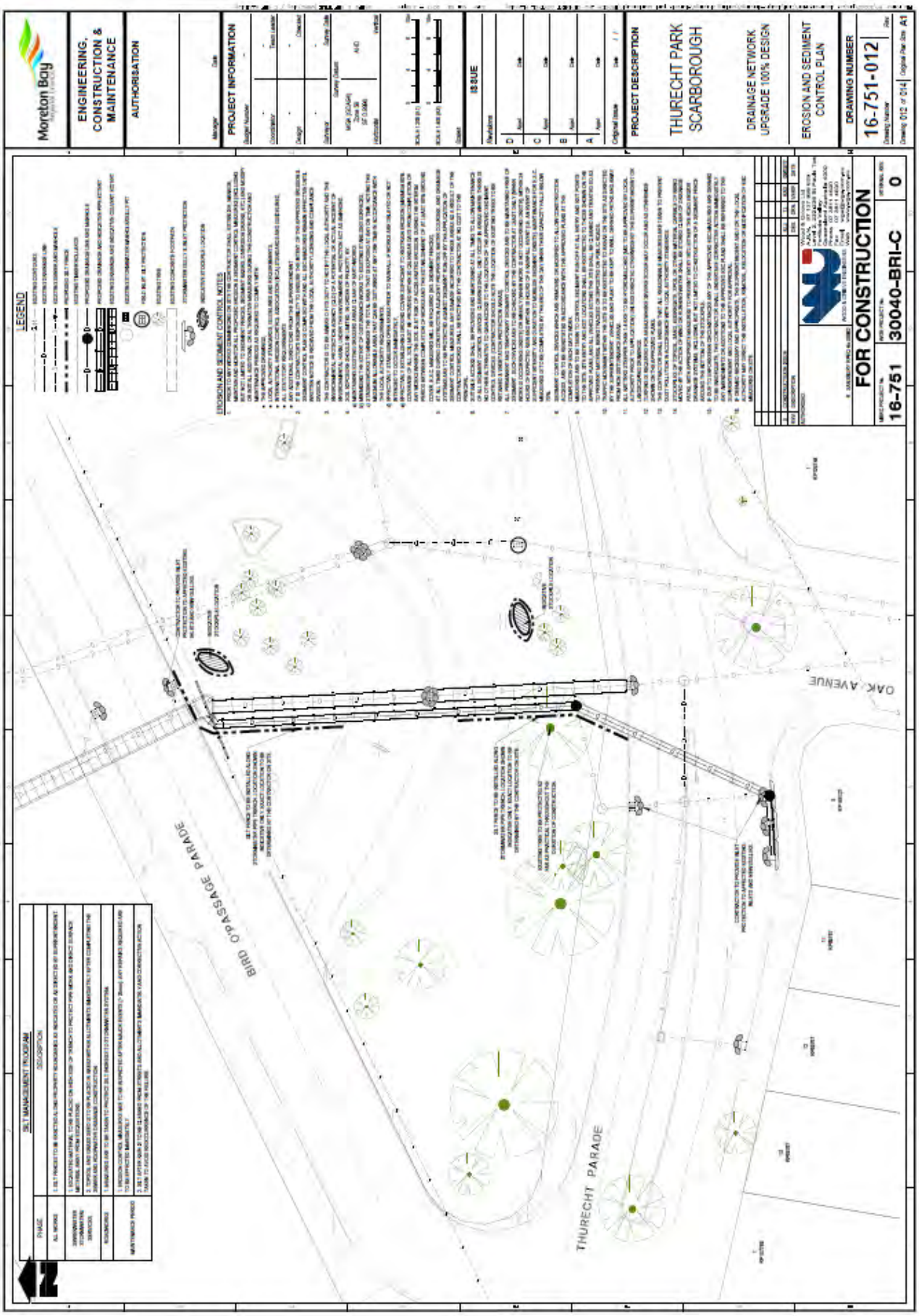
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DRAWING NUMBER
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SILT MANAGEMENT PROGRAM
PHASE
DESCRIPTION
ALL WORKS
MAINTENANCE PERIOD
FOR CONSTRUCTION
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30040-BRI-C
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BIRD OF PARADISE PARADE
THURECHT PARADE
OAK AVENUE

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PERSPECTIVE VIEW
TYPICAL SECTION
INSTALLATION OF SEDIMENT FENCE
LOCATION OF FENCE RELATIVE TO TOE OF SLOPE
SPILL THROUGH WEIR DETAIL
FIELD INLET PROTECTION
FIELD INLET SEDIMENT CONTROL
SAG INLET SEDIMENT TRAP
NOTE
TYPICAL STOCKPILE CONFIGURATION
STOCKPILE NOTES

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FOR CONSTRUCTION
16-751
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LEGEND
C1
C2
C3
DEANE AVENUE
EVANS STREET
THURECHT PARADE

DRAINAGE MASTER PLAN

DRAINAGE INVESTIGATION AREA 16, BURPENGARY

DRAINAGE MASTER PLAN FOR DRAINAGE INVESTIGATION AREA 16

1 INTRODUCTION

1.2 Introduction and Purpose of Drainage Master Plan

This Drainage Master Plan (DMP) applies to Drainage Investigation Area (DIA) 16 identified in Figure 8.2.2.9 of the Flood Hazard Overlay Code. This DMP has been prepared by the Moreton Bay Regional Council (MBRC) in accordance with section 3.6 of the Planning Scheme Policy – Flood Hazard, Coastal Hazard and Overland Flow.

The purpose of the DMP is to identify:

(a) the flood and drainage constraints affecting DIA 16;
(b) the flood mitigation strategy for DIA 16 that achieves overall outcome d. of the Flood Hazard Overlay Code in a way intended to facilitate development in the DIA consistent with the Urban Neighbourhood Precinct of the General Residential Zone;
(c) the particular components of the flood mitigation strategy that will be undertaken by the Council; and
(d) the particular components and applicable standards of the flood mitigation strategy that are required to be undertaken by applicants as part of carrying out assessable development.

The DMP contains the following sections:

- Section 1 (this section) – providing an introduction and confirming when the DMP applies to assessable development;
- Section 2 – Providing an overview and description of the DIA, a summary of the flood issues relevant to the DIA and summary of the planning context/intent;
- Section 3 – Providing a description of the flood risk mitigation strategy and the different components of the strategy;
- Section 4 – Identifying the preferred implementation and sequencing of the flood mitigation strategy; and
- Section 5 – The design standards and requirements for works for all aspects of development (i.e. material change of use, reconfiguring a lot, building work and operational work) in addition to the requirements otherwise required by the MBRC Planning Scheme.

1.2 Application of DMP

This DMP applies to development carried out in DIA 16 where required in accordance with the Flood Hazard Overlay Code.

This DMP identifies standards for carrying out development in addition to the applicable planning scheme codes.

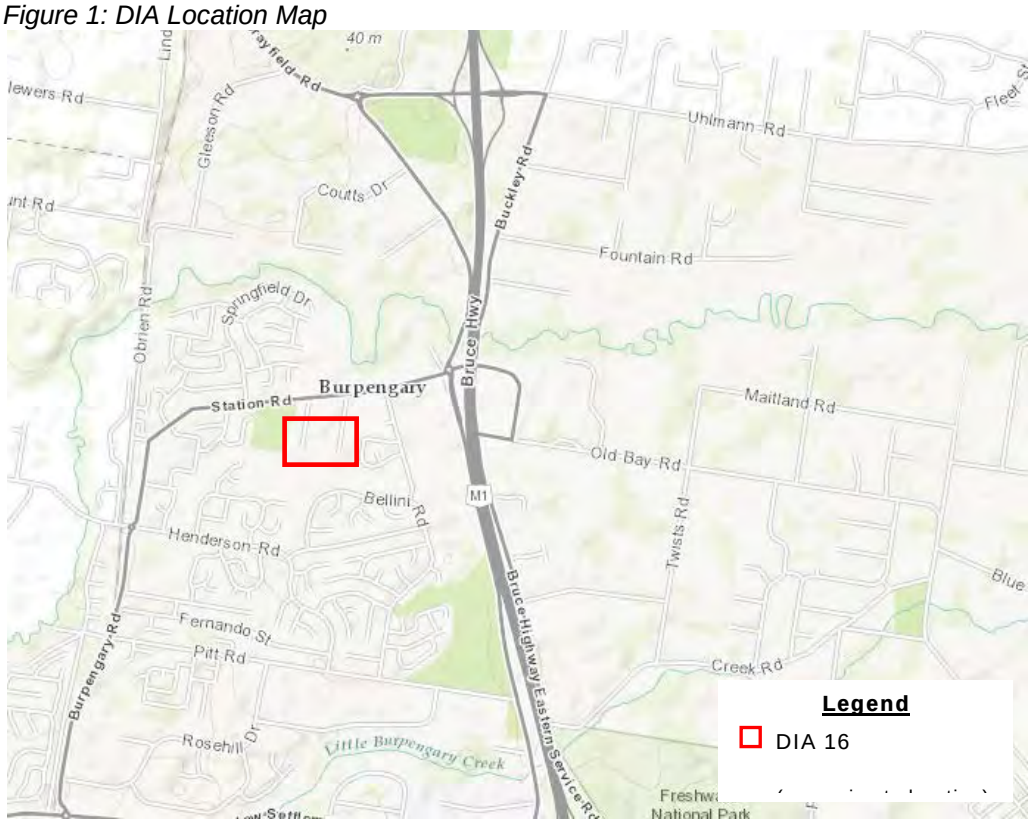
This DMP does not apply to development identified as exempt in Part 5.10.2 Levels of Assessment for the Flood Hazard Overlay.

2 DIA DESCRIPTION

2.1 Overview/Description of DIA

DIA 16 is located in the suburb of Burpengary, a primarily suburban neighbourhood of the Moreton Bay Region. Burpengary is located between the rail corridor to the west and the Bruce Highway to the east. Refer to Figure 1 identifying the location of DIA 16 in Burpengary.

Figure 1: DIA Location Map



Source: MBRC Aerial Photography, 2015

DIA 16 comprises an area of approximately 40,000m^2 and contains properties located at the southern end of David and Joyce Streets. DIA 16 also adjoins an open space area to the south. Refer to Figure 2 for a map of the DIA 16.

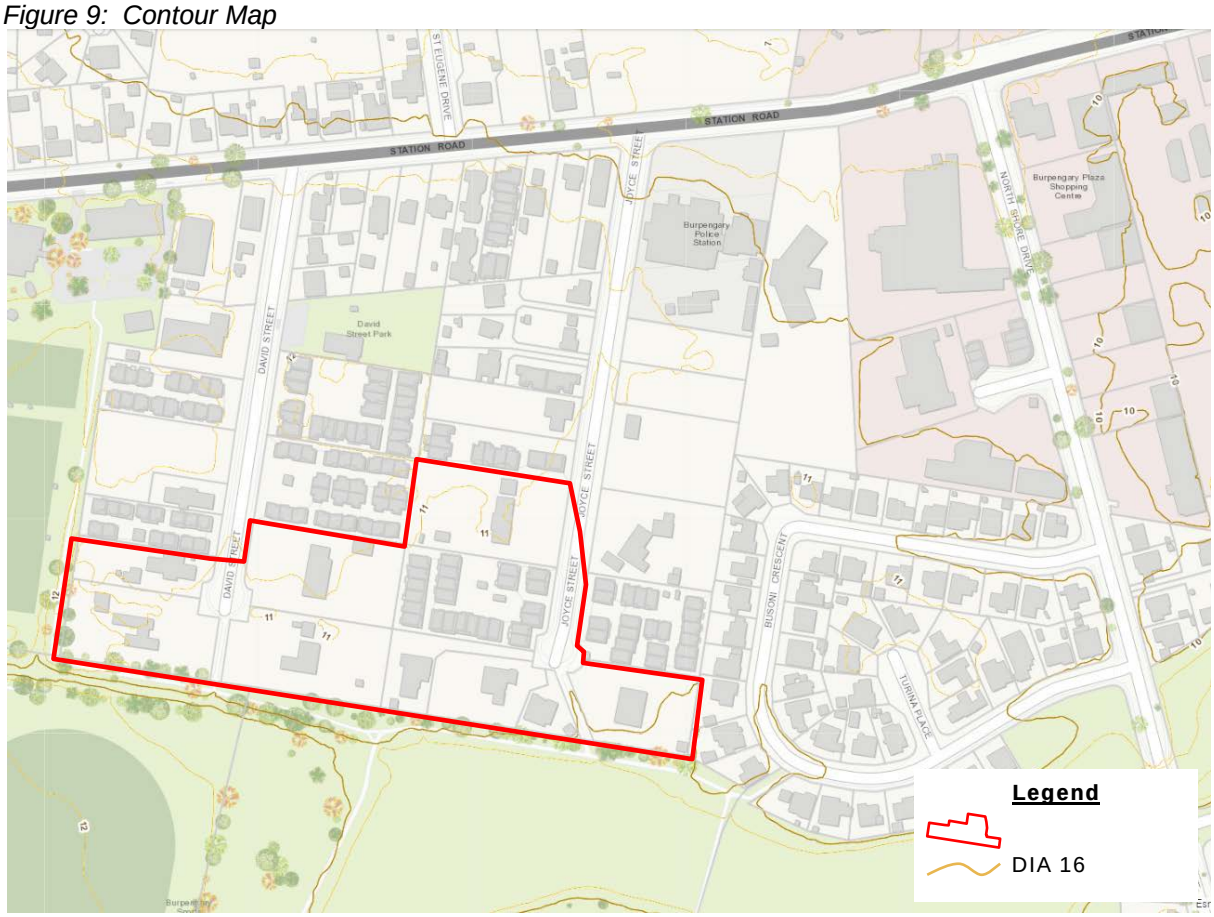
Figure 8: DIA 16

Source: MBRC Interactive Mapping, 2016

DIA 16 predominately contains a mix of detached residential housing and multiple dwelling activities and is in proximity to the Burpengary district centre. DIA 16 is also located in proximity to the higher order centre precincts of Caboolture and Morayfield as well as a number of local and specialised centre precincts. The area is accessible to a number of open space areas and local parks accessible through the open space network located south of DIA 16.

The area including DIA 16 and surrounds is flat and low lying terrain. Refer to Figure 3 below for a contour map of the area.

Figure 9: Contour Map



Source: MBRC Aerial Photography (2015) and Contours (2016)

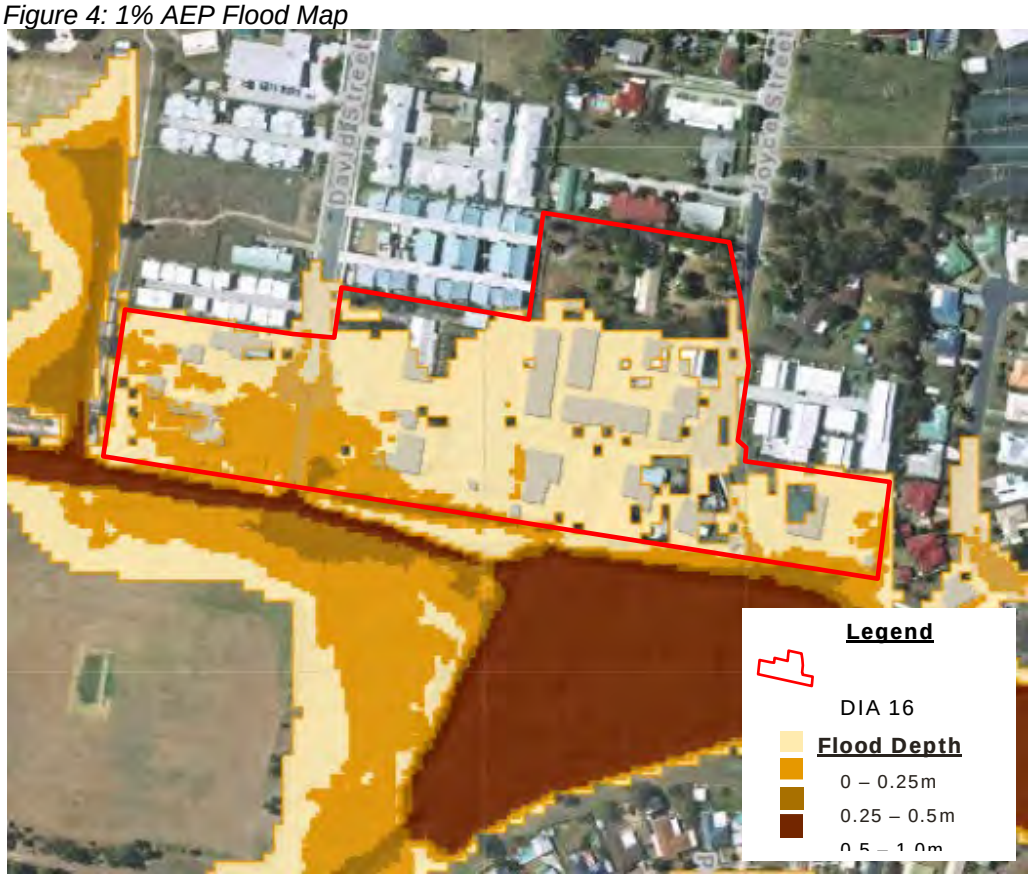
2.2 Summary of Flood Issues affecting the DIA

The flooding issues affecting DIA 16 are characterised by flood water break out of the channel adjacent to the south-west corner of DIA 16. The watercourse is a tributary of Burpengary Creek and the flood impacts are caused by existing land development and construction within the watercourse. .

In the 1% Annual Exceedance Probability (AEP) flood event it is estimated the majority of properties within the DIA are inundated to some degree (i.e. prior to the implementation of the flood risk mitigation strategy contained in this DMP).

Refer to Figure 4 identifying the 1% AEP flood map for DIA 16.

Figure 4: 1% AEP Flood Map



Source: MBRC Flood Explorer, 2016

2.3 Planning Context and Intent

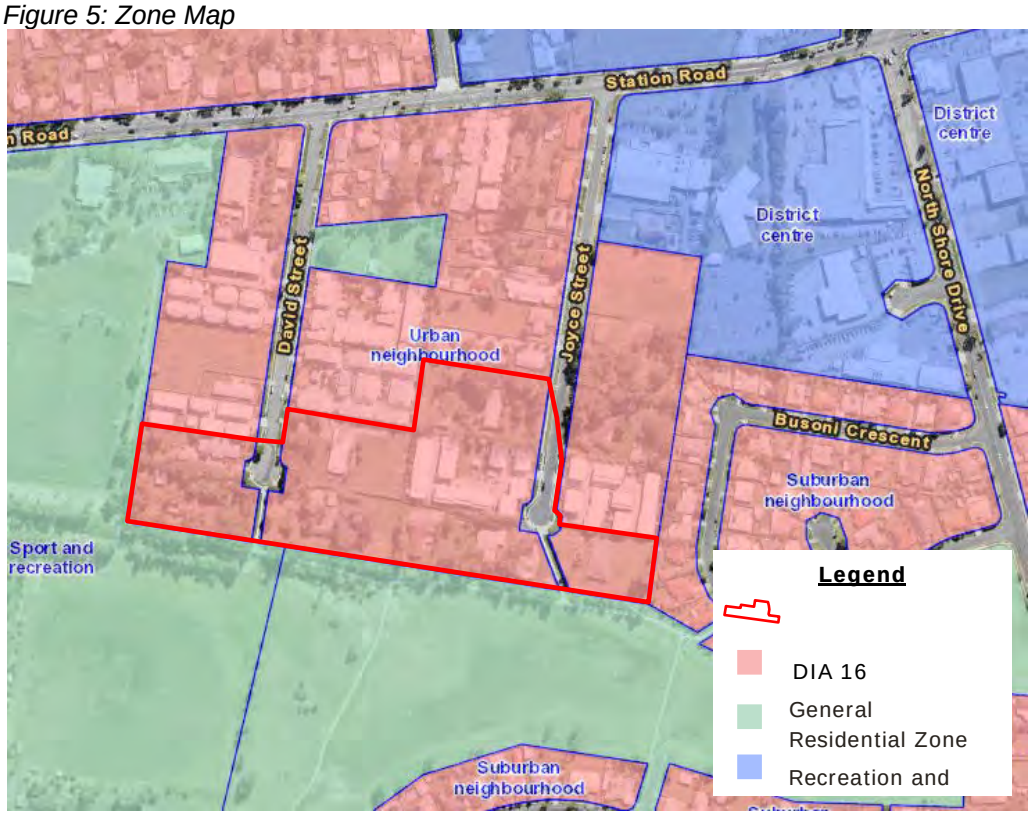
DIA 16 is entirely included in the Urban Neighbourhood Precinct of the General Residential Zone. Accordingly development outcomes expected by the DMP are those identified in the purpose and overall outcomes of the General Residential Zone Code. In summary this includes a diverse mix of residential uses at a scale and density that facilitates efficient land use patterns and supports compact, walkable and sustainable communities that are well connected.

Outcomes for other aspects of development not addressed by the zone codes (e.g. reconfiguring a lot, operational work etc) are expressed in the relevant planning scheme codes and continue to apply to development in the DIA.

Development outcomes in DIA 16 prior to the implementation of the flood risk mitigation strategy in this DMP are constrained due to the flood impacts affecting the area. The implementation of the DMP and development standards supports the intended high dwelling density at this location (consistent with the zone outcomes) in conjunction with the implementation of the DMP.

Refer to Figure 5 identifying the planning scheme zone applying to DIA 16.

Figure 5: Zone Map



Source: MBRC Interactive Mapping, 2016

3 FLOOD RISK MITIGATION STRATEGY

3.1 Overview/Summary

The general approach to the flood risk mitigation strategy in DIA 16 is to increase the capacity of the drainage system to allow for filling of allotments to achieve appropriate flood immunity levels. Increasing the drainage capacity has the effect of reducing the known flood risk determined at the date of adoption of the planning scheme. In turn this allows the filling of all allotments in the DIA to flood immunity levels over time without exacerbating flood risks (as determined at the date of adoption of the planning scheme).

The flood risk mitigation strategy for DIA 16 therefore comprises:

(a) The flood risk mitigation to be undertaken by Council - Drainage upgrade works in the park and flood plain located south of the DIA; and
(b) The flood risk mitigation to be undertaken by applicants - Filling of allotments within the DIA to the required flood immunity level.

Each of these components of the flood risk mitigation strategy are described in sections 3.2 and 3.3.

Based on the hydraulic modelling the flood risk mitigation strategy will reduce the medium and high flood risk areas in the DIA supporting development to the fullest potential intended by the MBRC Planning Scheme.

3.2 Flood Risk Mitigation to be undertaken by Council

The drainage upgrade works to be undertaken by the Moreton Bay Regional Council involve upgrading the capacity of the existing open drain adjacent to the southern boundary of the DIA. The works involve increasing the capacity of the drain with a 10m wide base to reduce the adjacent flood levels by 50mm.

Detailed of the proposed work are included in *Appendix A - Flood Risk Mitigation to be undertaken by Council - Detailed Design DIA 16*.

The Council can be contacted to confirm the expected timing for commencement/completion of the drainage works to be undertaken by Council.

3.3 Flood Risk Mitigation to be undertaken by Applicants

The flood risk mitigation to be undertaken by applicants is to fill all allotments within the DIA to the Flood Planning Level (Defined Flood Event + required freeboard for the Flood Planning Area)..

Filling required in accordance with the standards identified in section 5 is required not only to achieve flood immunity for individual properties but to specifically direct flood waters to the street and drainage network away from surrounding properties. Filling is a fundamental part of the flood mitigation strategy for the DIA as a whole and accordingly will be a mandatory condition of development.

The general approach to allotment filling is to provide a uniform grade with a minimum 1:100 cross fall to the street for the whole allotment/development site. Section 5 and Table 1 of the DMP identifies the detailed standards and circumstances where filling is required for all aspects of development (i.e. material change of use, reconfiguring a lot, building work and operational work). Filling is required where carrying out a material change of use and/or reconfiguring a lot (other than a boundary realignment). Filling is permitted but not mandatory in other circumstances.

4 FLOOD RISK MITIGATION IMPLEMENTATION AND SEQUENCING

The drainage upgrade works to be carried out by Council as detailed in Section 3.2 must be completed before filling of allotments in accordance with the standards in Section 5 is permitted.

Filling proposed prior to the implementation of the drainage works to be carried out by Council is not in accordance with this DMP and subject to the respective performance outcomes of the Flood hazard overlay code.

5 REQUIREMENTS FOR WORKS AND DESIGN STANDARDS

The flood risk mitigation to be undertaken by applicants includes filling where required in accordance with Table 1.

Alternative approaches to the standards in this section are subject to assessment against the applicable performance outcomes of the Flood hazard overlay code.

Table 1 - Fill Requirements

Note: The drainage upgrade works to be carried out by Council as detailed in Section 3.2 must be completed before filling of allotments in accordance with the standards in Section 5 is permitted. Filling proposed prior to the implementation of the drainage works to be carried out by Council is not in accordance with this DMP and subject to the respective performance outcomes of the Flood hazard overlay code.

Aspect of Development	Filling Requirements	Minimum Fill Level	Minimum Extent of Filling	Notes
Material change of use and/or Reconfiguring a lot (other than a boundary realignment)	Filling is mandatory	Flood Planning Level	The entire allotment/development site area and meeting the following: (a) provide a minimum 1:100 uniform cross fall shaped to contains flood waters to the street and drainage network with the exception of meeting (b) and (c); (b) provide an accessible grade for vehicle access by the applicable design vehicle for the development from the street to the minimum fill level; and (c) ensure no worsening of flood impacts to other properties beyond known flood impacts at the date of adoption of the planning scheme.	The filling requirements outlined in this DMP must be considered in conjunction with the other applicable code requirements identified in the MBRC Planning Scheme. This may include consideration of, but not limited to: ▪ earthworks, drainage, filling and associated retaining walls to avoid adverse impacts on adjacent properties; and ▪ flood immunity requirements for building work and other components of development where not achieved by filling alone.

Aspect of Development	Filling Requirements	Minimum Fill Level	Minimum Extent of Filling	Notes
Reconfiguring a Lot where for a boundary realignment	Filling is permitted but not mandatory	N/A	N/A	Filling is permitted and minimum fill levels are not regulated by the DMP for this aspect of development. Note: Maximum fill to DMP levels is encouraged. Where filling occurs, other applicable code requirements apply in the MBRC Planning Scheme. This may include consideration of, but not limited to: ▪ earthworks, drainage, filling and associated retaining walls to avoid adverse impacts on adjacent properties; and ▪ flood immunity requirements for building work and other components of development where not achieved by filling alone.

Aspect of Development	Filling Requirements	Minimum Fill Level	Minimum Extent of Filling	Notes
Operational work (filling or excavation only)	Filling is mandatory	Flood Planning Level	The entire allotment/development site area and meeting the following: (a) provide a minimum 1:100 uniform cross fall shaped to contains flood waters to the street and drainage network with the exception of meeting (b) and (c); (b) provide an accessible grade for vehicle access by the applicable design vehicle for the development from the street to the minimum fill level; and (c) ensure no worsening of flood impacts to other properties beyond known flood impacts at the date of adoption of the planning scheme.	The filling requirements outlined in this DMP must be considered in conjunction with the other applicable code requirements identified in the MBRC Planning Scheme. This may include consideration of, but not limited to: ▪ earthworks, drainage, filling and associated retaining walls to avoid adverse impacts on adjacent properties; and ▪ flood immunity requirements for building work and other components of development where not achieved by filling alone.

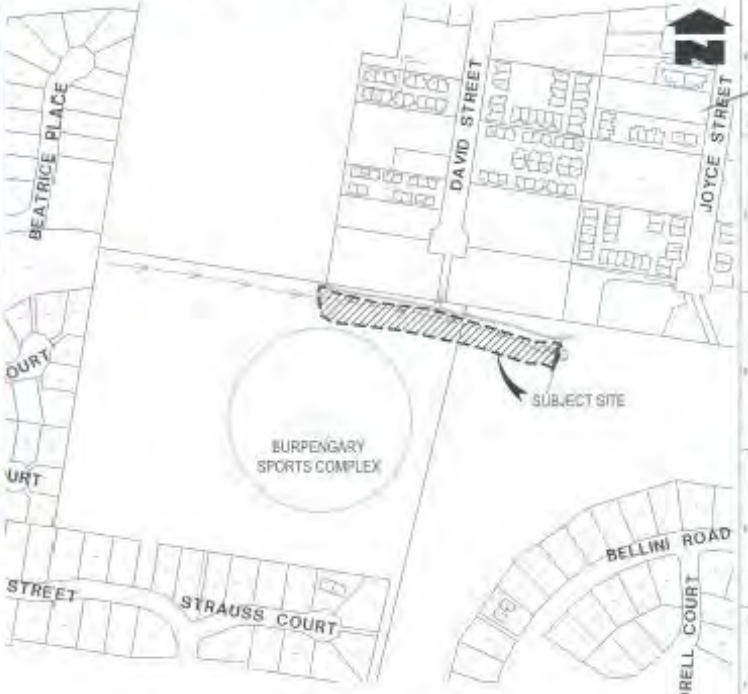
Aspect of Development	Filling Requirements	Minimum Fill Level	Minimum Extent of Filling	Notes
All other operational work where not associated with a material change of use or reconfiguring a lot	Filling is permitted but not mandatory	N/A	N/A	Filling is permitted and minimum fill levels are not regulated by the DMP for this aspect of development. The filling requirements outlined in this DMP must be considered in conjunction with the other applicable code requirements identified in the MBRC Planning Scheme. This may include consideration of, but not limited to: ▪ earthworks, drainage filling and associated retaining walls to avoid adverse impacts on adjacent properties; and ▪ flood immunity requirements for building work and other components of development where not achieved by filling alone.
Building work where not associated with a material change of use	Filling is permitted but not mandatory	N/A	N/A	Filling is permitted and minimum fill levels are not regulated by the DMP for this aspect of development. The filling requirements outlined in this DMP must be considered in conjunction with the other applicable code requirements identified in the MBRC Planning Scheme. This may include consideration of, but not limited to: ▪ earthworks, filling and associated retaining walls to avoid adverse impacts on adjacent properties; and ▪ flood immunity requirements for building work and other components of development where not achieved by filling alone.

Appendix A - Flood Risk Mitigation to be undertaken by Council

Detailed Design DIA16

DAVID STREET, BURPENGARY
DRAINAGE CHANNEL UPGRADE

LOCALITY PLAN
NTS



DETAIL PLAN

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MORETON BAY REGIONAL COUNCIL

Moreton Bay Regional Council

ENGINEERING, CONSTRUCTION & MAINTENANCE

AUTHORISATION

PROJECT INFORMATION

ISSUE

Revisions			
D			
C			
B			
A			

PROJECT DESCRIPTION

DAVID STREET
BURPENGARY

DRAINAGE CHANNEL UPGRADE 100% DESIGN

COVER SHEET

DRAWING NUMBER

16-748-001

FOR CONSTRUCTION

16-748	29977-BRI-C	D

Moreton Bay Regional Council
ENGINEERING, CONSTRUCTION & MAINTENANCE
AUTHORISATION
PROJECT INFORMATION
ISSUE
Revisions
PROJECT DESCRIPTION
JOYCE STREET
BURPENGARY
SPORTSFIELD
SURVEY CONTROL & SITE LOCALITY
DRAWING NUMBER
16-748-002
To STN 3
DAVID ST
SURVEY CONTROL TABLE
STATION | EASTING | NORTHING | R.L. | DESCRIPTION
1 | 496628.455 | 6995900.186 | 14.139 | SPIKE
2 | 496819.431 | 6996074.426 | 10.525 | SCREW IN CONCRETE
3 | 496857.963 | 6996300.02 | 11.561 | NAIL IN CONCRETE
5 | 496749.396 | 6995896.255 | 12.097 | NAIL IN CONCRETE

Moreton Bay
ENGINEERING, CONSTRUCTION & MAINTENANCE
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PROJECT INFORMATION
ISSUE
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DAVID STREET
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DRAINAGE CHANNEL
UPGRADE 100% DESIGN
EROSION AND SEDIMENT
CONTROL LAYOUT PLAN
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SEDIMENT FENCE DETAIL
ROCK FILTER CHECK DAM
TEMPORARY CONSTRUCTION ENTRY / EXIT
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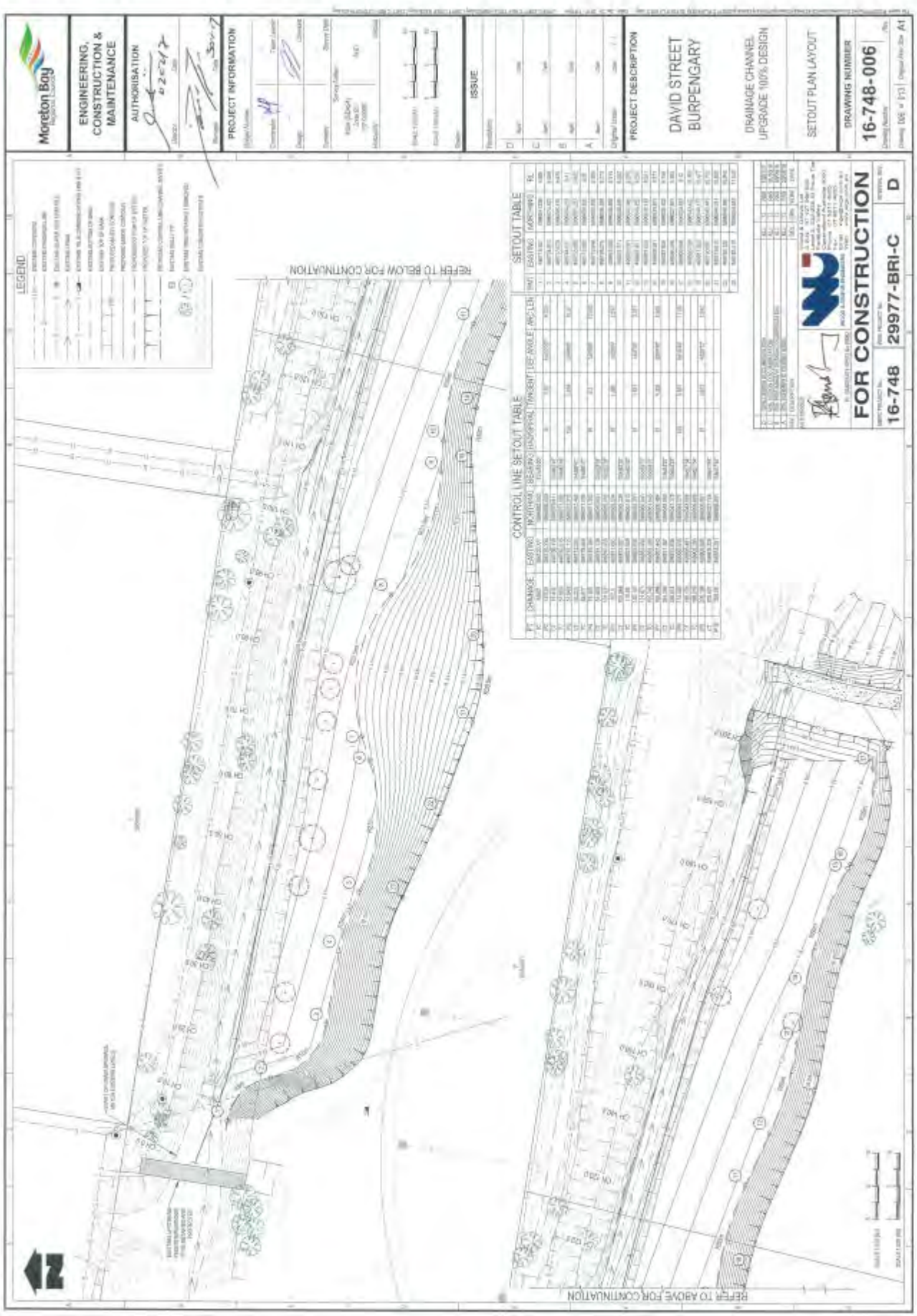
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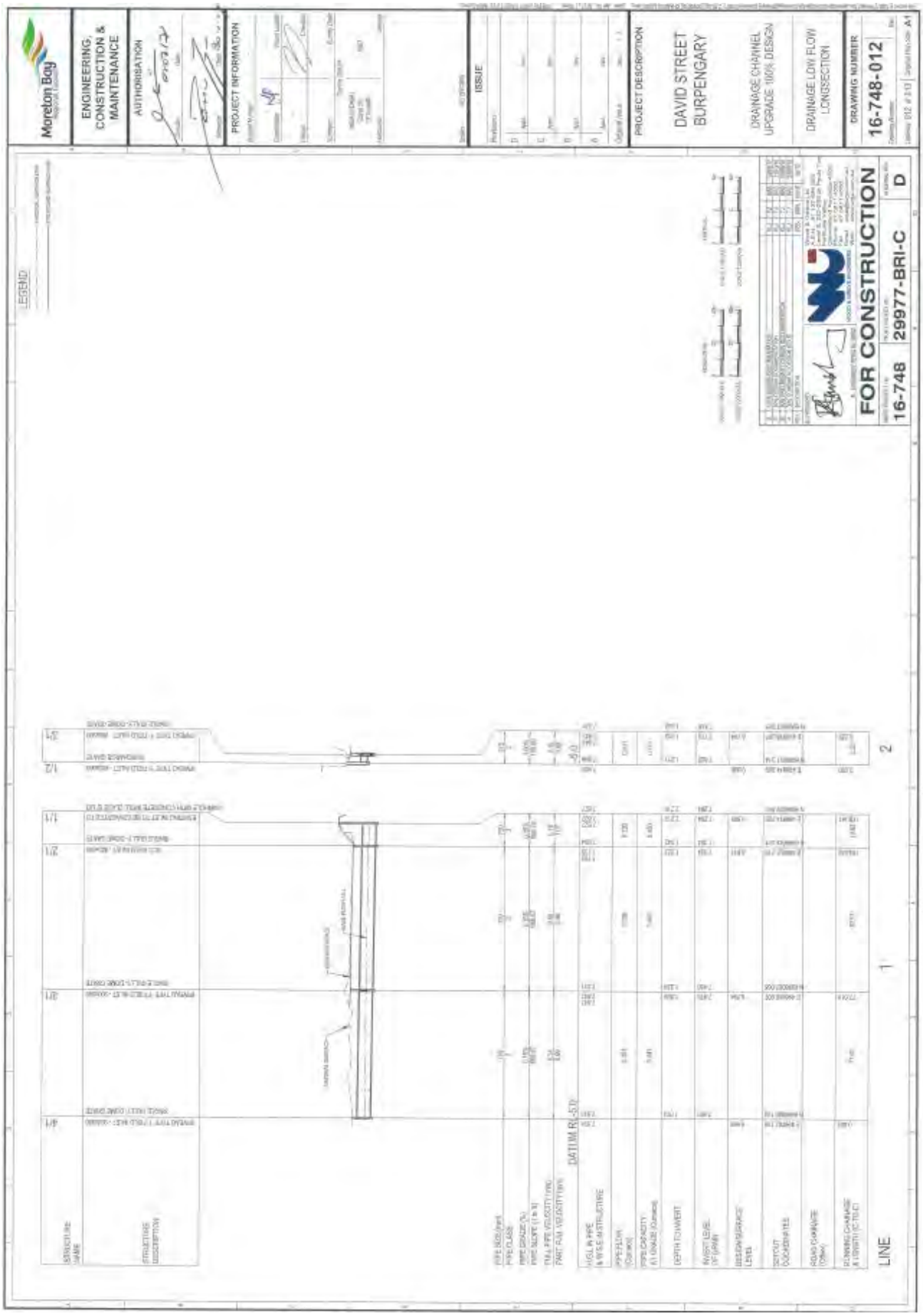
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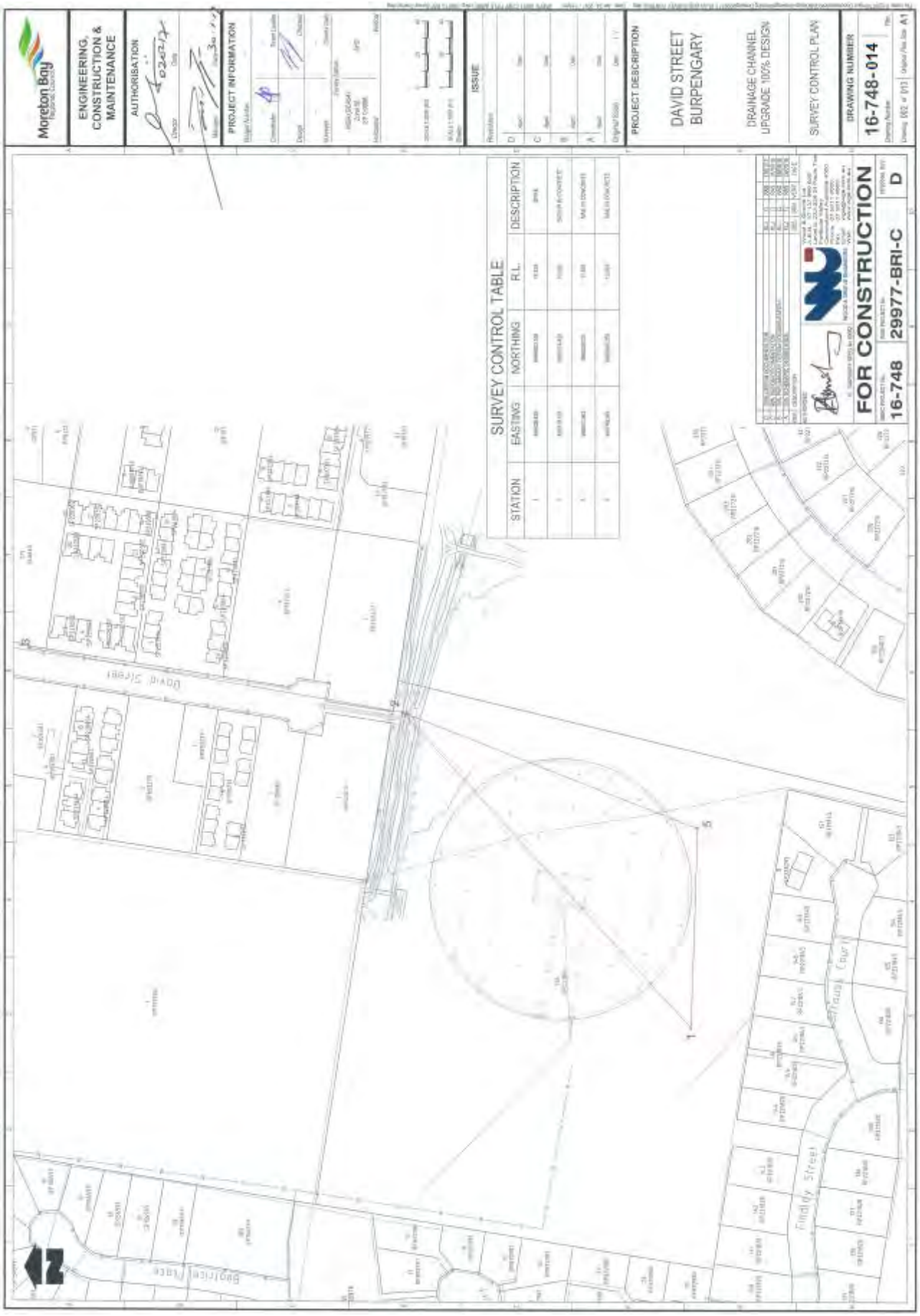
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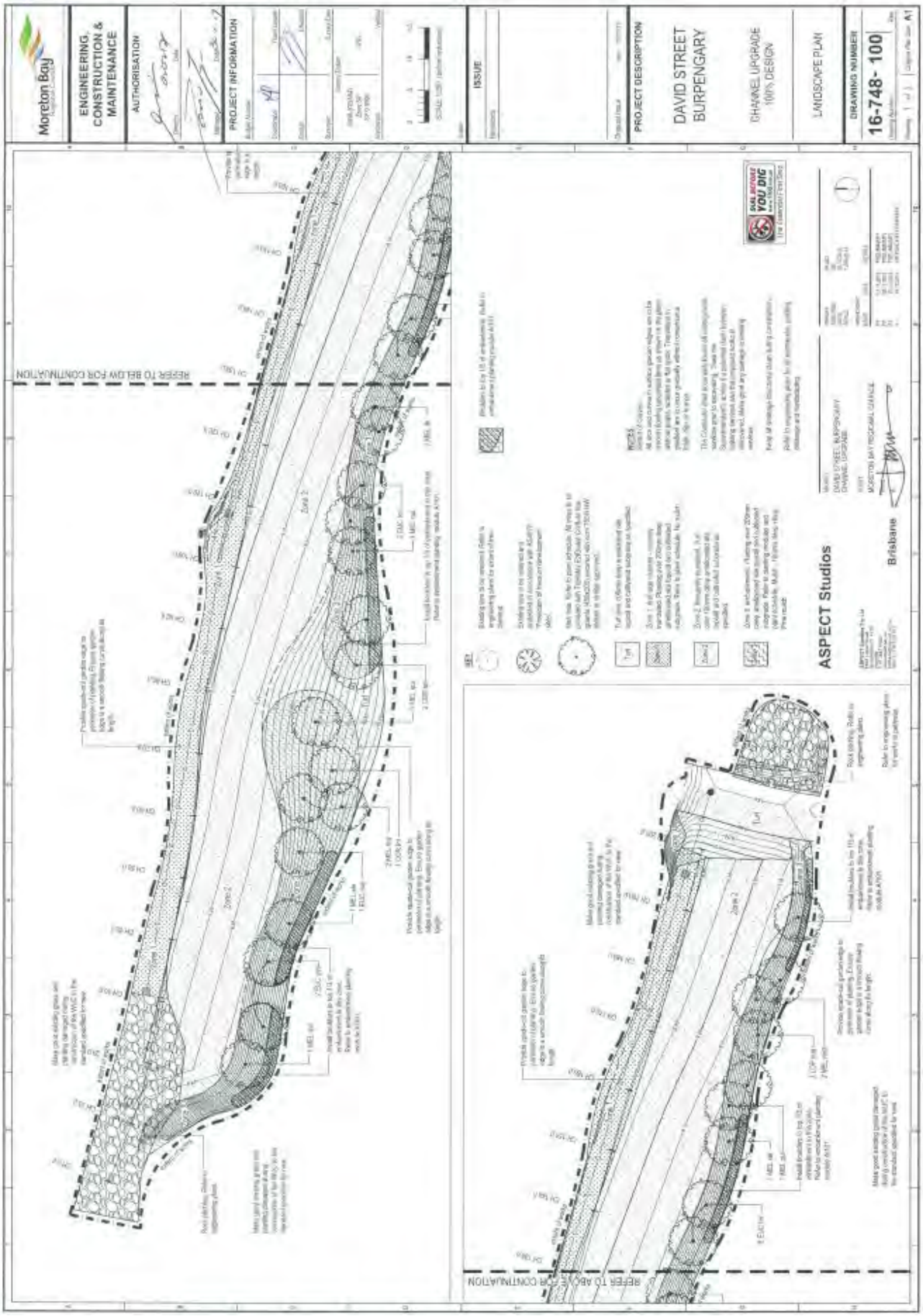
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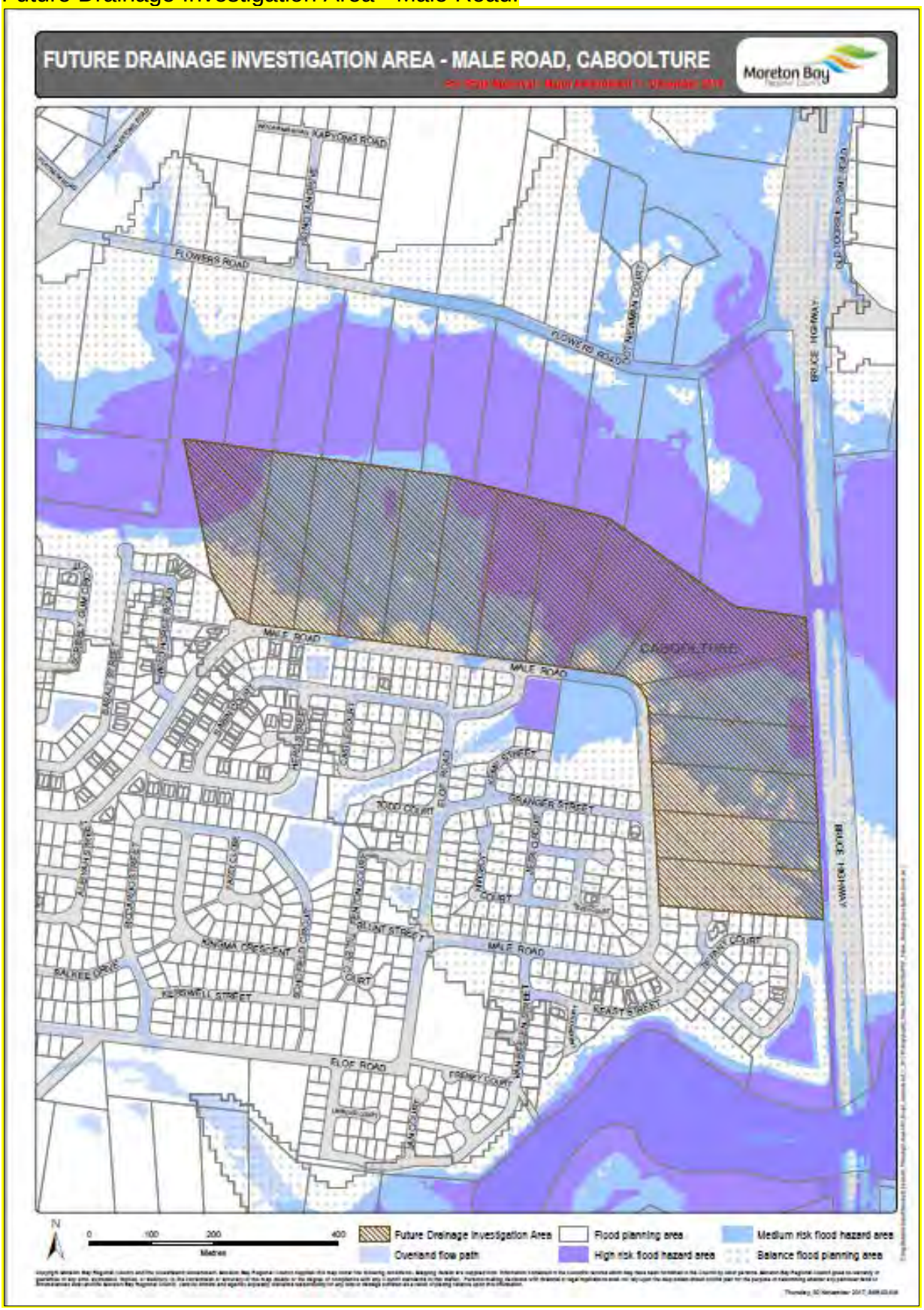
Appendix 2

Future Drainage Investigation Area - Male Road.



Planning Scheme Policy
Integrated Design

For State Approval - Major Amendment 1 - December 2017

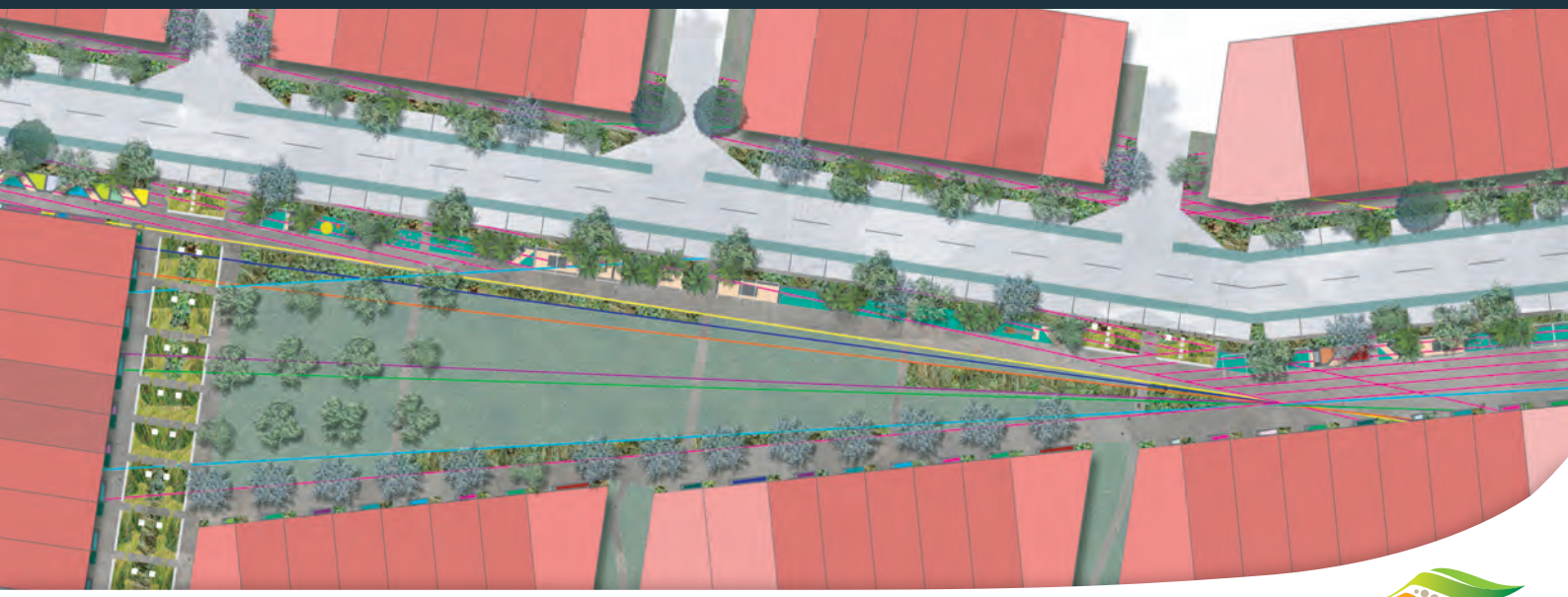


Table of amendments

Date of adoption and effective date	Planning scheme policy version number	Amendment type	Summary of amendments

Contents

Adoption

MBRC adopted this planning scheme policy on 24 November 2015.

Commencement

This planning scheme policy will take effect from 1 February 2016. Amendments to this planning scheme are included at **Table of Amendments** (inside front cover).

1. Introduction

This policy supports the Moreton Bay Regional Council Planning Scheme and has been made by Council in accordance with Chapter 3, Part 4, Division 2 and Part 5, Division 1 of the *Sustainable Planning Act 2009*.

1.1 Purpose

The purpose of this planning scheme policy is to:

a) Identify the roads and streets, public spaces, and landscaping standards and associated infrastructure design standards for development expected within the Region;
b) Provide information Council may request for a development application;
c) Provide guidance or advice on satisfying assessment criteria which identifies this planning scheme policy for that purpose.

Note: Where the information required by this policy is not supplied when the development application is made, they will be subject to an information request under the Integrated Development Assessment System (IDAS).

1.2 Application

The planning scheme policy applies to development applications for material change of use, reconfiguring a lot or operational works.

1.3 Interpretation

Terms used in this planning scheme policy are defined in Schedule 1 – Definitions of the planning scheme. Where a term is not defined in Schedule 1, section 1.3 *Interpretation of the Planning Scheme* applies.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HOW TO USE THIS
POLICY?

2. How to use this policy

The policy outlines Moreton Bay Regional Council's standards for the planning and design of streets, roads, private and public spaces within the Moreton Bay Region.

Technical standards and guidelines have a key role in the delivery of good design, but, when used over prescriptively, they often compromise the achievement of wider objectives and good integrated design outcomes.

Designers are expected to use their professional judgement when designing projects and should not be over reliant on guidance. Available guidance, warrants and standards cannot be expected to cover the conditions and circumstances that apply to each individual project which will have its unique set of conditions.

Alternative innovative solutions which meet the strategic vision of the Moreton Bay Regional Council Planning Scheme Strategic Framework and infrastructure strategies are therefore encouraged.

The mark of a great region is not how they design their special streets and public spaces, but rather how they design their everyday streets and public spaces. They are fundamental elements that underpin our communities through the provision of "public spaces" which afford opportunities for informal, formal, social and economic exchange. Essentially, they become the stages of the built environment on which everyday life unfolds.

These "public spaces" need to be carefully designed and managed to ensure that access to both public and private spaces meets the complex place making and functions required by our modern infrastructure networks. They can no longer be designed to solely serve a single function, rather they need to be designed as places that accommodate a variety of community, recreational and environmental pursuits and which foster a greater sense of community pride in place. Their design more importantly needs to deliver a product fit for its intended users and contextually respectful of surrounds and place within our environments.

The concept of movement and place is an important element in the design process. With streets and other public spaces “Place Design” is central to the process. Whilst higher order roads have a primary emphasis on movement, most roads also have many components of street and place functionality and should be designed in a context sensitive manner to reflect user needs.

Without a fundamental shift in design philosophy, our streets will continue to result in wide, high-speed environments that only move vehicles and compromise vital community goals and desires.

The design of this infrastructure plays an enormous role in determining the overall quality, atmosphere, form, function and ability to survive everyday rigours. Where the interface between public and private buildings and space is managed well and respectful of its surrounds, great roads and streets and desirable destinations are created that allow us to further build community capacity, ownership and resilience in our neighbourhoods and centres.

Our behaviour within streets and roads is particularly influenced, as barren and wide streets tend to reinforce the desire for motorists to speed, while tree lined streets, activated with on street car parking and incorporating active transportation opportunities, promote a desire to slow down providing a safer and more pleasant experience for all users.


6 STEPS TO DESIGN
EXCELLENCE
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3. Six Steps to Design Excellence

1. Get to know Council's Vision, Goals and Urban Design Principles

2. Design Criteria specific to MBRC:

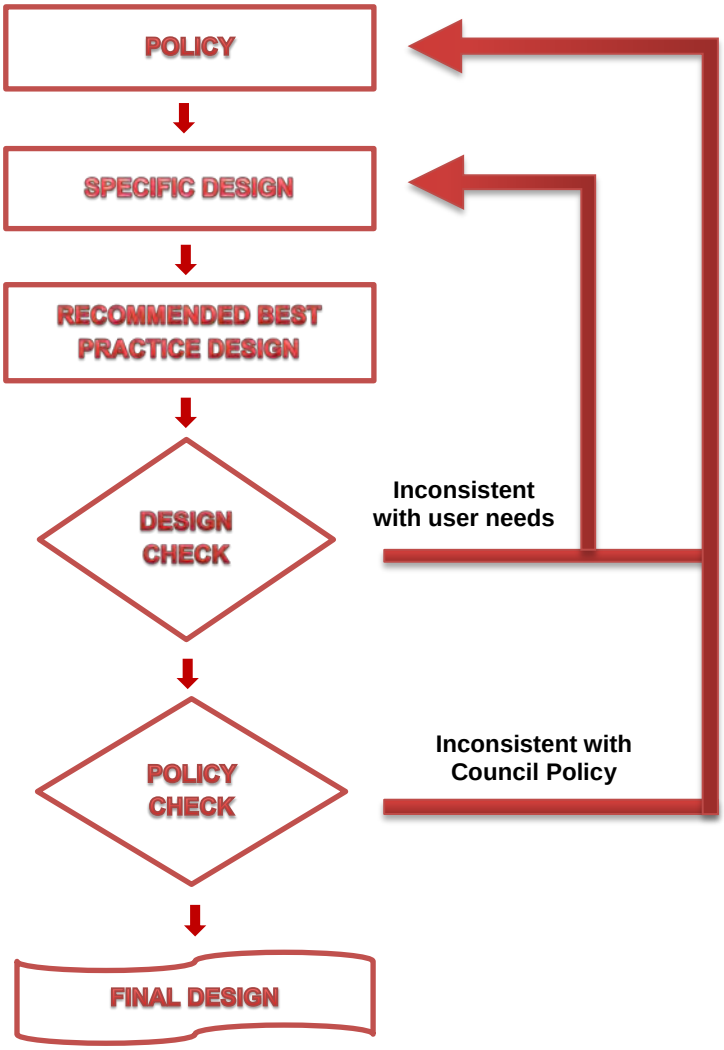
    a) Design integration
    b) Streets, roads and utilities
    c) Open and civic space design
    d) Stormwater management
    e) Landscaping design & street trees

3. Current Best Planning and Design Practice used by MBRC

4. Designing for the User Checklist

5. Design and Access Statement – to ensure best practice, integration with contiguous land uses and context sensitive design

6. Prepare and submit final design drawings (certified by RPEQ)



3.1 Step 1 - Get to know Council's Policy Led Design Visions

The Moreton Bay Regional Council Strategic Framework has set a new vision for the region that will allow future generations to live, work and play within our unique, prosperous and growing region. At the heart of this vision is the desire for walkable communities that foster the creation of living streets and public spaces which actively encourage healthy lifestyles, economic prosperity and environmental stewardship. This new vision will allow Council to actively move away from the standardised, risk averse designs previously used.

To meet this challenge, our underperforming streets need to be transformed so that they no longer purely serve the needs of those confined to vehicles but rather provide space for all users in a safe environment that successfully integrates the built form of the private domain within the broader street environment. Without a fundamental shift in design philosophy, our streets will continue to result in wide, high-speed environments that only move vehicles whilst compromising vital community goals and desires.

There are seven Primary Policy Documents that Establish the Vision and are the policy basis for all project planning and design of streets and roads, stormwater management and open and civic spaces within Moreton Bay Region.

1	**Moreton Bay Regional Council Planning Scheme Strategic Framework** This document sets the context of our vision of creating diverse, connected and accessible places whilst accommodating significant growth.	
2	**Moreton Bay Regional Council Urban Design Charter** This articulates the vision set in the Strategic Framework and identifies Nine Values for Good Place Design	
3	**International Charter for Walking** Council is a signatory to the International Charter for Walking. This charter provides Council with a framework to refocus our policies, activities, planning and design to create a culture where people choose to walk.	

4	**Integrated Local Transport Strategy** Contains several key strategies that set the future direction of integration of transport and land use and contain valuable information on walking, cycling, public transport use and access and movement throughout the Moreton Bay Region.	
5	**Water Strategy** This plan articulates the importance of planning and designing for best practice water planning, design and management.	
6	**Open Space Strategy** The open space strategy is Council's primary reference document for the future provision and embellishment of parks and open spaces.	
7	**Community Infrastructure Strategy** The Community Infrastructure Strategy is Council's primary reference document for the future provision and embellishment of all community facilities such as community halls and libraries.	

3.2 Step 2 - Design Guidelines Specific to MBRC

These design guidelines are based around current best practice that MBRC consider meets the values and principles of Council Policy and its future vision. The guidelines seek to integrate land use and infrastructure at all levels. Best practice design guidance may change from time to time so it is important that the designer has the most current set of guidelines for reference purposes.

MBRC has identified some design requirements that are specific to the Moreton Bay Region. These are included within these guidelines under the following headings:

a) Section 4 - Principles of Integrated Design
b) Section 5 – Streets, Roads and Utilities
c) Section 6 - Open and Civic Space Design
d) Section 7 – Stormwater Management
e) Section 8 – Landscaping Design and Street Trees

The designer should refer to these MBRC specific elements of design first, before referring to general best practice design guidance in step 3.

3.3 Step 3 - Current Best Design Practice Used by MBRC

Moreton Bay Regional Council has adopted a number of primary design guideline documents that should be used as the key reference documents for project planning and design purposes. The project planner/designer should become familiar with these documents.

Appendix G outlines Moreton Bay Regional Council's best practice guidelines for design and construction of service infrastructure for new developments.

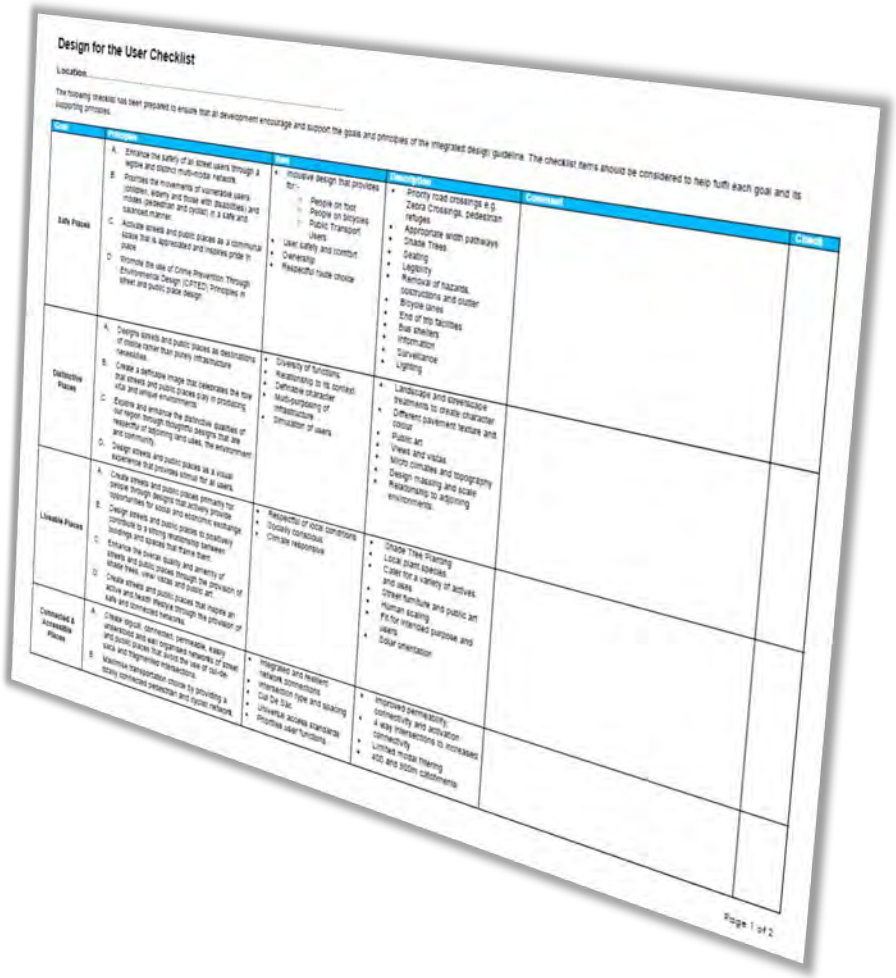
A development scheme may refer to a different guideline or specific response and propose alternative and innovative solutions in consultation with the MBRC and other relevant parties as appropriate.

The documents referenced in this guideline are the version current at the time a decision is made on a development application. MBRC may have regard to other documents in assessing development applications.

3.4 Step 4 - Designing for User Needs - A Checklist

MBRC has responded to the needs of the community by implementing a strategic process of planning and design based on goals and targets established in the MBRC Community Plan 2011 - 2021. This policy document and subsequent policies has led to an urban design focussed strategic plan that meets both the current and future needs of our growing Region.

When designing projects it is easy to become immersed in technical design detail such as pavement depth, concrete strength and other design elements that are extremely important in their own right for good design outcomes. Responding to user needs requires the same focus on elements such as the provision of multipurpose infrastructure, user amenity and pedestrian crossings to meet existing and future desire lines and quality street tree planting to provide shade. To aid the design process and to ensure that these user needs elements of design have been considered for all relevant projects, a checklist has been prepared and is included in Appendix E. This checklist must be completed and included with the certified detailed design drawings.


Design for the User Checklist

Location

The following checklist has been prepared to ensure that all development encourage and support the goals and principles of the integrated design guideline. The checklist items should be considered to help fulfil each goal and its supporting principles.

Goal	Principles	Item	Description	Comment	Check
Safe Places	A. Enhance the safety of all street users through a legible and distinct multi-mode network. B. Promotes the movements of vulnerable users (children, elderly and those with disabilities) and modes (pedestrian and cyclist) in a safe and balanced manner. C. Activate streets and public places as a communal space that is appreciated and inspires pride in place. D. Promote the use of Crime Prevention Through Environmental Design (CPTED) principles in street and public place design.	• Inclusive design that provides for:- ○ People on foot ○ People on bicycles ○ Public Transport Users • User safety and comfort • Ownership • Residential route choice	• Priority road crossings e.g. Zebra Crossings, pedestrian refuges • Appropriate width pathways • Shade Trees • Seating • Legibility • Removal of hazards, constructions and clutter • Bicycle rails • End of trip facilities • Bus shelters • Information • Surveillance • Lighting		
Distinctive Places	A. Designs streets and public places as destinations of visible center than purely infrastructure necessities. B. Create a definitive image that celebrates the role that streets and public places play in producing vital and unique environments. C. Explore and enhance the distinctive qualities of our region through thoughtful designs that are respectful of adjoining land uses, the environment and community. D. Design streets and public places as a visual experience that provides stimuli for all users.	• Diversity of functions • Relationship to its context • Definable character • Multi-purposing of infrastructure • Simulation of users	• Landscape and streetscape treatments to create character • Different pavement texture and colour • Public art • Views and vistas • Micro climates and topography • Design massing and scale • Relationships to adjoining environments		
Liveable Places	A. Create streets and public places primarily for people through designs that achieve private opportunities for social and economic exchange. B. Design streets and public places to positively contribute to a strong relationship between buildings and spaces that frame them. C. Enhance the overall quality and amenity of streets and public places through the provision of shade trees, view vistas and public art. D. Create streets and public places that inspire an active and healthy lifestyle through the provision of safe and connected networks.	• Respectful of local conditions • Socially conscious • Climate responsive	• Shade Tree Planting • Local plant species • Cater for a variety of actives and uses • Street furniture and public art • Human scaling • Fit for intended purpose and users • Solar orientation		
Connected & Accessible Places	A. Create logical, connected, permeable, easily understood and well organised networks of street and public places that define the use of on-site uses and regulates interactions. B. Maximise transportation choice by providing a safe and connected pedestrian and cyclist network.	• Integrated and resilient network connections • Intersection type and spacing • Cul De Sac • Universal access standards • Promote user functions	• Improved permeability, connectivity and activation • 4 way intersections to increase connectivity • Limited cul-de-sac treatments • Limited mid-block treatments • 400 and 800m catchments		

Page 1 of 2

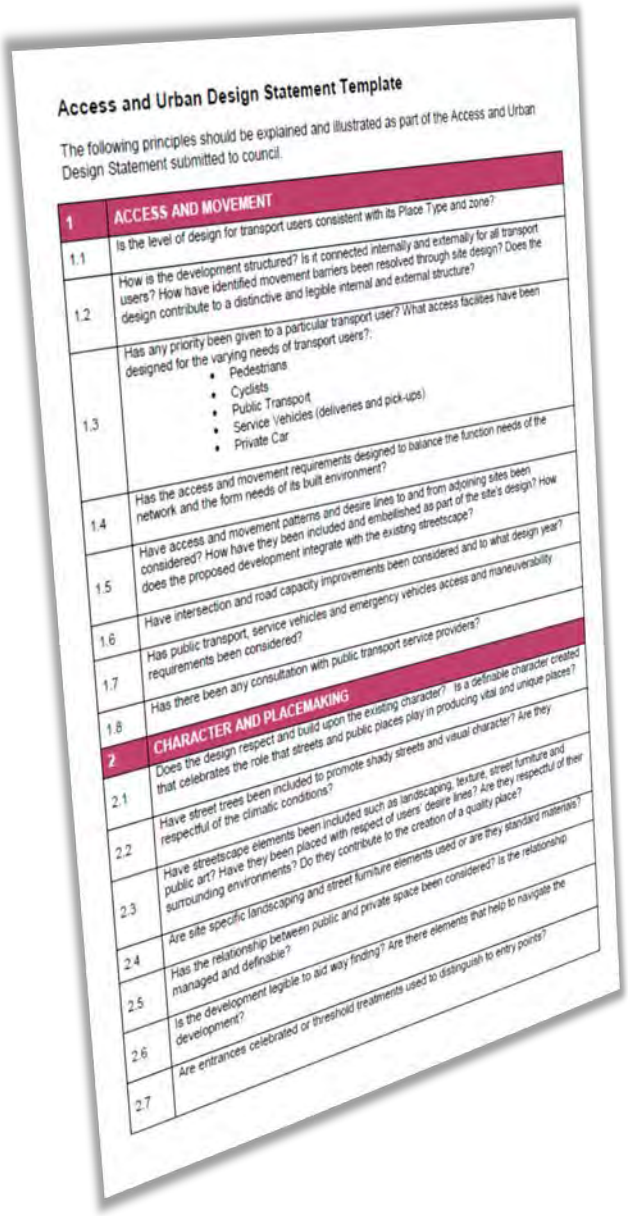
3.5 Step 5 - Access and Urban Design Statement

An Access and Urban Design Statement is a short report accompanying and supporting a development application and describing design intent and how the design is consistent with Council policies.

The length of the Statement should reflect the nature and complexity of the accompanying planning application. The main roles of the Statement are to:

a) Ensure that the design is context sensitive to its Place Type and that MBRC's policies and values have been addressed.
b) Explain how the objectives of best practice design have been applied and existing and future user needs have been incorporated.
c) Illustrate how access needs have been designed and are responsive to contiguous land uses.

A Template for the completion of the Access and Urban Design Statement is attached as Appendix F.



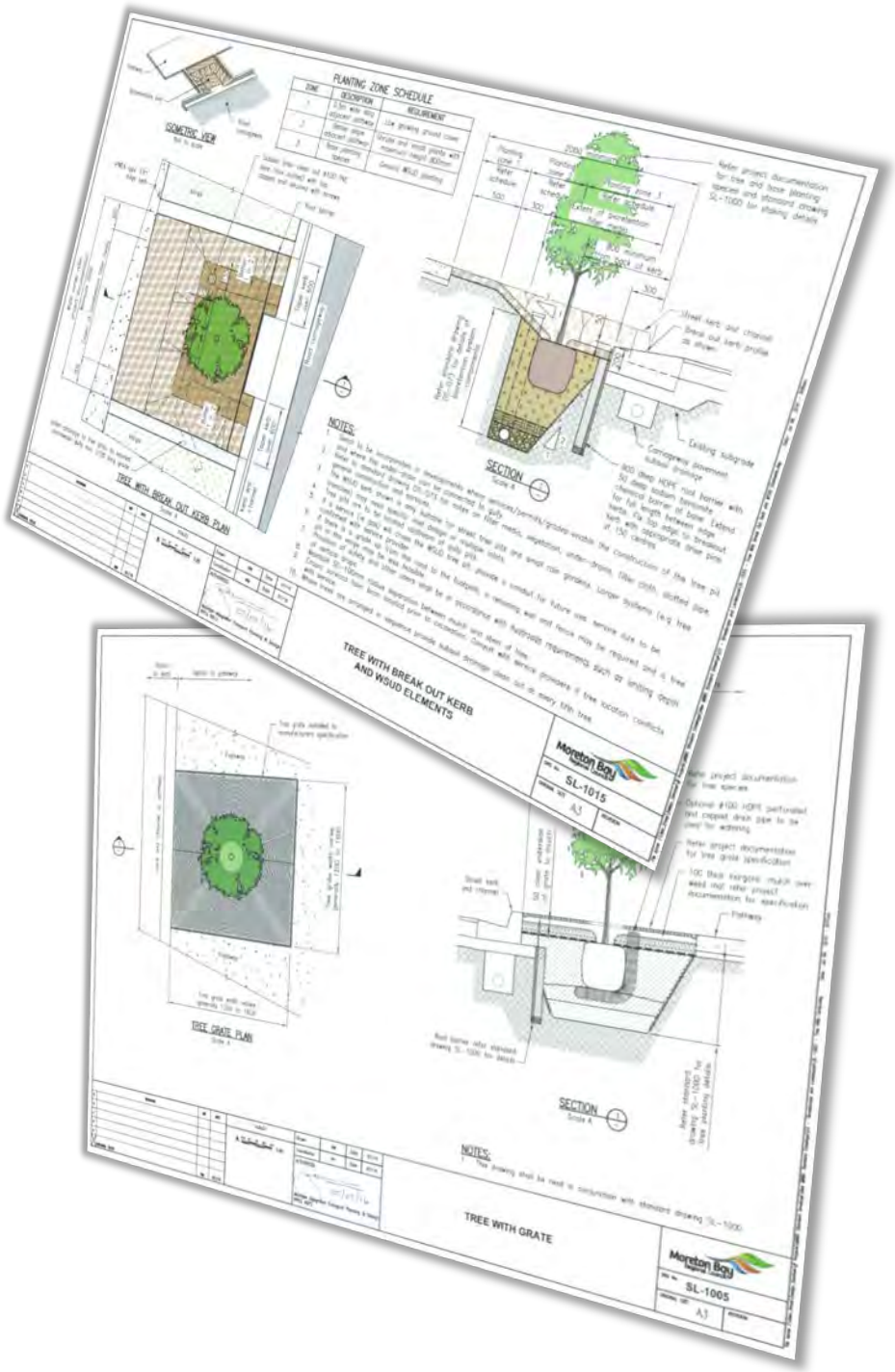
Access and Urban Design Statement Template

The following principles should be explained and illustrated as part of the Access and Urban Design Statement submitted to council.

1	**ACCESS AND MOVEMENT**
1.1	Is the level of design for transport users consistent with its Place Type and zone?
1.2	How is the development structured? Is it connected internally and externally for all transport users? How have identified movement barriers been resolved through site design? Does the design contribute to a distinctive and legible internal and external structure?
1.3	Has any priority been given to a particular transport user? What access facilities have been designed for the varying needs of transport users?: • Pedestrians • Cyclists • Public Transport • Service Vehicles (deliveries and pick-ups) • Private Car
1.4	Has the access and movement requirements designed to balance the function needs of the network and the form needs of its built environment?
1.5	Have access and movement patterns and desire lines to and from adjoining sites been considered? How have they been included and embellished as part of the site's design? How does the proposed development integrate with the existing streetscape?
1.6	Have intersection and road capacity improvements been considered and to what design year?
1.7	Has public transport, service vehicles and emergency vehicles access and maneuverability requirements been considered?
1.8	Has there been any consultation with public transport service providers?
2	**CHARACTER AND PLACEMAKING**
2.1	Does the design respect and build upon the existing character? Is a definable character created that celebrates the role that streets and public places play in producing vital and unique places?
2.2	Have street trees been included to promote shady streets and visual character? Are they respectful of the climatic conditions?
2.3	Have streetscape elements been included such as landscaping, texture, street furniture and public art? Have they been placed with respect of users' desire lines? Are they respectful of their surrounding environments? Do they contribute to the creation of a quality place?
2.4	Are site specific landscaping and street furniture elements used or are they standard materials?
2.5	Has the relationship between public and private space been considered? Is the relationship managed and definable?
2.6	Is the development legible to aid way finding? Are there elements that help to navigate the development?
2.7	Are entrances celebrated or threshold treatments used to distinguish to entry points?

3.6 Step 6 - Prepare and Submit Design Drawings

The range and quantity of detailed design drawings will vary depending upon the complexity of the design. All engineering drawings must be signed by a Registered Professional Engineer Queensland (RPEQ). In addition to the engineering drawings all landscaping, streetscaping and drawings containing trees within public spaces must also be signed by an RPEQ, and certified by a Registered Landscape Architect, to ensure that safety features such as sightlines and visibility splays have been assessed for consistency with relevant design standards. Landscaping drawings must therefore be submitted at the same time as the engineering drawings so that the design review person or team can be satisfied that all design elements have been considered in an integrated manner.

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4. Principles of Integrated Design

4.1 Introduction

The desire to create quality and durable places, networks and streetscapes requires an integrated approach to design outcomes. This considers context, place, the needs of all users and how various elements interact to create integrated and complete design outcomes.

The addition or subtraction of elements plays a pivotal role in a user's perception of streets and places and what constitutes appropriate behaviour when in these spaces.

Streets and roads, for example, can no longer be designed to solely serve the function of transportation, rather they need to be designed as "third places" able to accommodate a variety of community, recreational and environmental pursuits and deliver a greater sense of community pride.

A multi-disciplinary approach allows designers to move away from a rigid standards driven process that delivers an isolated infrastructure asset. This allows designers to explore more creative design responses that reflect the changing perspective of what these places could be. This integrated and complete approach allows spaces to be formed in such a manner that places a greater emphasis on the needs of all users.

Streets include appropriate provision of shade for all users

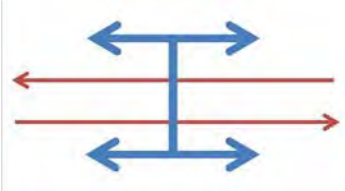
4.2 Goals and Principles

Five goals describe how streets and places will be expected to perform within Council's overall public space network. The principles outline how these five goals can be achieved through responsive and innovative design solutions.

These goals and principles articulate Council's desire to establish functional streets serving a network of places with character and quality design outcomes within our region.

Ensuring that roads and streets, stormwater management and open and civic are designed and delivered in accordance with these goals and principles will help developers, designers and Council to contribute towards the creation of a coherent network of quality and meaningful public spaces throughout the Moreton Bay Region.

1. Safe Places



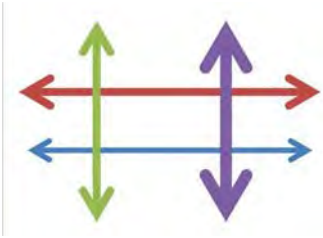
A. Enhance the safety of all users through a legible and distinct multi-purpose network.

B. Priorities the movements of vulnerable users (children, elderly and those with disabilities) and modes (pedestrian and cyclist) in a safe and balanced manner.

C. Activate them as a communal space that is appreciated and inspires pride in place.

D. Promote the use of Crime Prevention Through Environmental Design (CPTED) Principles in street design.

2. Distinctive Places



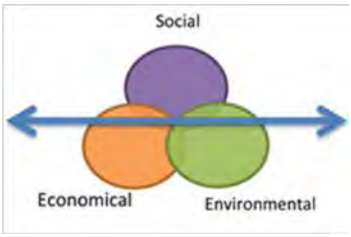
A. Designs streets and public places as destinations of choice rather than purely infrastructure necessities.

B. Create a definable image that celebrates the role that they play in producing vital and unique places.

C. Explore and enhance the distinctive qualities of our region through thoughtful designs that are respectful of adjoining land uses, the environment and community.

D. Design streets and public places as a visual experience that provides stimuli for all users.

3. Liveable Places



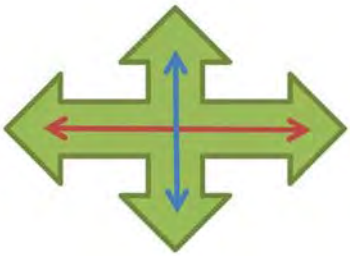
A. Create streets and public places primarily for people through designs that actively provide opportunities for social and economic exchange.

B. Design them to positively contribute to a strong relationship between buildings and spaces that frame them.

C. Enhance the overall quality and amenity of streets through the provision of street trees, view/ vistas and public art.

D. Create streets and public places that inspire an active and health lifestyle through the provision of safe and connected networks.

4. Connected & Accessible Places



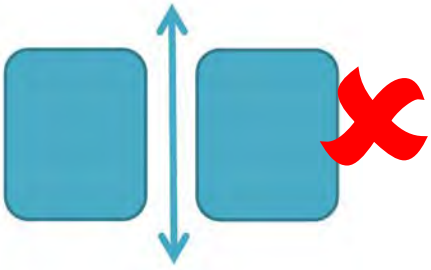
A. Create logical, connected, permeable, easily understood and well organised networks that avoid the use of cul-de-sacs and three way intersections.

B. Maximise transportation choice by providing a totally connected pedestrian and cyclist network.

C. Design streets and public places that contribute to a distinctive structure.

D. Promote the use of universal design standards to create a clear, connected and unobstructed network for people of all needs.

5. Responsive & Sustainable Places



A. Respect and respond to the natural and built environment through design that positively contributes to the structure of a place.

B. Design adaptable places that are able to accommodate future evolutions in their form and function.

C. Promote the individualisation of streets and places to reinforce the character, micro-climate and context of their surrounds.

D. Integrate environmental stewardship through the incorporation of water sensitive design, climate responsive design and the preservation of native flora and fauna.

A heavily engineered design process that focuses solely on function will fail to deliver a design response

Balancing of both form and function elements will allow for the successful creation of streets as places.


5. Streets, Roads and Utilities

5. Streets, Roads and Utilities

5.1 Introduction

Complete Streets IPWEAQ is the primary document by which Council is responding to the current and future needs of all street users. Complete Streets is a philosophy that embraces all elements of road and street design that support their optimal use and which are respectful of their context and how it serves the differing needs of people that use the street.

Council has developed a number of Street Typology Cross Sections (Appendix A) that reinforce the principles of Complete Streets. These Cross Sections are based primarily on a classification system that define a street by the type of place that it helps to form (the Place Type).

Each Topology Cross Section also has a series of other attributes that can be used to consider the appropriateness of any particular cross section to achieve the desired design outcomes.

This classification system follows the principle that roads and streets designed for people are more functional and attractive and leads to greater integration within the built environment.

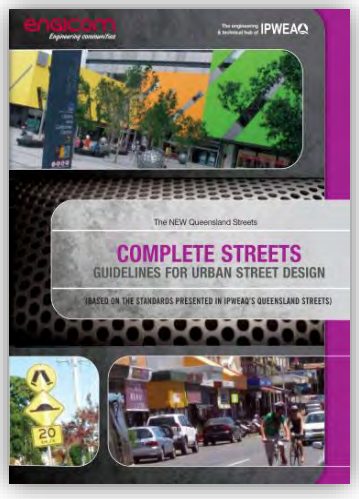
Classifying a street by its hierarchical function e.g. Sub-Arterial will still have significance in determining traffic carrying capacity and its applicable cross section, however this will no longer be its sole attribute or determining factor. Streets and roads do not necessarily serve the same user needs along their entire length, they continually change to embrace and support adjoining land uses.

A heavily engineered design process that focuses solely on function will fail to deliver a design response that is respectful of its context. It is important that the designer considers all elements of user needs, for example pedestrian crossings, in all street and road designs.

Design Principles - There are two high level sets of design principles that the designer should be familiar with:

1. A permeable and connected network
2. Context sensitive design solutions

"Complete Streets is a technical guide for urban street design, but really it is so much more than that. In conjunction with its online presence, this Guide seeks to be a living, breathing, evolving, comprehensive how-to-kit for contemporary urban street design that will produce quality spaces that cut across a variety of contexts for a wide range of users to experience and enjoy." - Complete Streets



5.2 A Permeable and Connected Network

The goal is to provide an easily walked network of direct routes, streets that have shade with roads that are easy to cross for pedestrians of all abilities but above all places of character.

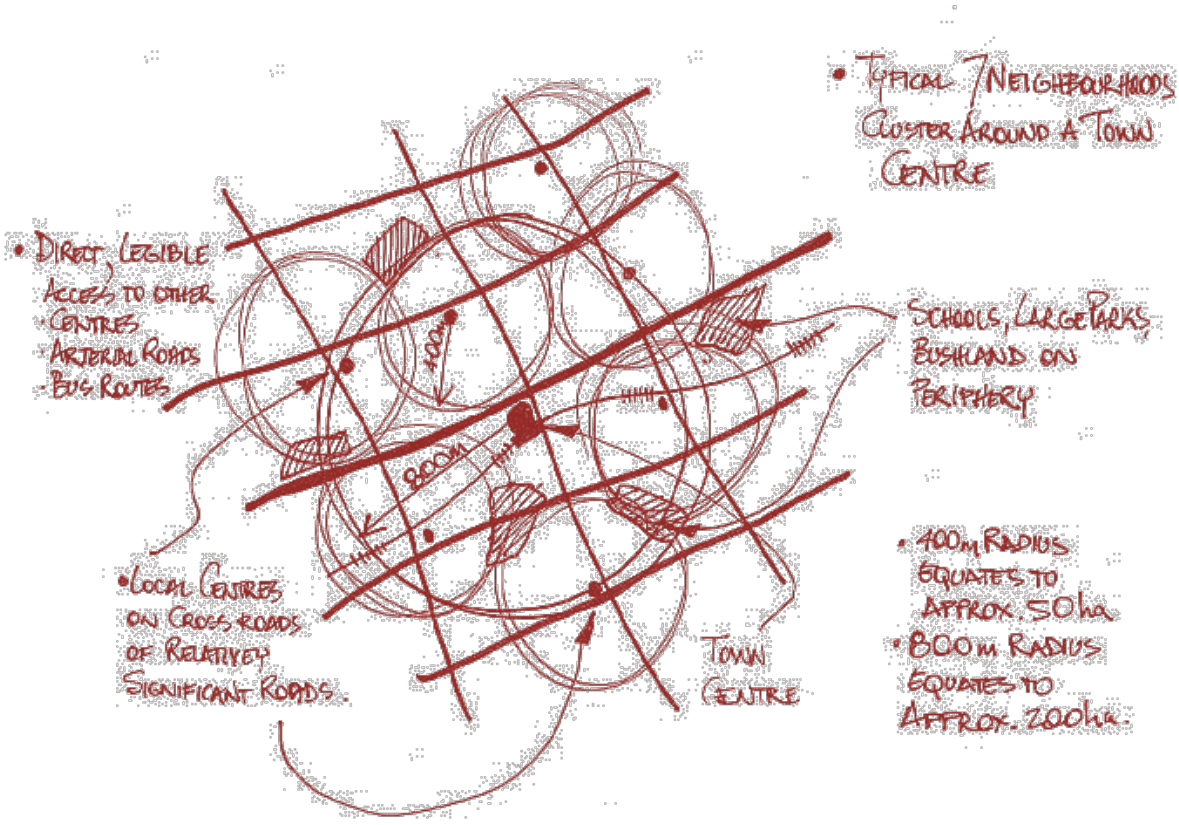
The street network should comfortably accommodate non-vehicle users and supports adjacent land uses. The streets should be designed to have a good relationship to surrounding buildings and spaces and be a network of streets and public spaces that respond to the needs of all users and not just a system of roads for cars.

The result is a movement framework that integrates pedestrians, cyclists and public transport users and which disperses traffic rather than concentrates it. Increased network connectivity and permeability is much more legible for users and is flexible enough to change with future needs.

Within a more connected street pattern the viability of existing centres can be reinforced with increased development density and better access. New centres and transport nodes can be easily placed in accessible locations near to the arterial network on cross roads of important streets and still be at the centre of their communities and activities. A well connected street network allows for ease of access to walkable catchments and to those accessing from further afield.

5.2.1 Urban Structure

The provision of a well-connected and accessible structure of walkable neighbourhood clusters forming along transport routes and not centres bounded by major roads leads to more viable and liveable local communities.



5.2.2 Compact Centres

The development of walkable neighbourhoods based on centres and transport nodes can only be sustainable with the placement of the most intensive uses closest to the centre. The result is a dome of density towards the centre of activity where the mix of land uses and housing types increases the choices and the level of activity. The basis of this activity is an accessible street network.

5.2.3 Walking and Cycling Catchments

Designing walking and cycling friendly communities will require high levels of infrastructure and land use planning coordination. An important consideration for the designer is the principle of 15 Minute Catchments. These catchments are based around the design requirements for people walking, cycling and using public transport within 15 minutes of

Activity Centres and other key destinations. A 15 minute walkable catchment (the PedShed), is equivalent to an 800 metre distance at an average walking speed. More information regarding this important design element can be obtained from Complete Streets and MBRC Active Transport Strategy.

5.2.4 Legibility and Access

Legibility of a layout is the ease at which is understood and navigated through. The easiest way to navigate through a place is to continue straight ahead. Two design elements in particular have contributed to disconnected street networks that are highly illegible and left us with a legacy of sprawling car dominated suburbs:

a) The Cul-de-sac
b) The 3 way intersection

As can be seen from the diagram below the cul-de-sac dominated layouts are impermeable and disconnected, where the grid is highly legible.

Cul-de-sacs provide for only one way in and out which concentrate traffic and as such should be avoided. If they are deemed necessary then they should only occur at edge of places, kept very short and placed so as not to interfere with connectivity.

5.2.5 Network Permeability

Four way intersections offer significant benefits in improving network connectivity, permeability and legibility. Avoid three way intersections wherever possible. Further guidance on these best practice design outcomes can be obtained from Planning scheme policy - Neighbourhood design.

5.2.6 Subdivision Plans

Subdivision plans create the basis for the underlying structure of the built environment and as such guides how a place will develop. It determines the street network and how it connects to the surrounding. It creates the block dimensions and size and therefore how easy it is to access. It provides the scale, at which people will experience it and the development that will occur within. It determines how it will interact with the environment, topography and the existing community that surrounds it.

Street and block layouts need to be created with a vision and understanding of what development may occur into the future. Not just the site's role today but in consideration of an evolving community that changes as a response to the evolving needs of future communities and uses. In this way street layouts need to be connected, permeable and legible.

Simply creating a land subdivision without consideration of the surroundings and the character of a place does not provide for well-connected sustainable places for people to live, work and play in. A more comprehensive look at the context that the site sits within, how it relates to the existing physical aspects of the site, as well as the needs of the residents and adjoining communities now and into the future is essential to providing sustainable and liveable places.

5.2.7 Block Size & Dimension

The layout, size and dimension of street blocks is a basic tool in determining the permeability, connectivity and legibility of a layout and thereby the ability to move through a place. The longer the street blocks and the distance between intersections the less permeable the neighbourhood.

Greater permeability equates to greater connectivity improving the walkability of a place by expanding the PedShed. The result is shorter street lengths thereby affording greater opportunities to reduce vehicle speeds and rat running drivers.

Small blocks may reduce the ability to develop a place and should not be so small as to be unfeasible for possible future development. A balance is therefore needed to be found between the need for smaller blocks for walkability and connectivity and the need for a dimension and size that accommodates future redevelopment.

Variation in the size of street lots allows for variations in intensity and scale of development with reduction in block size as a centre of activity is approached to ensure greater intensity of street edges.

A good rule of thumb for the ratio between the width and depth of a street block is to have the long side 2 to 3 times the length of the shorter. Refer to Planning Scheme Policy – Neighbourhood Design for more guidance.

5.3 Context Sensitive Design Solutions

Context sensitive design solutions address design objectives and considerations that meet user needs and also consider wider issues. Complete Streets aims at providing technical guidance so that a designer can produce a design that balances user needs with competing factors such as capital and maintenance costs, environmental, economic and social outcomes.

Moreton Bay Regional Council have adopted a series of policy objectives (listed in Step 1). In the unlikely event that there are conflicting guidance, the designer should always consider the MBRC specific guidance contained in the policy as taking precedence.

The MBRC street and road user hierarchy is consistent with many best practice planning and design guidelines where an iterative process is undertaken with pedestrians considered first, cyclists second, public transport users third and then other motorised vehicle users. Complete Streets addresses all the elements necessary to achieve quality design outcomes. There are a number of design objectives informed by Council's strategic values that are worthy of further mention to provide additional design clarity:

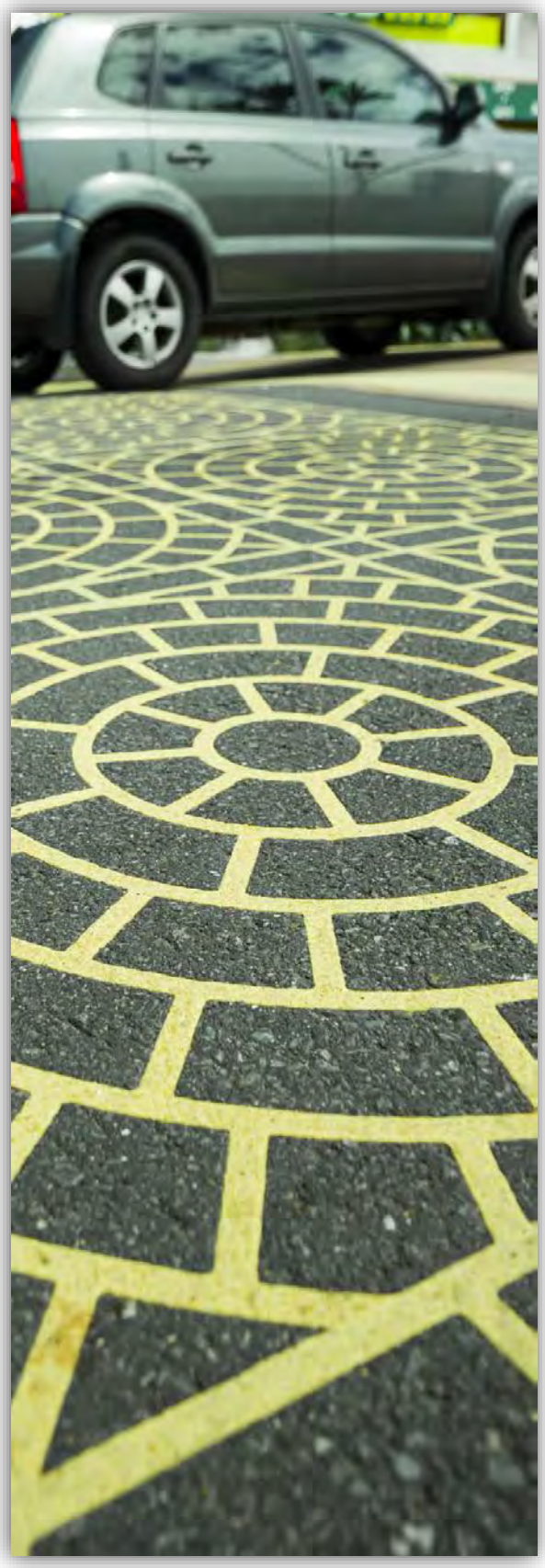
a) Prioritising pedestrians and cyclists

b) The importance of street tree plantings

c) Water sensitive design solutions

d) What design vehicles to use for streets and roads

e) Designing for personal safety and security



5.3.1 Prioritising pedestrians and cyclists

Designing for people on foot and on bicycles is of the highest importance to achieve Council's strategic 20 year vision. Active transport catchment planning around centres and key destinations is fundamental in the development of higher density and mixed use place types. Council has endorsed several policies that support this vision including:

a) MBRC Strategic Framework
b) MBRC Active Transport Strategy
c) MBRC Street, Place and Movement Guideline
d) MBRC Urban Design Charter
e) International Charter for Walking

The designer should be cognisant of these policies when designing priorities for pedestrians and cyclists, particularly within the 15 minute catchments of Activity Centres and key destinations. Priority crossings for pedestrians and cyclists should always be incorporated in designs relative to context and place type. These will generally take the form of zebra crossings or signalised crossings, however other form of priority crossings are available to the designer including Shared Zones and Priority Raised Crossing (Austroads Cycling Aspects Guideline 2011 7.6.4).

Provision shall be made for pathways in all projects and as required by Council's Planning Scheme, Conditions of Development Approval or the MBRC Movement Plan. The minimum width of any pathway is generally 2.0 metres, however this can be reduced in local access street situations, especially in lower density residential areas. All pathway designs should seek to minimise obstructions, clutter and other hazards to users.

5.3.2 The importance of street tree plantings

Street trees should be included in most if not all street and road designs. Streets trees are arguably the most cost effective design improvement that can be implemented in any street design and have multiple benefits:

a) They offer shade to pedestrians and cyclists.
b) They provide improved amenity values and environmental qualities to the public realm enhancing civic pride and communicating a quality of place to visitors.
c) They can be used to visually traffic calm streets.
d) They provide a cooler micro climate by reducing the urban heat island effect.
e) They provide a biodiversity for many species and contribute to Council's Green Infrastructure Strategy.

5.3.3 Water sensitive design solutions

Water sensitive urban design solutions (WSUD) are included within Appendix C – Stormwater Management* of these PSP. Specific mention is given to them here because Complete Streets only gives a cursory design response to them. The details provided in these guidelines should provide all the information required for the designer to incorporate the appropriate WSUD as part of an integrated and complete street design. Integration of WSUD is encouraged as part of all street and road designs and should also be part of the landscaping/streetscaping design outcome. Shade tree planting should be integrated with WSUD where possible. Further guidance on this is included in Appendix C – Stormwater Management and Appendix D – Landscape design and street trees.

5.3.4 What design vehicle to use for streets and roads

- Access streets is a heavy rigid vehicle (HRV) - 12.5 metre turning radius
- District collector and above is a heavy rigid vehicle (HRV) – 12.5 metre turning radius

These standards are generic and the designer should ensure that the design is specific to the circumstances. Care should be taken by the designer in transcribing a turning arc that minimises the kerb radii to reduce pedestrian crossing distance and traffic turning speeds. Local streets in next generation and urban precincts may need to accommodate a standard 14.5m bus.

"Interference Patterns" create static spaces within the street and promote slower vehicle speeds

5.3.5 Designing for personal safety and security

Crime prevention through environmental design is an important design principle for all streets and roads. Designing in casual surveillance provided by those live and work along the street can significantly improve design outcomes and activate streets. Pedestrians should not be visually removed from the buildings that are located along the street.

Care must be taken to ensure that private open space is not placed to the frontage of buildings resulting in the blocking of the visual connection between the building and those walking along the street. In this way routes that segregate pedestrians and cyclists from the traffic should be avoided. If they are required then they must be short, well overlooked and relatively wide to avoid a sense of confinement.

The most common of these situations is the pedestrian link between cul-de-sacs. These are often created as result of poorly connected neighbourhoods. Street focused movement is preferred where possible and cul-de-sacs must be avoided or kept short and minimised in number and located where there is no need, possibility or desire to continue past the end. Refer to Planning scheme policy – Neighbourhood design for further guidance.

"If we can develop and design streets so that they are wonderful, fulfilling places to be, community-building places, attractive public places for all people of cities and neighbourhoods, then we will have successfully designed about one-third of the city directly and will have had an immense impact on the rest." - *Allan B. Jacobs, Great Streets*

Higher traffic volume roads can still have frontage access by using innovative use of shared space and consolidated access


6. Open Space
and
Civic Design

6. Open and Civic Space Design

6.1 Introduction

The quality of public open space created a strong impression to residents and visitors to our region. Cities, towns and regions that maintain generous well designed, high-quality public open and civic space look better, feel better and work better. It is part of what gives the varied communities within the region their unique identity and local citizens a sense of civic pride. Appendix B provides technical details on the MBRC standards for park types.

Design Evolution and Integration

Contemporary planning and design of open space has moved towards planned networks. Open space design is no longer only about providing a minimal amount of public land in a new development for public use. Open spaces serve multiple functions and therefore, must be carefully planned and designed to generate the best net benefit to the community and to the natural environment. Greater consideration needs to be given in the design process to ensure that public open spaces provide functions that best suit the needs of the entire community.

Open space design now incorporates a number of recreational, sporting and civic functions as well as giving regard to flood mitigation, biodiversity, sustainable drainage systems, business performance, community health and the character of an area. This process of integrated design is a key theme of this guideline.

The primary objective of integrated Open Space design is to allow open spaces to work in harmony with other uses, by taking on multiple functions that provide benefits for the entire community.

For example, the planning and design of a new playground should look for opportunities to integrate with other compatible uses. This may be achieved by locating the playground in view of the children's reading room at the library or by locating it near a café so parents can watch their children play over a coffee.

Each use receives a greater benefit being located near each other than if separated. The playground gets more exposure and the café and library receive increased business. The legibility between the uses and users has been enhanced and results in reciprocal benefits such as increased interest and vitality of the space.

Alternative solutions may be adopted provided the outcomes or performance at least equivalent to that presented in this guideline. Where it is not considered reasonable or practicable to achieve the outcome, the designer may be required to provide—to the satisfaction of Council—justification for the decision and how the design achieves the principles and desired outcomes.

Council's technical design guidelines for open and civic spaces and how they relate to place types are contained in Appendix B.

6.2 Design Principles

There are six high level design principles for open and civic space that the designer should become familiar with:

1. Relative to place and culture
2. Diverse, multi-functional and adaptable
3. Connected and accessible
4. Financially sustainable
5. Legible, activated and safe
6. Promote environmental values

6.2.1 Relative to place and culture

Residents take great pride in their neighbourhoods. Successful and enduring open spaces are those that remain relevant to people's day-to-day lives. It is important that open spaces compliment the places where people live and provide a balanced range of recreation opportunity that meets community expectations.

Council has endorsed a strategic framework vision that introduces a variety of place types for the region. The place types are key elements in a land use model which establishes desired outcomes expected in a variety of locations throughout the region. Council uses the place types to understand the needs within particular communities for parks and recreation facilities. This information allows Council to plan, design and deliver the variety of spaces and facilities that best meet the needs of the particular community and which respect the inherent landscape character. A description of the individual place types as it related to open space can be found in *Appendix B.*

The planning and design of open space should:

a) Create spaces with identity and real 'sense of place'.

b) Provide the necessary recreational opportunities and embellishments that are related to the role, function and location of the space.

c) Retain and promote natural and cultural features and Incorporate opportunities for public art and expression of community values in landscaping..

d) Provide wayfinding and signage when cultural and environmental features are present.

e) Be responsive to climatic conditions.

6.2.2 Diverse, multi-functional and adaptable

With the trend towards increased density of urban development, density, the reduction of private open space will increase the demand on the public open space network.

Every individual within the region experiences and uses open spaces in varying ways. Meeting the needs of the individual as well as the wider community is often a challenging task. In some existing neighbourhoods parks and open spaces tend to replicate the same experiences. This does not encourage a variety of users from different age groups with diverse interests to utilise open spaces. Open space users want a choice of activities and recreation opportunities across a range of settings.

People's needs for open and civic spaces also change over time. What users need today will most likely be different in the future as new interests and technologies emerge and demographics shift in the neighbourhood. To get the best out of parks and make the most efficient use of space, parks need to be adaptable to change and capable of meeting a variety of users' needs.

Multi-functional and flexible spaces adapt well to those changes, allowing for a range of users to enjoy the same space at different times of the day. For example civic spaces may be used to host community events such as markets or live music but also provide space for people to eat lunch during the day.

The planning and design of open space design should:

a) Incorporate the ability to evolve, mature and adapt over time.

b) Create an equitable network of parks with a variety of settings, experiences and facilities responsive to community needs.

c) Determine potential opportunities for multi-functionality and co-location of facilities.

d) Provide adaptable embellishments such as multi-use sport equipment and multi-purpose public art.

6.2.3 Connected and accessible

Connected and accessible open space corridors can provide attractive walkable links to popular destinations and promote an active transportation alternative. Having a good quality open and civic spaces close to residents home or workplace makes neighbourhoods much better places to live, work and play.

Open and civic space design should:

a) Provide a network of open space corridors and spaces to facilitate access and be designed to encourage use for all abilities.

b) Locate parks in prominent locations with a level of transport accessibility relevant to their place type, role, form and function.

c) Provide activities and facilities for a range of ages.

d) Create a safe and attractive walking and cycling environment to and within.

e) Create strategic links with adjoining open and civic space or land uses, particularly along waterways.

f) Consider key destination points within the open space network, serviced by sufficiently wide and well graded pathways with seating, drink fountains and activity nodes along the route.

g) Utilise shared pathway networks.

6.2.4 Financially sustainable

An understanding of the long term financial sustainability of park and open space is essential if community aspirations are to be realised and the quality of those spaces is to endure. In reality many of the most important and basic elements in open spaces are not expensive to construct and have low ongoing maintenance costs. For example, paths, trees, grass, and seats are the simple features of parks that have endured for centuries and generally hold the widest appeal. Careful planning and design of more significant and expensive facilities can also ensure sustainable ongoing maintenance costs and achieve long lifecycles.

Open space design should:

a) balance costs with the service standards expected by both Council and the community.

b) Promote the shared use of space and consolidation of facilities and activities in more appropriately located park and open space.

c) Create vibrant and functional spaces with an ability to change and adapt over time.

d) Use durable materials and finishes that are easy to maintain and replace and also attractive.

6.2.5 Legible, activated and safe

Legibility in design is one of the key principles to encourage people to use parks and open space for passive recreational activities, active transport, educational pursuits and social and cultural experiences. Legibility refers to the degree to which a place can be easily understood and navigated.

The ability to comprehend the essential structure and nature of a place is important for the casual user or visitor in developing a 'sense of place'. A place that is easily understood and provides a feeling of safety is more likely to be enjoyed by many, shared with friends and visited time and time again.

Open and civic space design should:

a) Utilise Crime Prevention Through Environmental Design Principles (CPTED).
b) Encourage a range of activities throughout the day and evening to promote the activation of space.
c) Locate facilities close to other compatible facilities to maximise joint use and minimise duplication of infrastructure.
d) Mitigate unnecessary conflicts between users and potential risks.
e) Enhance legibility of a place through the use of:
    i) Prominent landmarks and gateways
    ii) Clear views, sight lines and focus points
    iii) Clear edges and buffers between spaces
    iv) Clear and easily navigable routes
    v) Innovative lighting
    vi) Public art that enables community values and cultural heritage to be expressed in meaningful and enduring ways
    vii) Interpretative signs and way finding markers
    viii) Interactive websites and maps

6.2.6 Promote environmental values

Natural areas not only provide essential habitats for native fauna and flora but also provide important green spaces for people. Natural areas face significant pressure from population growth and urban expansion. Green corridors not only support the movement of people between places but support animal and plant movement, dispersal and refuge.

Open and civic space design should:

a) Provide facilities and activities that are considerate of and promote the sites natural setting.
b) Incorporate natural elements such as waterways and retained vegetation into park designs where appropriate.
c) Identify and enhance significant corridors which provide both environmental and recreational values.

7. Stormwater Management

7.1 Design Evolution and Integration

Past development and conventional water management practices have resulted in a decline in the health of local waterways and estuaries and impacted on the function of floodplains. Additional population growth and a changing climate are expected to place further pressure on the region's natural resources. The sustainable development of the region will be governed by the ability to better design and manage the water cycle as a whole.

The traditional approach to stormwater management has been to recognise runoff as a nuisance that poses a potential risk to life and property. Stormwater has been collected and conveyed through piped drains and concrete channels as quickly and efficiently as possible.

In recent years, there has been an increasing recognition of the need to responsibly mange, control and improve the quality of stormwater runoff which can improve waterway health. A history of wasteful water consumption has significantly impacted upon the current state of Australia's water cycle and its status as the driest inhabited continent in the world. The current trends across Australian governmental agencies are to implement strategic initiatives that aim to strike a balance between the volume of water that is treated to a potable standard and the percentage that is actually consumed. Water Sensitive Urban Design (WSUD) offers one such approach by integrating water into the design fabric of the urban environment.

WSUD is a holistic design approach to the planning and design or urban development that aims to minimise negative impacts on the natural water cycle and protect the health of aquatic ecosystems. This is achieved by multidisciplinary design teams; including technical specialists such as ecologists, civil/environmental engineers, landscape architects, urban designers and maintenance personnel who collaborate to develop comprehensive stormwater systems that integrate with the local environment.

WSUD is expected to:

a) Reduce the negative impact of development on stormwater quality and limit potential for increased flows in local waterways. Protect waterway habitat from impacts of urbanisation
b) Reduce changes to the natural flow regime by maximising infiltration
c) Promote water reuse
d) Assist flooding and drainage control
e) Promote flexible solutions that correspond with site constraints

Consider the social value of stormwater by providing additional aesthetic benefits

7.2 Design Principles

The key principles upon which stormwater systems will be designed, constructed and maintained are presented below. Inevitably there is some degree of overlap between the principles so it is important that they are understood in their totality.

7.2.1 Integrated and Fit for Purpose

Water plays an essential role in the day-to-day lives of the community. Water can be treated to different levels with potable quality water required to sustain life. However water with a lower level of treatment can be used for non-potable purposes such as the irrigation of gardens or playing fields. Stormwater is a valuable resource that can be used to replace potable water where a higher standard of water is not required.

The stormwater network and associated infrastructure should be planned, designed and constructed to:

a) Meet the expectation of the community
b) Fulfil a range of functions (aesthetic, environmental, recreational, microclimate, etc).
c) Consider and support the planning and design of other infrastructure networks.

Stormwater conveyance, storage and treatment elements can be utilised to form a stormwater network that achieves the desired objectives and is integrated with the surrounding environment.

7.2.2 Manageable and financially sustainable

As with any asset managed by Council, ensuring stormwater assets are designed, constructed, established and maintained correctly is more cost effective than rectifying poorly-functioning assets. The risk of rectification can be substantially reduced by well-designed and constructed assets that consider whole of lifecycle costs.

The stormwater network and associated infrastructure should be planned, designed and constructed to:

a) Balance the cost implications with the service standards expected by both Council and the community
b) Mitigate the impacts of natural hazards on critical infrastructure
c) Enhance the ecological values of the region

7.2.3 Adaptable to Growth

The region is facing unprecedented growth over the coming years. This growth will present many challenges including increased water demand, flooding impacts, demand for space, climate change and the future health of our waterways.

As the needs of the community evolve over time, the way we treat water in the urban environment needs to evolve as well.

The stormwater network and associated infrastructure should be planned, designed and constructed to:

a) Cater for future demand
b) Be responsive and adaptive to changes in land use and built form
c) Integrated with other infrastructure networks

7.2.4 Safe

Planners and designers must recognise the constraints natural waterways and constructed stormwater systems place on development. Similarly designers must ensure any water infrastructure introduced into the urban environment is designed to meet current safety standards and minimise risk to the community but still provides a high level of amenity.

The stormwater network and associated infrastructure should be planned, designed and constructed to:

a) Protect people, property and critical infrastructure from the adverse impacts of flooding
b) Reduce peak flows from urban development by local detention measures, minimise impervious areas, and promote infiltration where applicable
c) Reduce pollutant loads to mitigate the health risks to the community and the environment
d) Mitigate conflicts between users and potential risks

7.2.5 Promote diversity and community values

Waterways and coastal areas are important, not only for the inherent value of their diverse ecosystems, but also for their recreational and economic uses. The value of waterways will be different for every individual in the region and meeting the needs of the individual as well as the wider community is often a challenging task.

The stormwater network and associated infrastructure should be planned, designed and constructed to:

a) Be functional, visually appealing, and integrate into the landscape to enhance visual, social, cultural and ecological values.
b) Maximise the retention and preservation of natural vegetation, landforms and ecological processes.
c) Prevent decline in waterway health
d) Promote natural diversity.

7.2.6 Improve Water Security

New urban developments are increasing pressure on the environment through the need to develop additional drinking water supplies and the discharge of polluted stormwater and treated wastewater into receiving waters. Better management of drinking water is integrally linked to both water conservation and waste minimisation through the efficient and effective re-use of stormwater and wastewater resources.

The stormwater network and associated infrastructure should be planned, designed and constructed to:

a) Reduce potable mains consumption through the efficient use and reuse of water
b) Consider alternative water sources through the use of rainwater and stormwater harvesting
c) Recharge of natural groundwater.

7.2.7 Improve Waterway Health

Many economic, ecological and social values can be seriously affected by a decrease in waterway health. Given the population and urban development forecasts, a business as usual approach will accelerate a decline in the health of the region's waterways. Managing the negative impacts of urban development, such as increased stormwater flows, and the associated sediment and nutrient loads is a priority to ensure the continued health of the region's waterways.

The stormwater network and associated infrastructure should be planned, designed and constructed to:

a) Protect and enhance the ecological health and biodiversity of streams, creeks and rivers.
b) Improve the quality of water draining from urban developments and Ensure new urban developments are increasing roadways into the receiving environment by utilising best practice stormwater management.
c) Prevent erosion of waterways, slopes and banks.
d) Minimise site disturbance, control runoff and prevent increased movement of sediment into surrounding waterways.

7.2.8 Protect coastal areas

Coastal and inland development such as waterway modification, development on floodplains, and removal of riparian vegetation, is placing pressure on inland and coastal aquatic ecosystems that are essential habitat for freshwater and marine plant and animal life. It is important that coastal areas are continually protected and the negative effects of development are minimised.

The stormwater network and associated infrastructure should be planned, designed and constructed to:

a) Incorporate best management practice in all projects
b) Protect the coastline and critical infrastructure from environmental processes such as erosion, storm tide and sea level rise.

Appendix C provides the technical criteria to deliver on these design principles.

8. Landscape Design & Street Trees

8. Landscape Design & Street Trees

8.1 Trees for Streets, Roads and Places

Trees are a vital component to achieve successful street, road and place design outcomes.

Trees in urban environments including streets and roads are essential for a high quality streetscape and contribute to shadier more comfortable pathways and places which in turn encourage increased participation in walking and cycling. Healthy, established urban trees provide a long term legacy for the community. Many of the most memorable streets, roads and places can attribute their noteworthy status to the presence of significant trees.

At the regional scale trees in streets and roads contribute to the overall percentage canopy cover which in turn delivers a variety of environmental benefits. To achieve successful streetscapes critical factors such as selection of the most appropriate tree species, quality of the plant stock, care in planting and planning for and providing adequate soil, water and maintenance are essential.

Appendix D – Landscape design and street trees of this PSP provides guidance on landscaping and street tree planting within the Moreton Bay Region.

Shady tree lined streets provide a welcoming environment for pedestrians and cyclists

8.1.1 Design Principles

1 Street trees are a legacy for the community. Maximise planting of trees in all streets and roads, and retain existing trees wherever possible.

2 Street trees should contribute to the overall unity of the streetscape, through their layout, scale and character. Careful selection of the tree species will provide scale and visual cohesion to the street. Beyond this generic design intent for the street trees, trees can also form landmarks, contribute to both contextual character and the general amenity of a place.

3 Select the most appropriate tree species to satisfy the design intent and the physical conditions of the site both natural and man-made. Respond to other functional requirements such as solar access, vehicle clearances etc.

4 Optimise growing conditions for trees. Locate trees to maximise available soil volume in the root zone, and that adequate moisture is provide to that zone, and incorporate structural soils, continues tree planning pits and permeable pavements to ensure sustainable growth.

5 Street trees need adequate water to flourish. Street tree location and design should optimise passive watering of all street trees.

6 Minimise infrastructure and functional conflicts. Locate trees and utility services to minimise potential conflicts between street elements and functions, such as streetlights being blocked by the tree canopy, or car doors being opened into tree trunks.

7 Where appropriate integrate water sensitive urban design (WSUD) initiatives with the provision of street trees.

8.2 Landscape design

This section forms the core of the PSP establishing the key principles upon which landscaping projects will be designed, delivered and managed. Inevitably there is some degree of overlap between the principles, so it is important that they are read and understood in their totality. Applying these principles in landscape design outcomes will ensure Council's vision for open space is achieved throughout the region.

8.2.1 Resilience

Resilience is the ability to adapt or cope with the changing world to keep parks and open space relevant and minimize the impact of adverse changes. The design must accommodate user change, cultural change and environmental change.

Through landscape design the development provides a landscape of resilient spaces designed to acknowledge our changing subtropical climate and maximise potential positive opportunity from change within the site and environment. Such spaces should seek to integrate change through:

a) The topography and existing site conditions, including existing vegetation;

b) Drought tolerance, through innovative use of rainwater runoff;

c) A minimization of the consumption of energy by selecting sustainable materials and appropriate species in planting to reduce maintenance intervention;

d) The use of robust, preferably local, materials; and

e) A consideration of potential positive and negative impacts from extreme weather events.

Through landscape design the development provides durable, multifunctional and useable spaces that are of sufficient area and dimension to cater for a diverse group of users and a range of passive and active recreation uses.

8.2.2 Place

A great place is created through the generation and enhancement of spaces that are distinct and acknowledge the landscape in which they sit. The design should acknowledge landscape character elements, a development's visual impact and history.

Through landscape design the development integrates and enhances topographic features, existing trees and vegetation, water bodies, landmarks, gateways, scenic areas and views of the site and surrounds.

Cultural, historical and heritage features of both indigenous and non-indigenous origin are integrated into the development in a way that enhances their values and conserves its core meaning.

Through landscape design, the development provides a landscape that acknowledges the qualities of our subtropical climate and enhances the 'sense of place' of the area, through:

a) Integrating and softening the built form, from the streetscape and adjoining uses;

b) The provision of shade trees;

c) The provision of sufficient buffers to the street and incompatible uses; and

d) A high standard of landscaping at entries, adjoining public spaces and pedestrian thoroughfares.

8.2.3 Movement

The spaces need to be connected, accessible and legible to function seamlessly and promote use. This is required for both internal lot movement and inter-lot movement.

Through landscape design the development provides a landscape that is legible and connects private open space and building forecourts with public spaces offsite to encourage pedestrian useability, to maximise accessibility, promote active lifestyles and ultimately link to the public transport system.

8.2.4 Environment

Through appropriate landscape planning and design, new development should provide a landscape that acknowledges and enhances the environmental values of the area through:

a) Effective buffering of areas of environmental sensitivity;

b) Rehabilitation of areas of poor environmental quality;

c) Maximising the retention of existing trees and vegetation;

d) Enhancing biodiversity by encouraging use of endemic flora and fauna;

Maximising wildlife connectivity and reducing habitat fragmentation by retaining remnant vegetation and connecting it with new landscaping.

8.2.5 Interaction

Landscape planning and design outcomes should encourage social interaction. There should be places that are comfortable for people to sit, dine, enjoy views within and external to the space and be comfortable with appropriate shade and weather protection. There should be opportunities for interaction with vegetated natural areas, edges of waterways or elevated viewpoints, to enhance a wider appreciation of the values and sensitivity of the surrounding landscape features.

The community should have ready access to open space that has:

a) Flexibility so that they can be used for a wide variety of activities;

b) Semi private areas as well as larger public expanses;

c) Access to winter sunshine, summer shade, and shelter from wind and rain;

d) Paths, crossing spaces and seating are located to encourage incidental social interaction;

e) The potential for community or kitchen gardens;

f) A range of amenities that enhance the enjoyment and use of the space.

The development provides visually appealing and comfortable private open spaces with sufficient area and shade for the enjoyment and appreciation of residents and their visitors.

Integrated Design - Appendix A
Streets, Roads & Utilities

For State Approval - Major Amendment 1 - December 2017

CONTENTS

1. Introduction

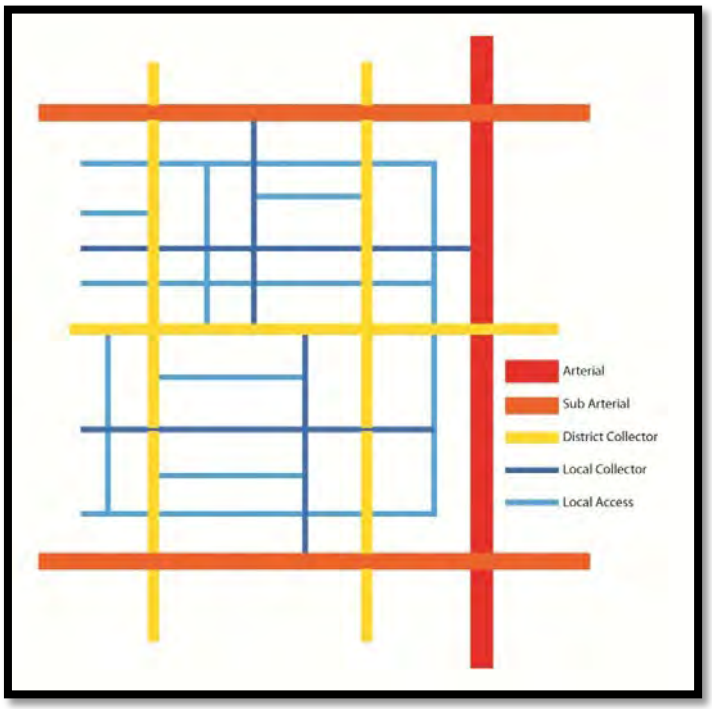
This appendix provides a step by step process to determining the appropriate road and street design standards, and requirements for utility provision in new roads and streets, and for new development including Material Change of Use and Reconfiguring a lot.

A Road network plan may be required to be prepared for new developments in order to determine the appropriate road and street functions and applicable cross sections. Further guidance on preparing road network plans is contained in Planning scheme policy – Neighbourhood design.

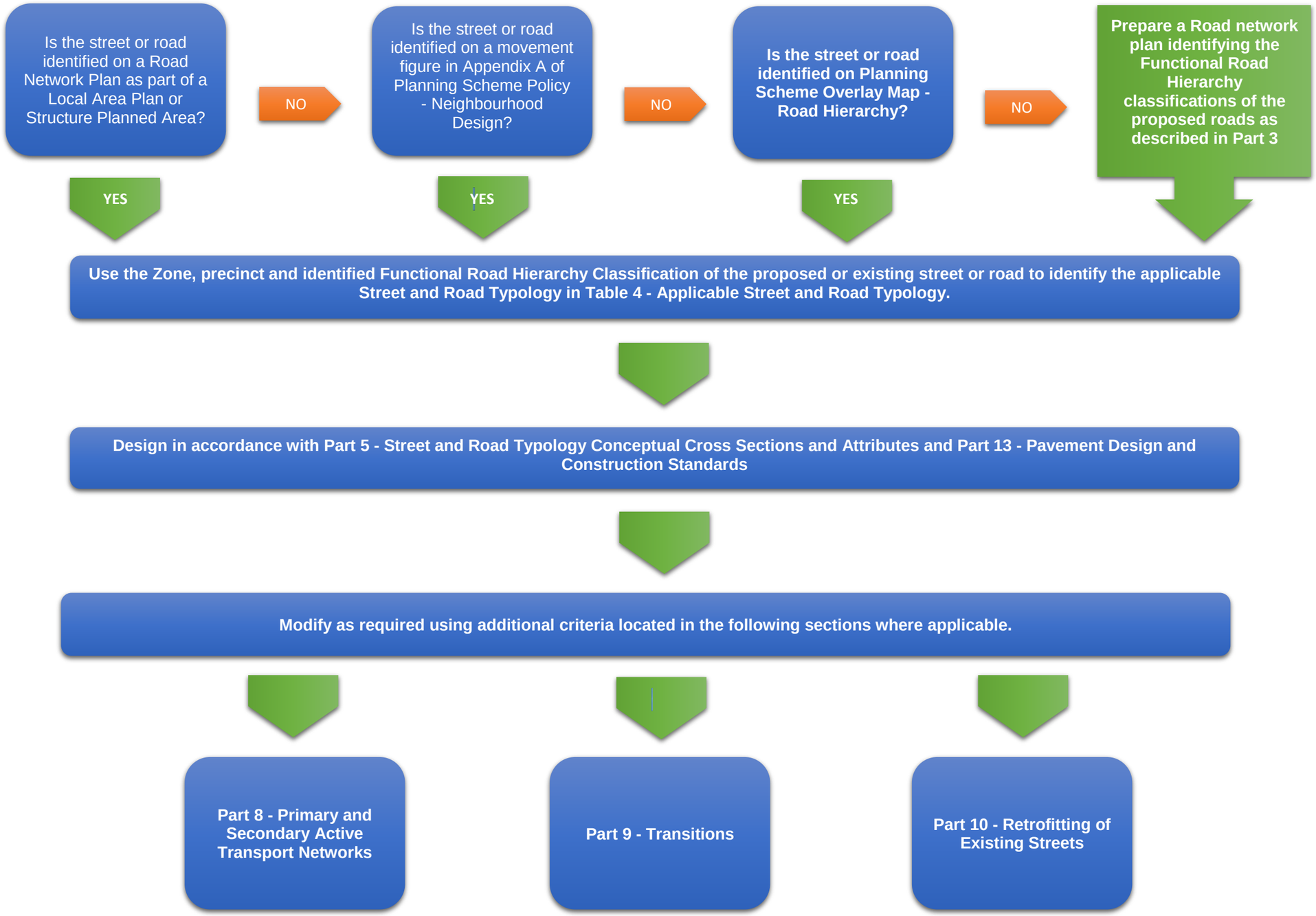
Part 2 of this appendix, provides the framework for the design and construction of new roads and streets, as well as retrofitting or upgrading of existing streets and roads. Additional design criteria related to street design also located in this appendix includes Part 7 - Recommended Posted Speed Limits, Part 11 - Pedestrian Crossing Design and Locations, and Part 12 - Intersection Management.

Appendix A also includes the design and location standards for driveways and crossovers in Part 14 - Driveways, Vehicle and Pedestrian Crossovers, and servicing standards for all new development in Part 15 - Street Lighting and Public utilities.

Reference is also made to Council's standard drawings listed in the Appendix H of this policy for specific detailed design standards for each component of roads, streets and utilities. The diagrams provided in this appendix are for conceptual purposes only, to illustrate how the attributes fit into an integrated cross section. Reference is also made to Appendix D - Landscape Design and Street Trees with regards to planting requirements for street trees and general landscaping within the reserve and Appendix C – Stormwater Management for design requirements for stormwater infrastructure including WSUD components.



2. Road & Street Selection Framework



Note: Refer to Planning scheme policy – Neighbourhood design and Planning scheme policy - Integrated transport assessment for guidance on road layouts and network design.

3. Functional Road and Street Classifications

<table>
<tr><th colspan="2">Detailed Function</th><th>Functional Hierarchy Designation</th><th>Primary Function</th></tr>
<tr><td rowspan="2">Regional movements

Longer distance intra-regional movements

Primary freight routes</td><td>Regionally and nationally significant movements.</td><td>Highway/Motorway</td><td rowspan="3">Movement
Roads carrying through traffic</td></tr>
<tr><td>Connections to and from highways and motorways
Prioritises intra-regional movements</td><td>Arterial Road</td></tr>
<tr><td colspan="2">Connections between destinations and Arterial Roads.</td><td>Sub-Arterial Road</td></tr>
<tr><td rowspan="2">Connections between suburbs and destinations.

Connections between higher order roads (sub-arterial, arterials) and Access streets</td><td>Major connections between 2 or more suburbs; or

Connections between higher order roads (Sub-arterial, Arterials)</td><td>District Collector Road</td><td rowspan="3">Place
Streets providing local property access and collection of local traffic.</td></tr>
<tr><td>Connections within a suburb or neighbourhood;

Carry traffic likely to have a trip end within the suburb or neighbourhood</td><td>Local Collector Street</td></tr>
<tr><td colspan="2">Access to individual properties and local destinations.</td><td>Access Street</td></tr>
</table>

4. Applicable Street and Road Typology

CENTRE

Zone & Precinct	Role, Function or Location	Applicable Road Type
Higher Order Precinct [1]	Main Street (as identified on a movement diagram or structure plan)	Main Street
	Roads located on the fringe of a centre (centre on one side of road only)	Urban Fringe
	District Collector roads or Above (other than Main Streets and roads on the fringe of the centre)	Urban
	Shared Streets (as identified on a movement diagram or structure plan)	Shared Business
	Laneways (for service, loading or rear parking access)	Business Laneway
	All other roads and streets (Local Access or Local Collector)	Higher Order Access
District Precinct	Main Street (as identified on a movement diagram or structure plan)	District Main Street
	Laneways (for service, loading or rear parking access)	Business Laneway
	All other roads (centre zone both sides)	Urban
	All other roads (centre one side only)	Urban Fringe
Local Precinct	Laneways (for service, loading or rear parking access)	Business Laneway
	All other roads (centre zone both sides)	Urban
	All other roads (centre one side only)	Urban Fringe

GENERAL RESIDENTIAL

Zone & Precinct	Role, Function or Location	Applicable Road Type
Coastal Communities Precinct	Arterial and Sub-Arterial	Arterial and Sub-Arterial
	District Collector	District Collector
	Local Collector	Living Residential
	Access Streets	Access Residential
	Fringe of Centre Zone (centre on one side of road only)	Urban Fringe
Suburban Neighbourhood Precinct	Arterial and Sub-Arterial	Arterial and Sub-Arterial
	District Collector	District Collector
	Local Collector	Living Residential
	Access Streets	Access Residential
	Fringe of Centre Zone (centre on one side of road only)	Urban Fringe
Next Generation Neighbourhood Precinct [2]	Arterial and Sub-Arterial	Arterial and Sub-Arterial
	Access Streets	Living Residential
	District Collector	District Collector
	Fringe of Centre Zone (centre on one side of road only)	Urban Fringe
	Local Collector	Contemporary Residential
	Laneway	Laneway Residential
Urban Neighbourhood Precinct	Arterial and Sub-Arterial	Arterial and Sub-Arterial
	District Collector or Above	District Collector
	Fringe of Centre Zone (centre on one side of road only)	Urban Fringe
	All other roads	Contemporary Residential
	Laneway	Laneway Residential

INDUSTRY

Zone & Precinct	Role, Function or Location	Applicable Road Type
All precincts	Access Streets	Industry Access
	Local Collectors	Industry Collector
	District Collectors	District Collector
	Arterial and Sub-Arterial	Arterial and Sub-Arterial

RURAL RESIDENTIAL

Zone & Precinct	Role, Function or Location	Applicable Road Type
All Precincts	District Collectors, Local Collectors and Access Streets	Rural Residential
	Sub-arterial & Arterial Roads	As per AustRoads *(must contain a 1.5 metre pathway and street trees as per Rural Residential cross section)*

RURAL

Zone & Precinct	Role, Function or Location	Applicable Road Type
All Precincts	All Roads	As per Austroads

RURAL TOWNSHIP

Zone & Precinct	Role, Function or Location	Applicable Road Type
All Precincts	Main Street (as identified on a movement diagram or structure plan)	Rural Main Street
	Sub-arterial & Arterial Roads	As per AustRoads *(must contain a 1.5 metre pathway and street trees as per access residential cross section)*
	All other streets	Access Residential

EMERGING COMMUNITY

Zone & Precinct	Role, Function or Location	Applicable Road Type
Transition precinct	Arterial and Sub-Arterial	Arterial and Sub-Arterial
	Access Streets	Living Residential
	District Collector	District Collector
	Fringe of Centre (centre on one side of road only)	Urban Fringe
	Local Collector	Contemporary Residential
	Laneway	Laneway Residential
Urban neighborhood area (Morayfield South)	Arterial and Sub-Arterial	Arterial and Sub-Arterial
	District Collector	District Collector
	Fringe of Centre (centre on one side of road only)	Urban Fringe
	All other roads	Contemporary Residential
	Laneway	Laneway Residential

Caboolture West Local Area

Zone & Precinct	Role, Function or Location	Applicable Road Type
Structure Plan Area 1	Arterial and Sub-Arterial	Arterial and Sub-Arterial
	Access Streets	Living Residential
	District Collector	District Collector
	Local Collector	Contemporary Residential
	Main Street (as identified in Structure Plan Area 1)	Caboolture West Main Street
	Landscape Character Street (as identified in Structure Plan Area 1)	Landscape Character
	Laneway	Laneway Residential

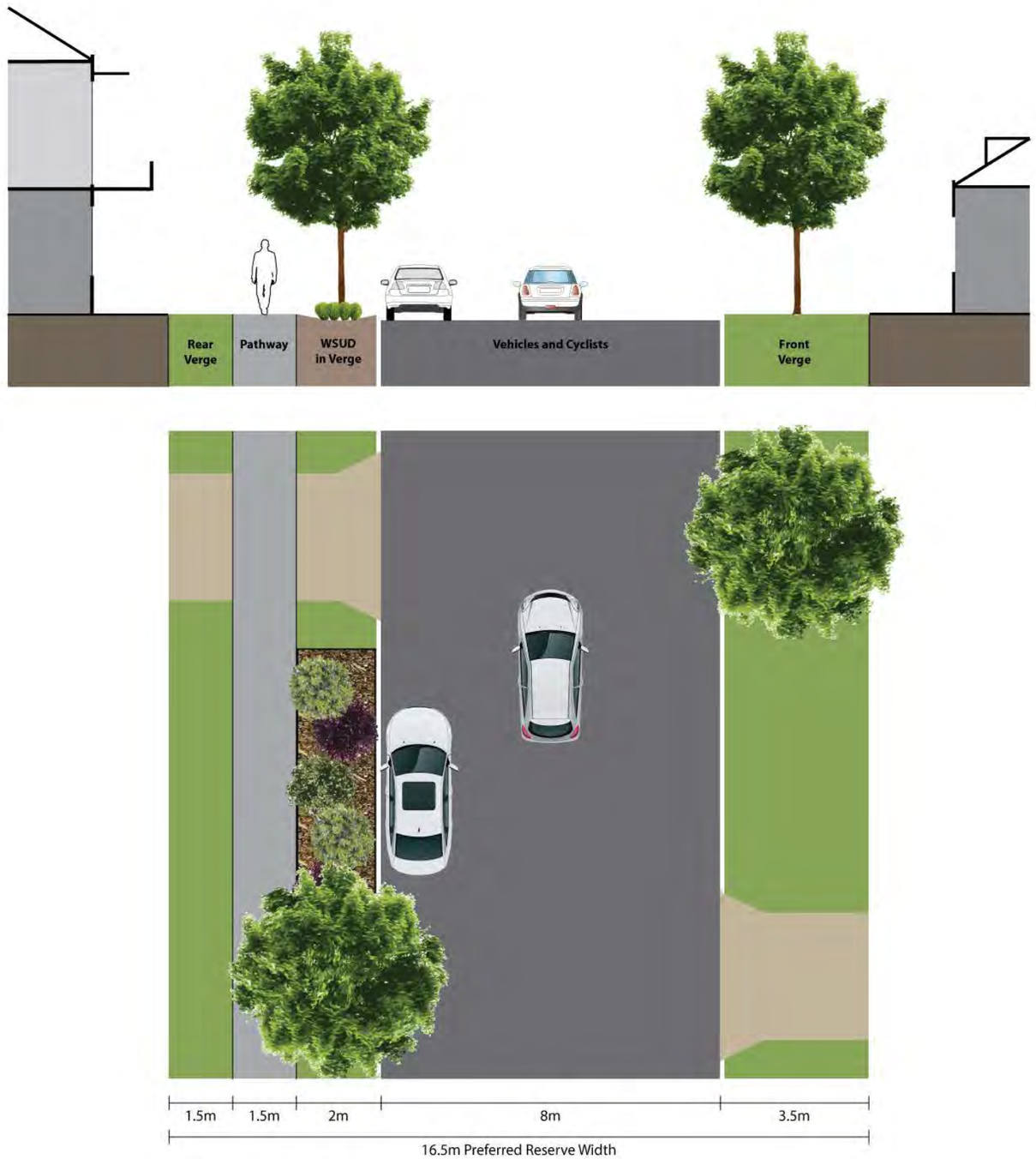
Redcliffe Kippa-Ring Local Plan

Local Plan Precinct	Role, Function or Location	Applicable Road Type
Kippa-Ring village precinct *Redcliffe seaside village precinct* *Health and Local services precinct*	Main Street (as identified on a movement diagram or structure plan)	Main Street
	Roads located on the fringe of a centre (centre on one side of road only)	Urban Fringe
	District Collector roads or Above (other than Main Streets and roads on the fringe of the centre)	Urban
	Shared Streets (as identified on a movement diagram or structure plan)	Shared Business
	Laneways (for service, loading or rear parking access)	Business Laneway
	All other roads and streets (Local Access or Local Collector)	Higher Order Access
Interim residential precinct	Arterial and Sub-Arterial	Arterial and Sub-Arterial
	District Collector or Above	District Collector
	Fringe of Centre Zone (centre on one side of road only)	Urban Fringe
	All other roads	Contemporary Residential
	Laneway	Laneway Residential

5. Street and Road Typology Conceptual Cross Sections & Attributes

5.1 Access Residential

Indicative Road & Street Typology Cross Section



Typology Attributes

*This typology is applicable to a road hierarchy of Access Street within the **Suburban neighbourhood precinct** only.*

Carriageway: ✓

- Minimum width of 8 metres.

Centre line, traffic lane or parking lane line-marking is not required. Carriageway is to allow for informal kerbside parallel parking to occur on both sides of the carriageway, whilst maintaining sufficient width to allow a refuse or emergency vehicle to pass unimpeded.

Pathway: ✓

- Minimum width 1.5 metres on one side of carriageway.

Cycle Lane: x

- Not required.

Street Trees: ✓

- Minimum of 1 tree per lot frontage.

Verge: ✓

- 5.0 metres minimum width where containing a pathway; or
- 3.5 metres where no pathway is provided.

Where a verge contains a pathway, the front verge (between the edge of pathway and back of kerb) is to be a minimum of 2 metres wide, whilst the rear verge (between the edge of pathway and property boundary) is to be a minimum of 1.5 metre wide.

On Street Parking: ✓

- Minimum of 0.5 on street car parking spaces per lot frontage.

Parking is to be provided informally within carriageway.

Direct Lot Vehicle Access: ✓

- Direct vehicle access is permitted.

Lots with frontages of less than 10m that gain access directly from this road typology are to combine and share a single crossover in accordance with PSP - Neighbourhood Design.

Median: x

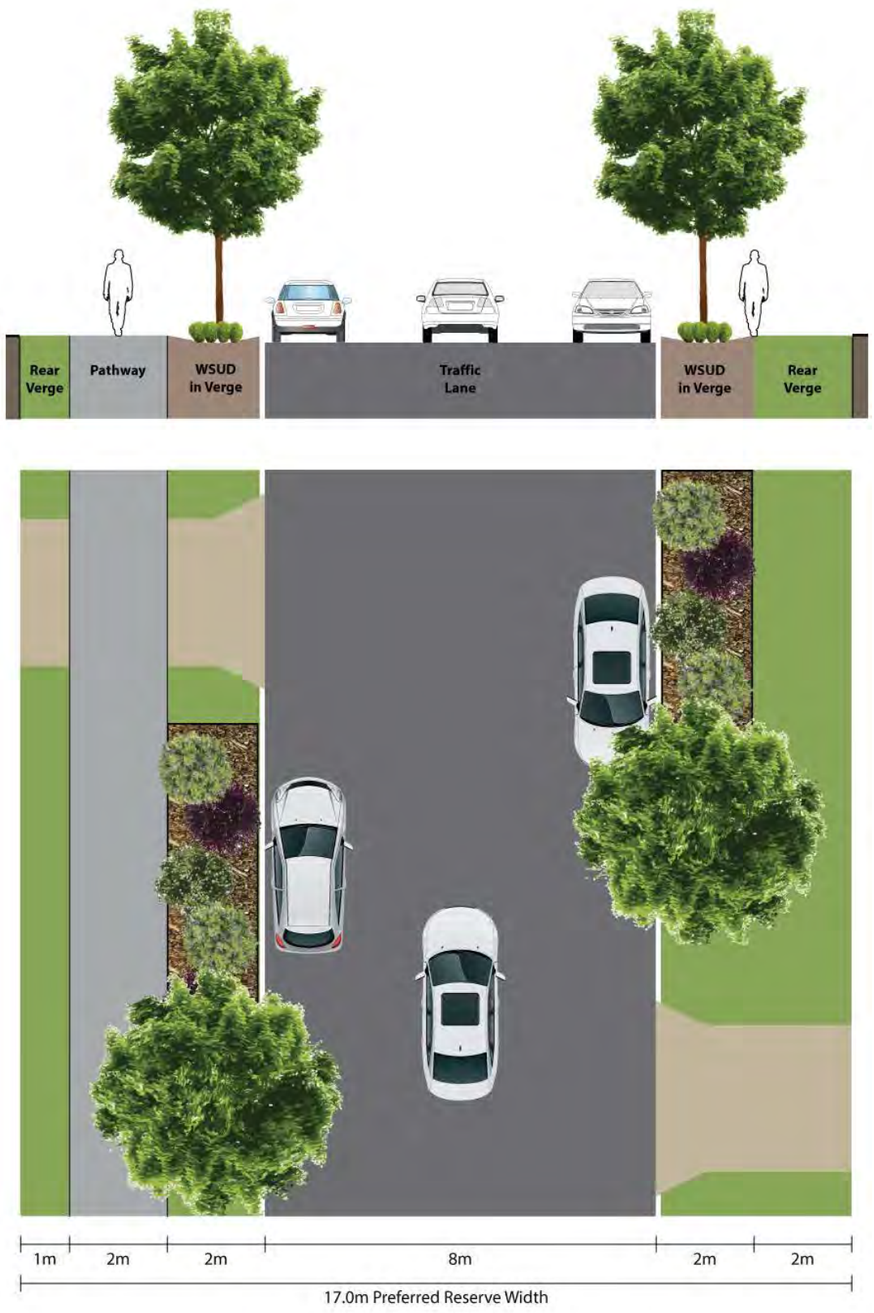
- Not required unless identified through detailed design for safety reasons.

Possible Bus Route: x

- Not required.

5.2 Living Residential

Indicative Road & Street Typology Cross Section



Typology Attributes

*This typology is applicable to road hierarchies of Access Streets within the **Next generation neighbourhood precinct** and Local Collectors within the **Suburban neighbourhood precinct**.*

Carriageway: ✓

- Minimum width of 8 metres.

Centre line, traffic lane or parking lane line-marking is not required. Carriageway is to allow for informal kerbside parallel parking to occur on both sides of the carriageway, whilst maintaining sufficient width to allow a refuse or emergency vehicle to pass unimpeded.

Pathway: ✓

- Minimum width 2.0 metres on one side of carriageway.

Cycle Lane: x

- Not required.

Street Trees: ✓

- Minimum of 1 tree per lot frontage.

Verge: ✓

- 5.0 metres minimum width where containing a pathway; or
- 4.0 metres where no pathway is provided.

Where a verge contains a pathway, the front verge (between the edge of pathway and back of kerb) is to be a minimum of 2 metres wide, whilst the rear verge (between the edge of pathway and property boundary) is to be a minimum of 1 metre wide.

On Street Parking: ✓

- Minimum of 0.5 on street car parking spaces per lot frontage.

Parking is to be provided informally within carriageway.

Direct Lot Vehicle Access: ✓

- Direct vehicle access is permitted.

Lots with frontages of less than 10m that gain access directly from this road typology are to combine and share a single crossover in accordance with PSP - Neighbourhood Design.

Median: x

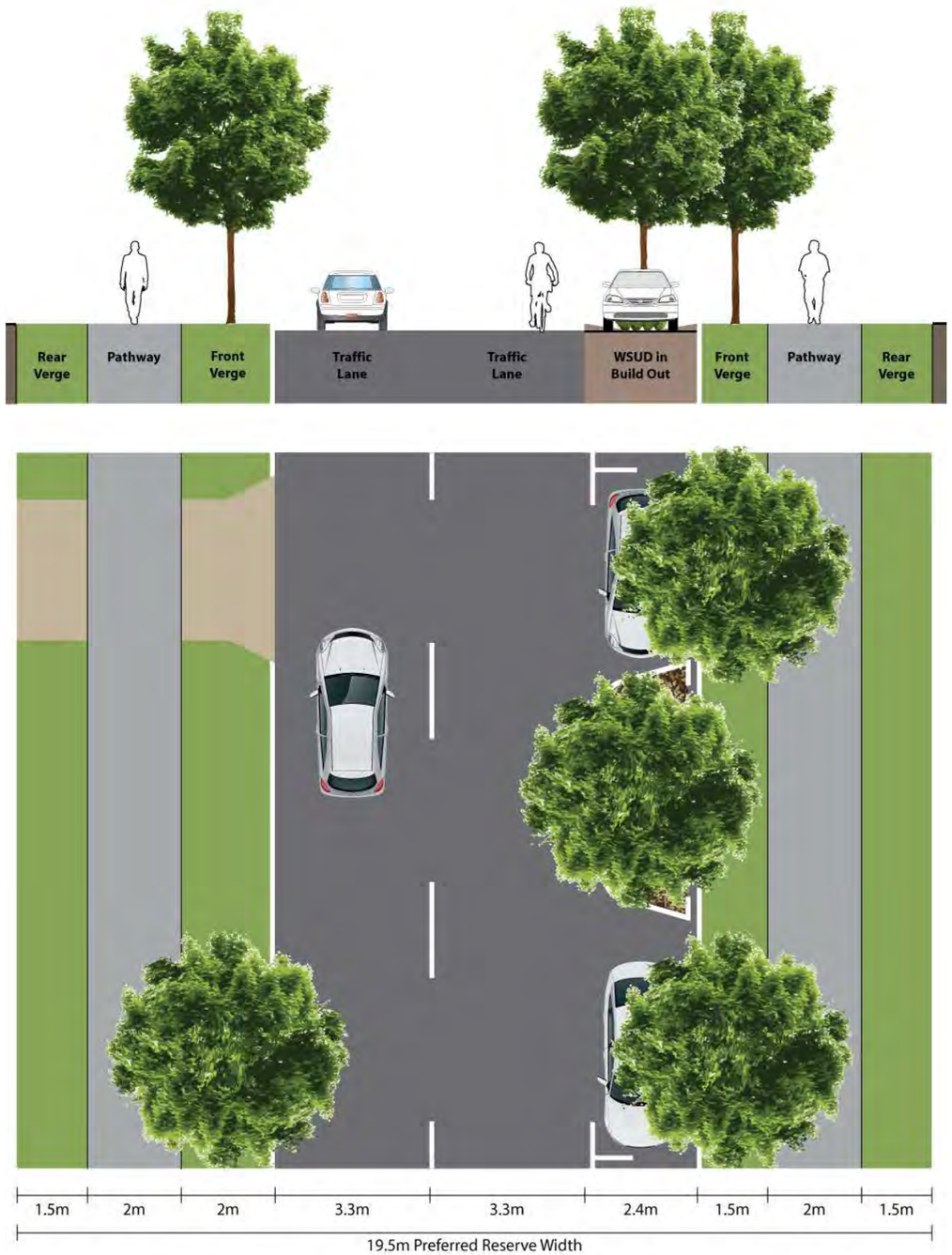
- Not required unless identified through detailed design for safety reasons.

Possible Bus Route: x

- Not required.

5.3 Contemporary Residential

Indicative Road & Street Typology Cross Section



Typology Attributes

*This typology is applicable to road hierarchies of Local Collector Streets within the **Next generation neighbourhood precinct** and Local Collectors and Access Streets within the **Urban neighbourhood precinct**.*

Carriageway: ✓

- Minimum width of 3.3 metres per traffic lane.

Centre line, traffic lane and parking bay line-marking is to be provided on this street type. Carriageway is to allow for kerbside parallel parking to occur on one or both sides of the carriageway, formalized by street tree build outs, whilst maintaining two clear through lanes.

Pathway: ✓

- Minimum width 2 metres on both sides of carriageway.

Cycle Lane: x

- Not required.

Street Trees: ✓

- Minimum of 1 tree per lot frontage plus 1 tree in every build out.

Verge: ✓

- 5.0 metres minimum width where containing a pathway; or
- 3.5 metres where no pathway is provided.

Where a verge contains a pathway, the front verge (between the edge of pathway and back of kerb) is to be a minimum of 2 metres wide, whilst the rear verge (between the edge of pathway and property boundary) is to be a minimum of 1.5 metre wide.

On Street Parking: ✓

- Minimum of 0.5 on street car parking spaces per lot frontage.

Kerbside parallel parking bays are to be provided on at least one side of the carriageway, formalised by street tree build outs.

Direct Lot Vehicle Access: ✓

- Direct vehicle access is permitted.

Lots with frontages of less than 10m that gain access directly from this road typology are to combine and share a single crossover in accordance with Planning scheme policy - Neighbourhood design.

Median: x

- Not required unless identified through detailed design for safety reasons.

Possible Bus Route: ✓

5.4 Laneway Residential

Indicative Road & Street Typology Cross Section

Typology Attributes

*This typology is applicable to Laneways in all precincts of the **General Residential Zone** as permitted by the Planning Scheme.*

Carriageway: ✓
- Minimum width of 5 metres

Pathway: x
- Not required.

Cycle Lane: x
- Not required.

Street Trees: ✓
- Not required. Are permitted in verge dependent on appropriate size and species.

Verge: ✓
- 1.0 metre minimum width either side of carriageway.

Verge width may be required to be widened to accommodate street lighting dependent on length of laneway and availability of space within mid lane pedestrian connections.

On Street Parking: x
- Parking is not to be accommodated on this street type.

Direct Lot Vehicle Access: ✓
- Direct vehicle access is permitted.

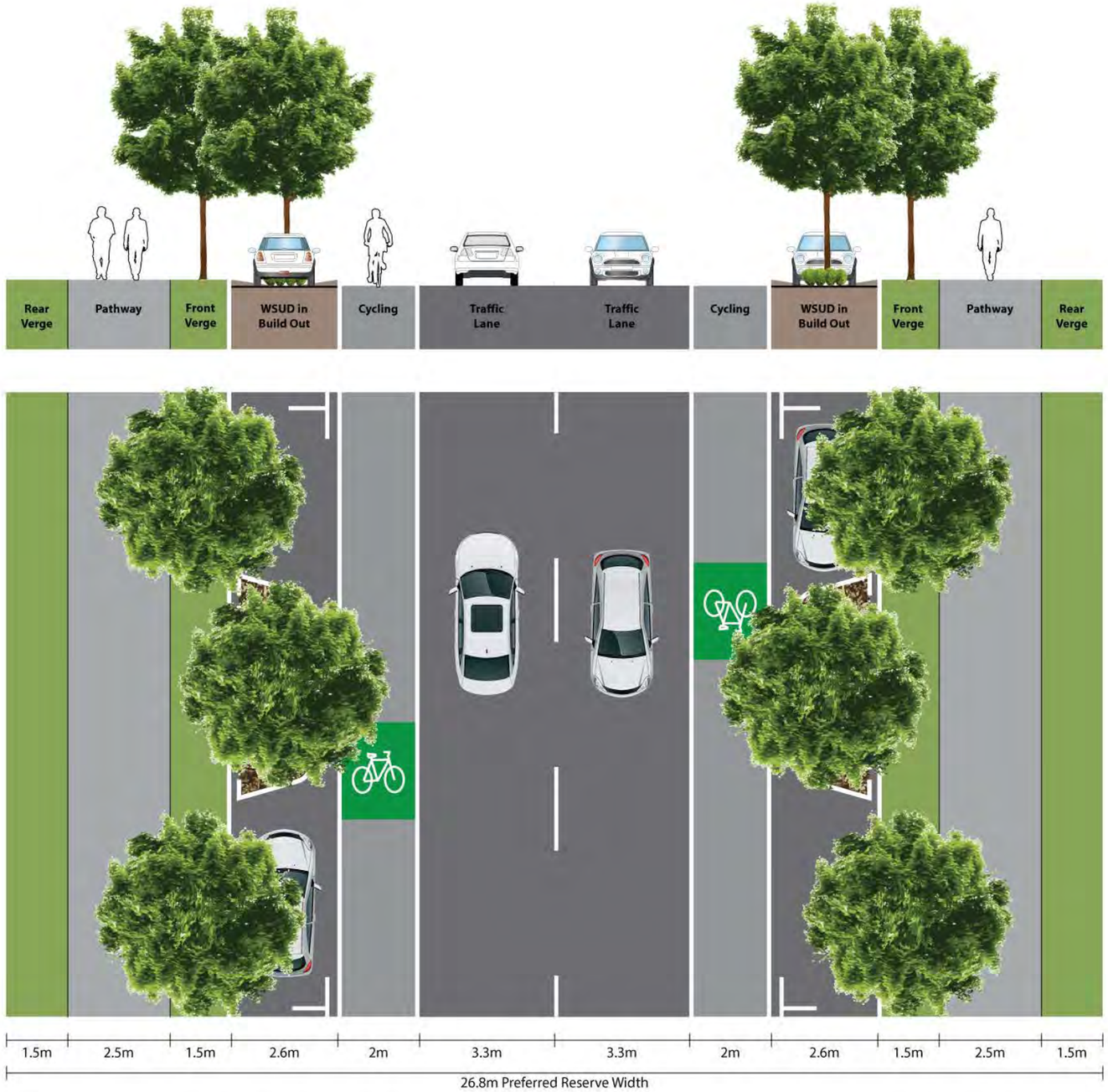
Lots serviced by this street type must obtain vehicle access from it.

Median: x
- Not required

Possible Bus Route: x
- Not required.

5.5 District Collector

Indicative Road & Street Typology Cross Section



Typology Attributes

*This typology is applicable to District Collectors in all precincts of the **General Residential Zone** as permitted by the Planning Scheme.*

Carriageway: ✓

- Minimum width of 3.3 metres per traffic lane.

Centre line, traffic lane and parking bay line-marking is to be provided on this street type. Carriageway is to allow for kerbside parallel parking to occur on both sides of the carriageway, formalized by street tree build outs, whilst maintaining two clear through lanes and dedicated on road cycle lanes.

Pathway: ✓

- Minimum width 2.5 metres on both sides of carriageway.

Cycle Lane: ✓

- Minimum width of 2 metres per cycle lane on each side of the carriageway.

Street Trees: ✓

- Minimum of 1 tree per lot frontage or 25m of street length whichever is the greater.

Verge: ✓

- 5.5 metres minimum width including pathway.

Where a verge contains a pathway, the front verge (between the edge of pathway and back of kerb) is to be a minimum of 2 metres wide, whilst the rear verge (between the edge of pathway and property boundary) is to be a minimum of 1.5 metre wide.

On Street Parking: ✓

- Minimum of 0.5 on street car parking spaces per lot frontage.

Kerbside parallel parking bays are to be provided on both sides of the carriageway, formalised by street tree build outs.

Direct Lot Vehicle Access: x

- Direct vehicle access is generally not permitted. Council may consider alternative access arrangements on a detailed design basis.

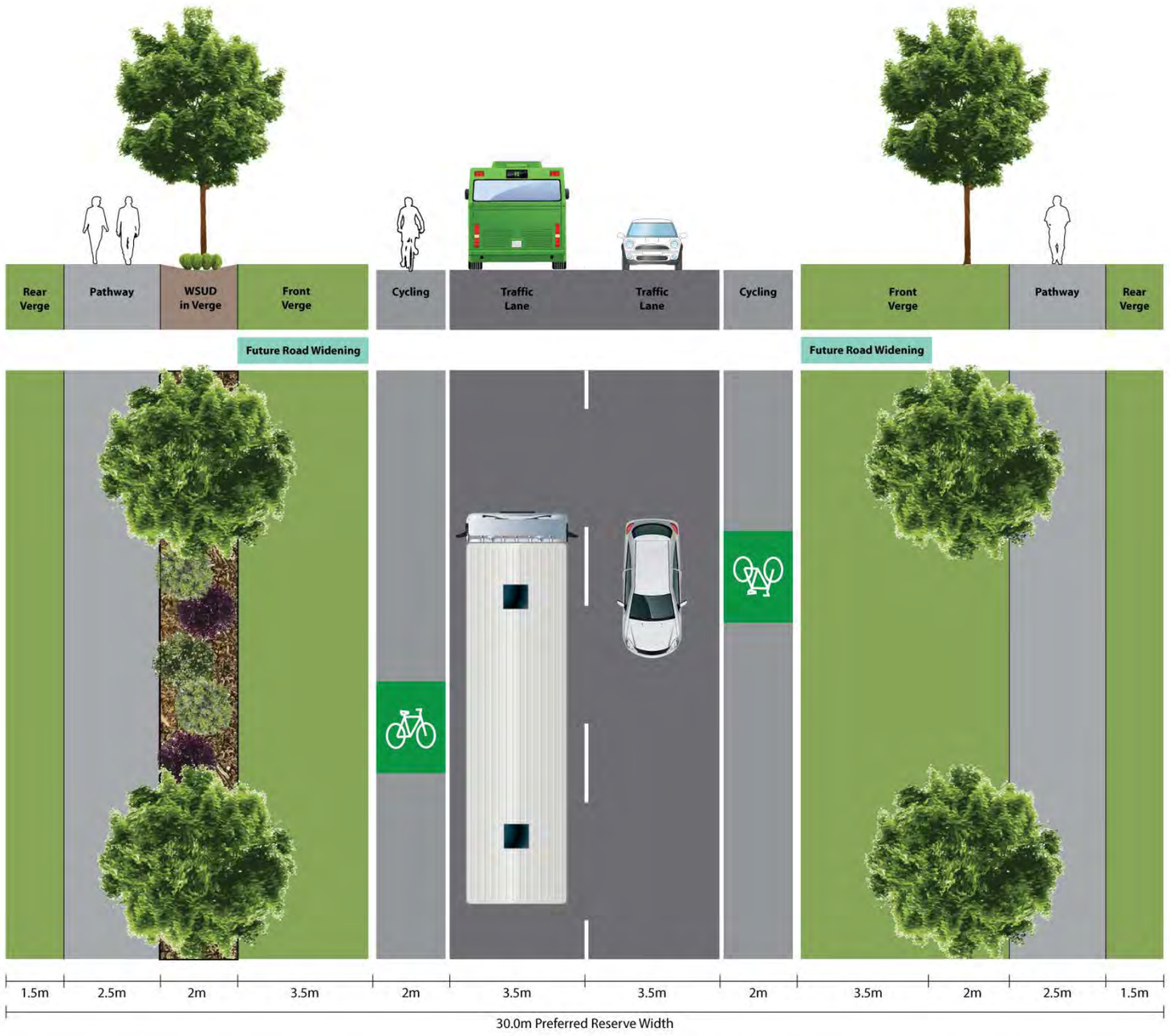
Median: x

- Not required unless identified through detailed design for safety reasons.

Possible Bus Route: ✓

5.6 Arterial & Sub-arterial

Indicative Road & Street Typology Cross Section



Typology Attributes

*This typology is applicable to Arterial and Sub-arterial Roads in **all Zones and precincts** as permitted by the Planning Scheme.*

Carriageway: ✓

- Minimum width of 3.5 metres per traffic lane.

Line-marking is to be provided on this street type. Carriageway is to allow a minimum of two clear through lanes as well as cycle lanes. Stated reserve width allows for additional traffic lanes in either direction depending on traffic analysis.

Pathway: ✓

- Minimum width 2.5 metres on both sides of carriageway.

Cycle Lane: ✓

- Minimum width of 2 metres per cycle lane on each side of the carriageway.

Street Trees: ✓

- Minimum of 1 tree per lot frontage or 25m of street length whichever is the greater.

Verge: ✓

- 5.5 metres minimum width including pathway.

Where a verge contains a pathway, the front verge (between the edge of pathway and back of kerb) is to be a minimum of 2 metres wide, whilst the rear verge (between the edge of pathway and property boundary) is to be a minimum of 1.5 metre wide.

On Street Parking: x

- Parking is not to be accommodated on this street type.

Direct Lot Vehicle Access: x

- Direct vehicle access is generally not permitted. Council may consider alternative access arrangements on a detailed design basis.

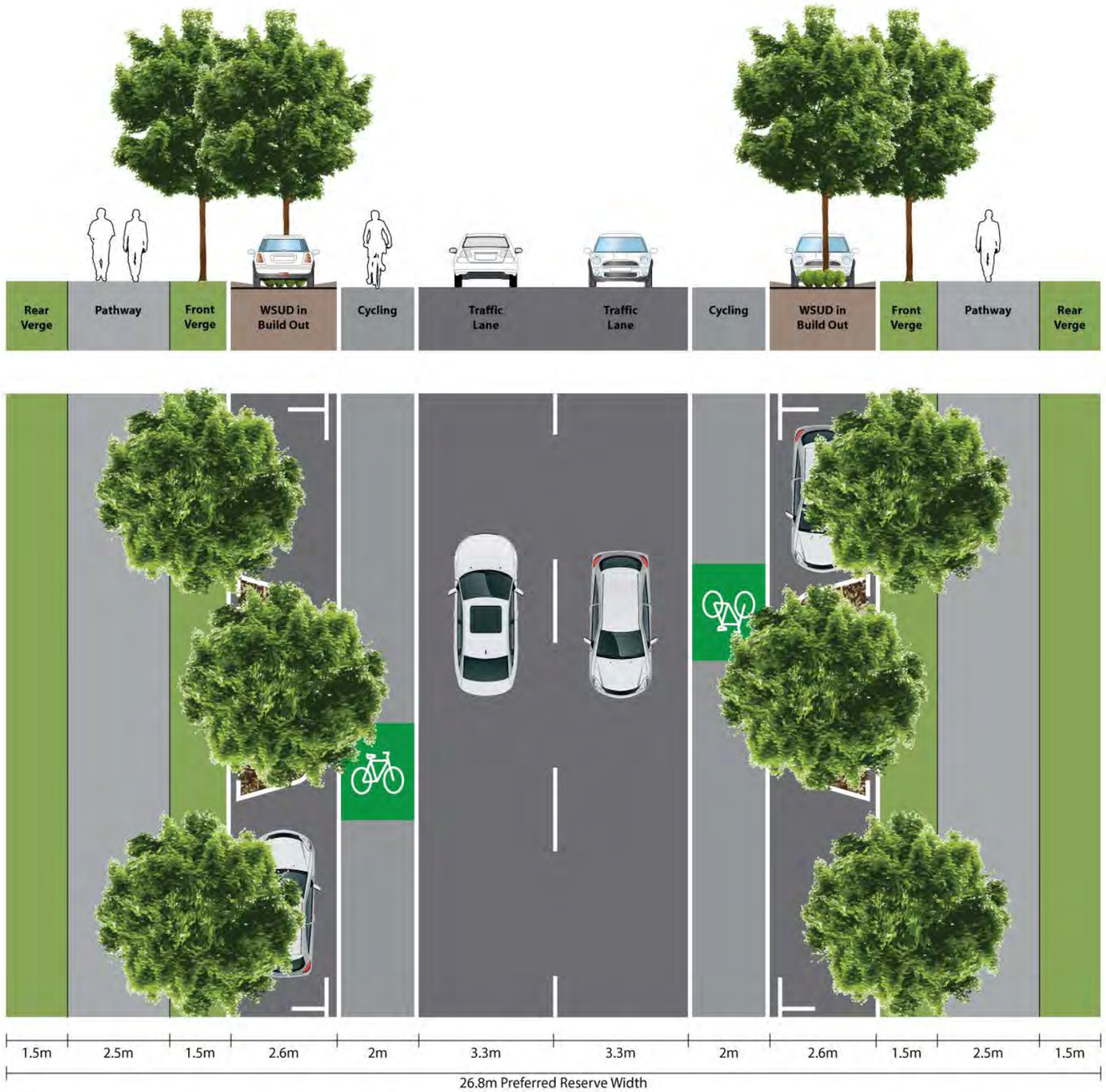
Median: x

- Not required as a minimum, but is likely to be required as a result of detailed design at intersections and other conflict points i.e. pedestrian crossings.

Possible Bus Route: ✓

5.7 Industry Collector

Indicative Road & Street Typology Cross Section



Typology Attributes

*This typology is applicable to Local Collector Streets in the **Industry zone** as permitted by the Planning Scheme.*

Carriageway: ✓
- Minimum width of 3.5 metres per traffic lane.

Line-marking is to be provided on this street type. Carriageway is to allow a minimum of two clear through lanes as well as cycle lanes. Stated reserve width allows for additional traffic lanes in either direction depending on traffic analysis.

Pathway: ✓
- Minimum width 2 metres on both sides of carriageway.

Cycle Lane: ✓
- Minimum width of 2 metres per cycle lane on each side of the carriageway.

Street Trees: ✓
- Minimum of 1 tree per lot frontage or 50m of street length whichever is the greater.

Verge: ✓
- 5.5 metres minimum width including pathway on both sides of carriageway.

Where a verge contains a pathway, the front verge (between the edge of pathway and back of kerb) is to be a minimum of 2 metres wide, whilst the rear verge (between the edge of pathway and property boundary) is to be a minimum of 1.5 metre wide.

On Street Parking & Build Outs: ✓
- 2.6 metres minimum width on both sides of carriageway

Kerbside parallel parking lanes are to be provided on both sides of the carriageway, formalised by street tree build outs at a maximum spacing of 100m along the street length.

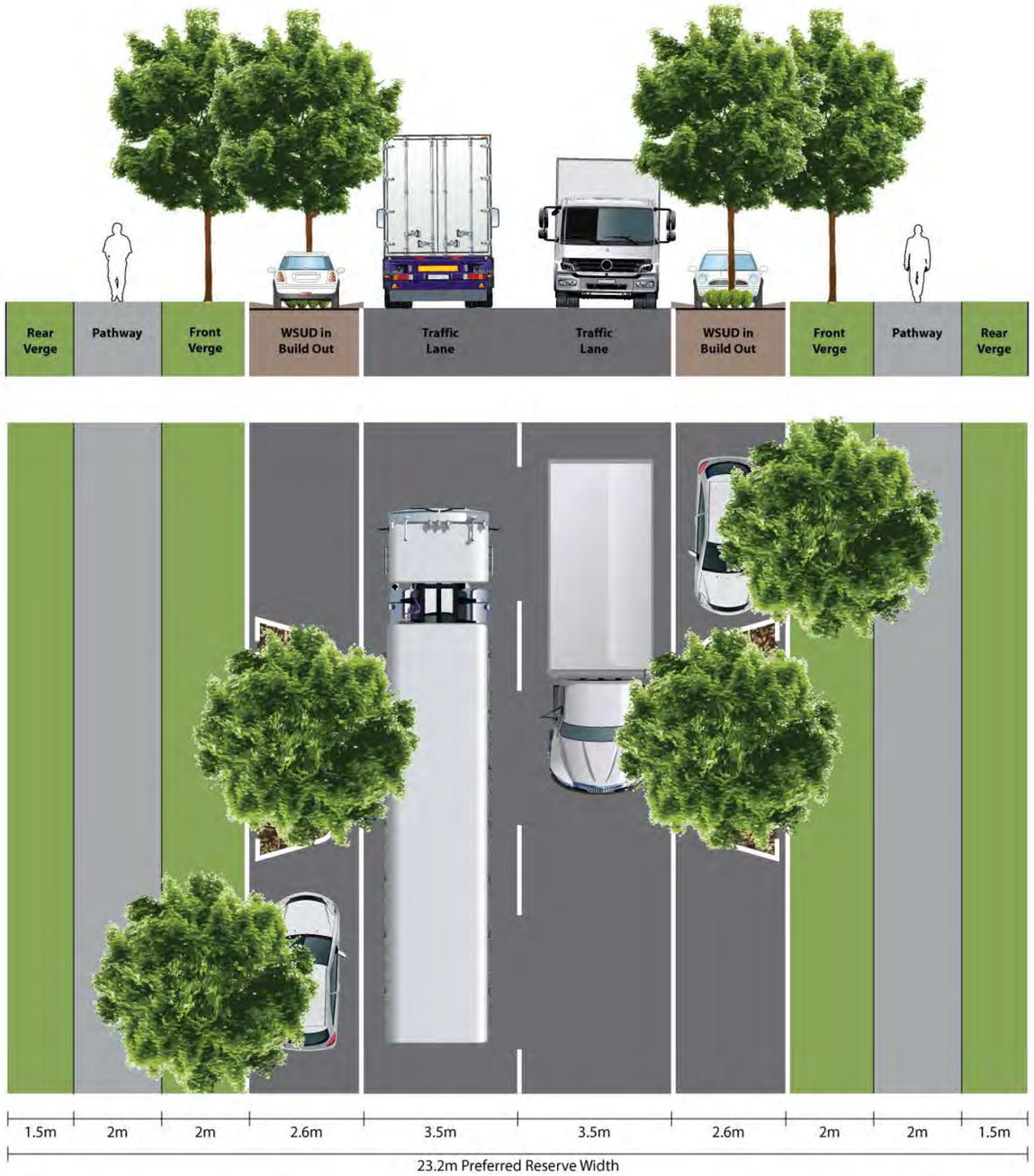
Direct Lot Vehicle Access: ✓
- Direct vehicle access is permitted.

Median: x
- Not required unless identified through detailed design for safety reasons.

Possible Bus Route: ✓

5.8 Industry Access

Indicative Road & Street Typology Cross Section



Typology Attributes

*This typology is applicable to Access Streets in the **Industry zone** as permitted by the Planning Scheme.*

Carriageway: ✓

- Minimum width of 3.5 metres per traffic lane.

Line-marking is to be provided on this street type. Carriageway is to allow a minimum of two clear through lanes as well as cycle lanes. Stated reserve width allows for additional traffic lanes in either direction depending on traffic analysis.

Pathway: ✓

- Minimum width 2 metres on both sides of carriageway.

Cycle Lane: x

- Not required.

Street Trees: ✓

- Minimum of 1 tree per lot frontage or 50m of street length whichever is the greater.

Verge: ✓

- 5.5 metres minimum width including pathway on both sides of carriageway.

Where a verge contains a pathway, the front verge (between the edge of pathway and back of kerb) is to be a minimum of 2 metres wide, whilst the rear verge (between the edge of pathway and property boundary) is to be a minimum of 1.5 metre wide.

On Street Parking & Build Outs: ✓

- 2.6 metres minimum width on both sides of carriageway

Kerbside parallel parking lanes are to be provided on both sides of the carriageway, formalised by street tree build outs at a maximum spacing of 100m along the street length.

Direct Lot Vehicle Access: ✓

- Direct vehicle access is permitted.

Median: x

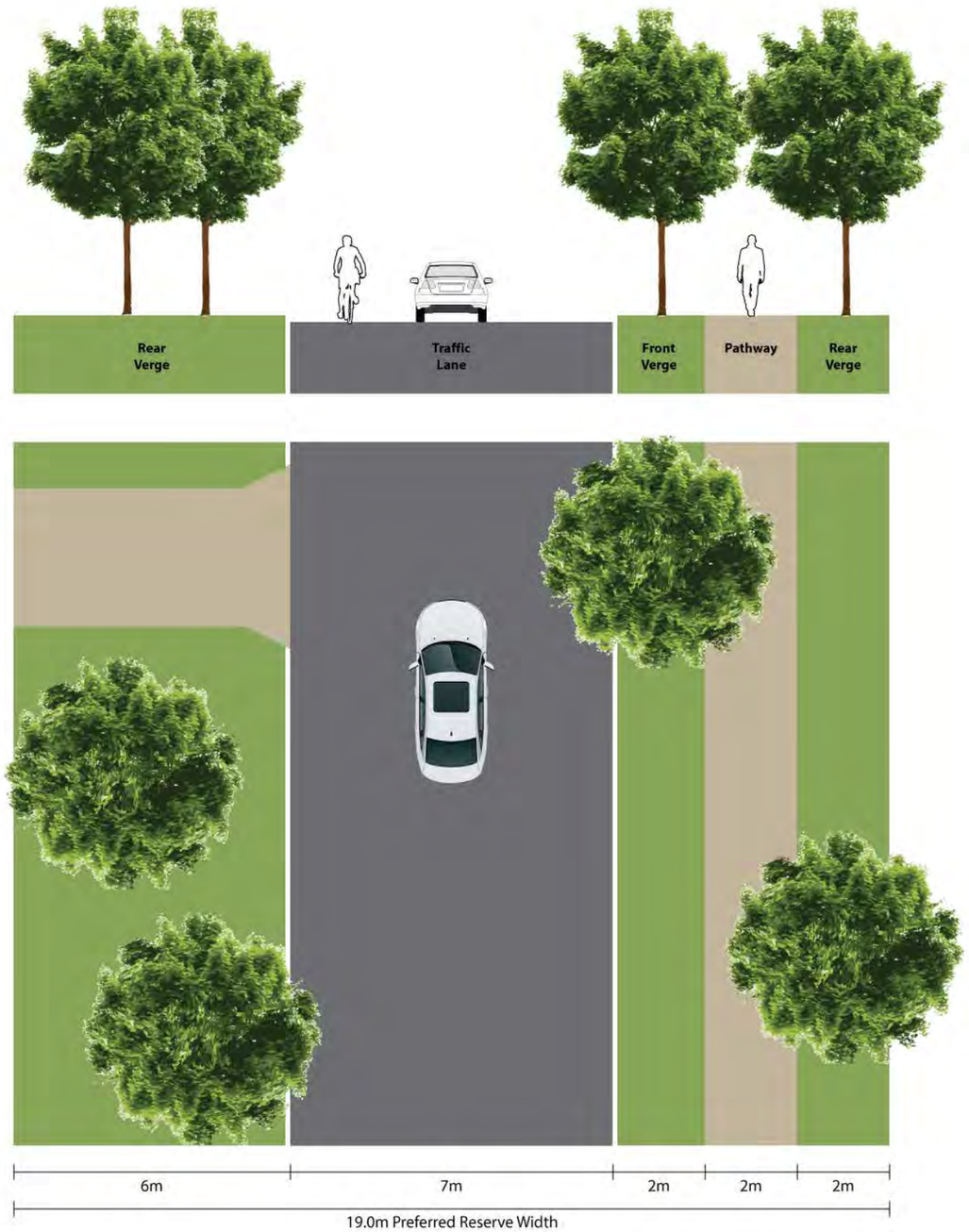
- Not required unless identified through detailed design for safety reasons.

Possible Bus Route: x

- Not required.

5.9 Rural Residential

Indicative Road & Street Typology Cross Section



Typology Attributes

*This typology is applicable to Access Streets and Local Collectors in the **Rural residential zone** as permitted by the Planning Scheme.*

Carriageway: ✓

- Minimum width of 7 metres.

Centre line, traffic lane or parking lane line-marking is not required. Carriageway is to allow for informal kerbside parallel parking to occur on both sides of the carriageway, whilst maintaining sufficient width to allow a refuse or emergency vehicle to pass unimpeded.

Pathway: ✓

- The verge is to contain a minimum 2m clear pedestrian zone. Construction standards for pedestrian pathways if provided are located in Part 13 of this appendix.

Cycle Lane: x

- Not required.

Street Trees: ✓

- Minimum of 1 tree per lot.

Verge: ✓

- 6 metres minimum width on both sides of carriageway.

Where a verge contains a pathway, the front verge (between the edge of pathway and back of kerb) is to be a minimum of 2 metres wide.

On Street Parking: ✓

- Parking is to be provided informally within carriageway.

Direct Lot Vehicle Access: ✓

- Direct vehicle access is permitted.

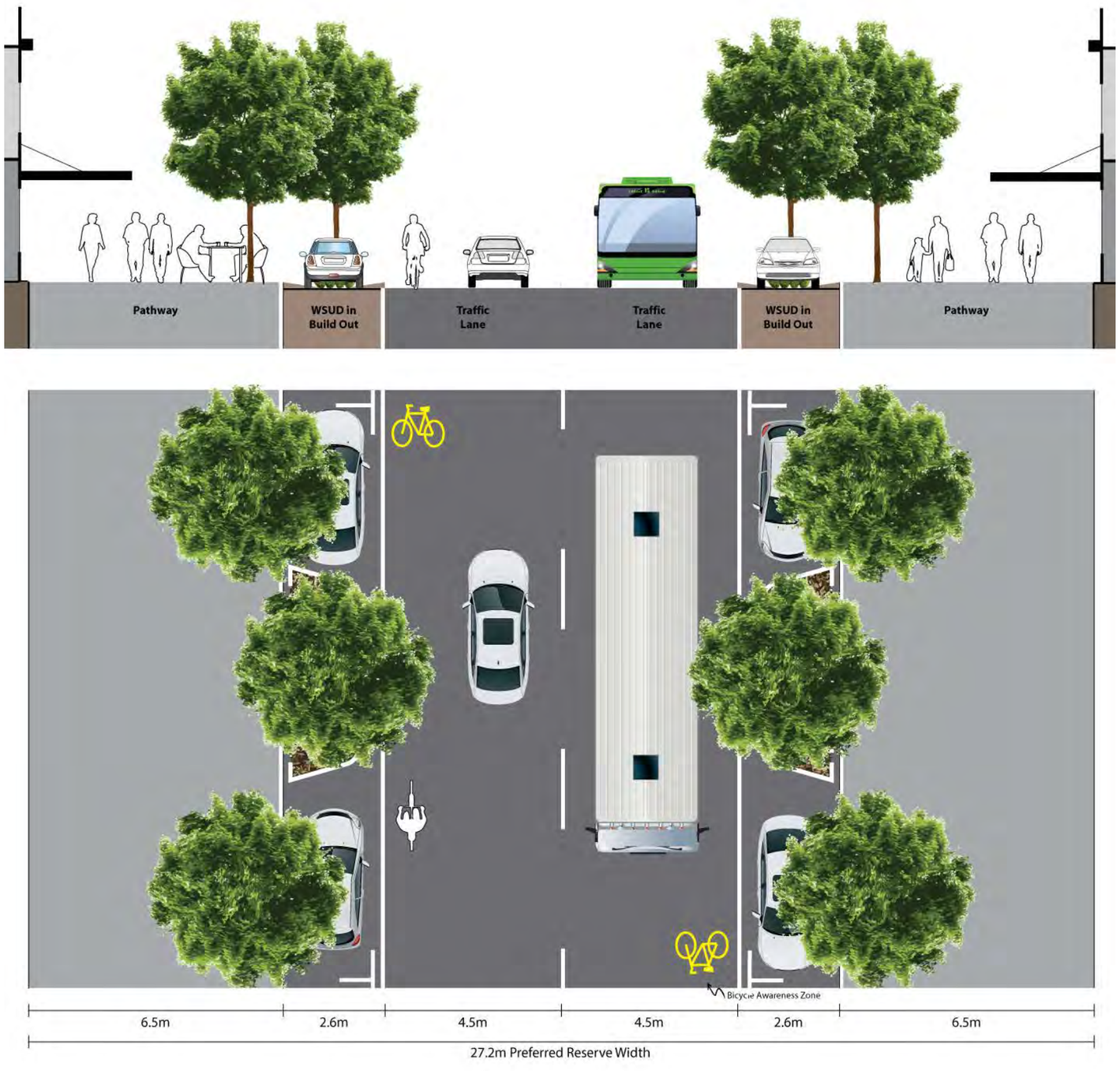
Median: x

- Not required unless identified through detailed design for safety reasons.

Possible Bus Route: ✓

5.10 Higher Order Main Street

Indicative Road & Street Typology Cross Section



Typology Attributes

*This typology is applicable to <u>all Functional road hierarchy classifications</u> in the **Centre zone - Caboolture, Morayfield and Strathpine precincts** where identified as a '<u>Main Street</u>' by the Planning Scheme.*

Carriageway: ✓

- Minimum width of 4.5 metres per traffic lane (where no cycle lane is provided)

Centre line, traffic lane and parking bay line-marking is to be provided on this street type. Carriageway is to allow for kerbside parallel parking to occur on both sides of the carriageway, formalized by street tree build outs, whilst maintaining a minimum of two clear through lanes for shared vehicle and cycle movement, unless a dedicated cycle lanes can be provided.

Pathway: ✓

- Minimum width 6.5 metres on both sides of carriageway. Full constructed verge.

Cycle Lane: x

- Not required unless speed environment necessitates dedicated lanes.

Street Trees: ✓

- Minimum of 1 tree per 25m of street frontage.

Verge: ✓

- Minimum width 6.5 metres on both sides of carriageway

On Street Parking & Build Outs: ✓

- Kerbside parallel parking bays are to be provided on both sides of the carriageway, formalised by street tree build outs.

Direct Lot Vehicle Access: x

- Direct lot vehicle access to this road type is not to be provided to this road type.

Consolidated access may be permitted dependent on detail design.

Median: x

- Not required unless identified through detailed design for safety reasons.

Possible Bus Route: ✓

5.11 District Main Street & Higher Order Access Street

Indicative Road & Street Typology Cross Section

Typology Attributes

*This typology is applicable to all Functional road hierarchy classifications in the **Centre zone - Caboolture, Morayfield and Strathpine precincts,** and where identified as a 'Main Street' in the **Centre zone - District centre precinct** as permitted by the Planning Scheme.*

Carriageway: ✓
- Minimum width of 3.3 metres per traffic lane.

Centre line, traffic lane and parking bay line-marking is to be provided on this street type. Carriageway is to allow for kerbside parallel parking to occur on both sides of the carriageway, formalized by street tree build outs, whilst maintaining two clear through lanes and dedicated on road cycle lanes.

Pathway: ✓
- Minimum width 6 metres on both sides of carriageway.

Cycle Lane: ✓
- Minimum width of 2 metres per cycle lane on each side of the carriageway.

Street Trees: ✓
- Minimum of 1 tree per 25m of street frontage.

Verge: ✓
- Minimum width 6 metres on both sides of carriageway

On Street Parking & Build Outs: ✓
- Kerbside parallel parking bays are to be provided on both sides of the carriageway, formalised by street tree build outs.

Direct Lot Vehicle Access: x
- Direct lot vehicle access to this road type is not to be provided to this road type.

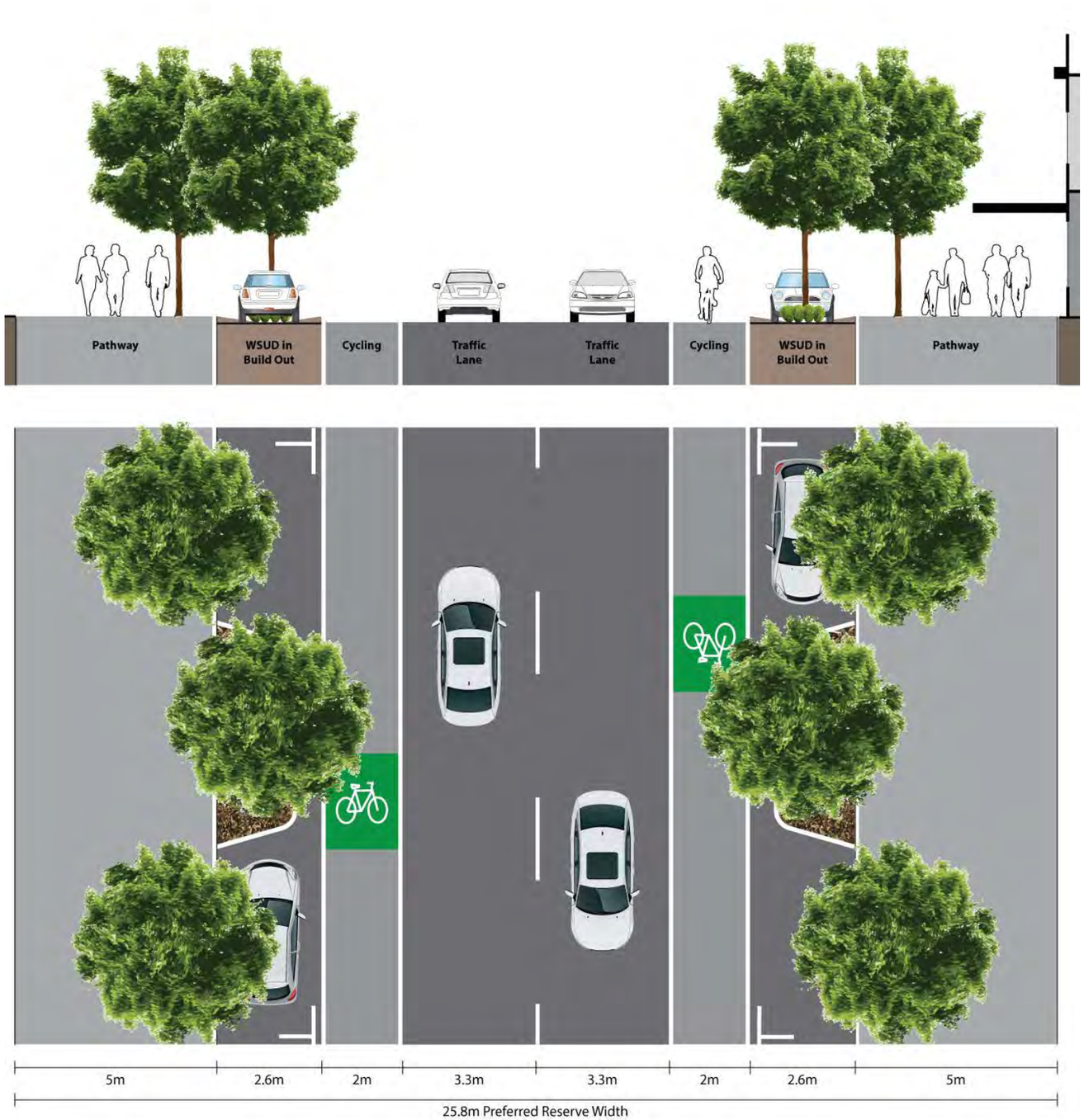
Consolidated access may be permitted dependent on detail design.

Median: x
- Not required unless identified through detailed design for safety reasons.

Possible Bus Route: ✓

5.12 Urban

Indicative Road & Street Typology Cross Section



Typology Attributes

*This typology is applicable to <u>all Functional road hierarchy classifications</u> in the **Centre Zone - District and Local Centre Precincts** other than where on the fringe of a centre, identified as a laneway or a Main Street, and <u>District Collectors and above</u> in the **Centre Zone - Strathpine, Morayfield, Caboolture or Redcliffe precincts** other than where on the fringe of the centre or identified as a laneway, shared street or Main Street as permitted by the Planning Scheme.*

Carriageway: ✓

- Minimum width of 3.3 metres per traffic lane.

Centre line, traffic lane and parking bay line-marking is to be provided on this street type. Carriageway is to allow for kerbside parallel parking to occur on both sides of the carriageway, formalized by street tree build outs, whilst maintaining two clear through lanes and dedicated on road cycle lanes.

Pathway: ✓

- Minimum width 5 metres on both sides of carriageway.

Cycle Lane: ✓

- Minimum width of 2 metres per cycle lane on each side of the carriageway.

Street Trees: ✓

- Minimum of 1 tree per 25m of street frontage.

Verge: ✓

- 5 metres minimum width on both sides of carriageway.

On Street Parking & Build Outs: ✓

- Kerbside parallel parking bays are to be provided on the Centre zone side of the carriageway, formalised by street tree build outs.

Direct Lot Vehicle Access: ✓

- Direct vehicle access is permitted.

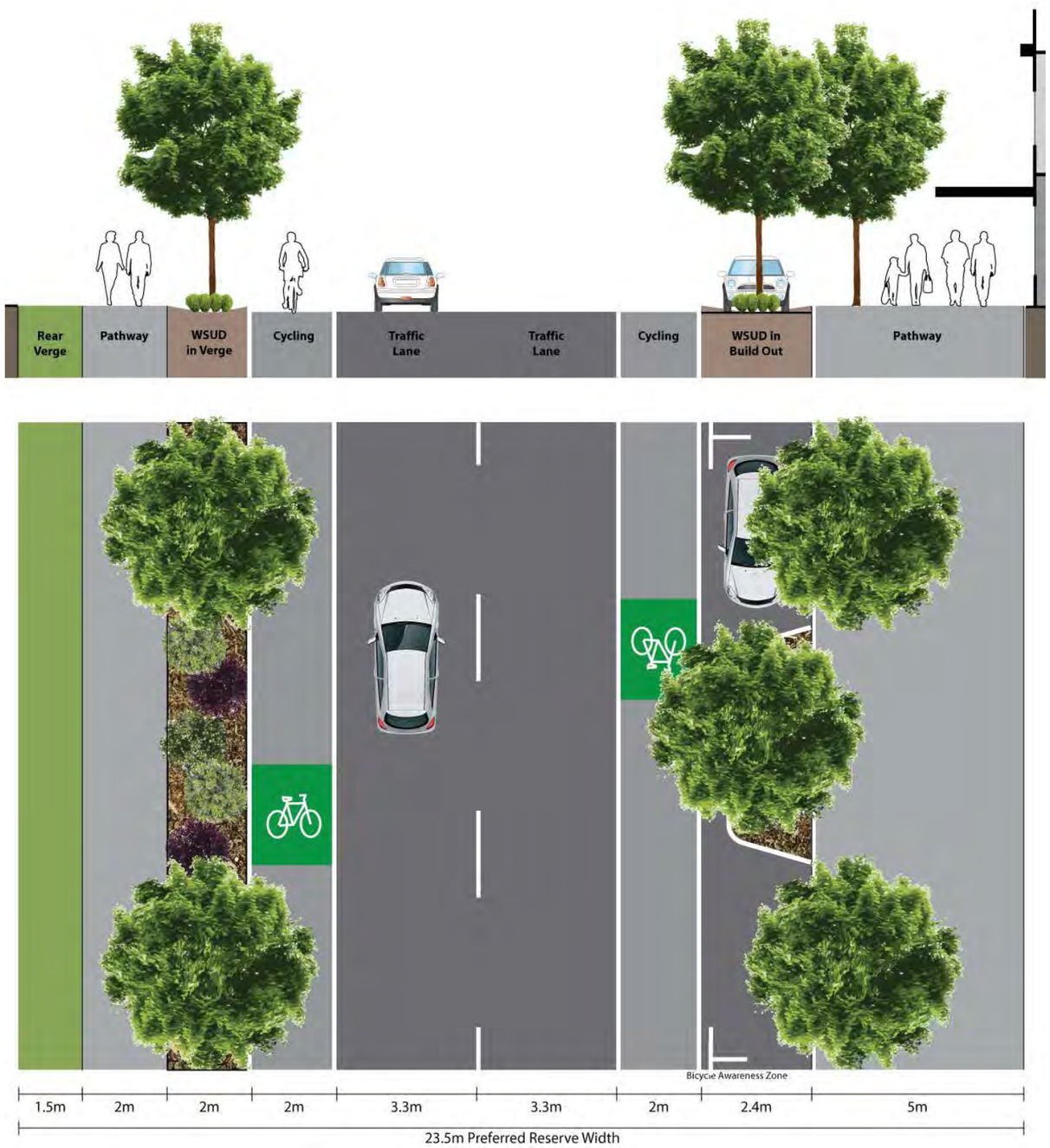
Median: x

- Not required unless identified through detailed design for safety reasons.

Possible Bus Route: ✓

5.13 Urban Fringe

Indicative Road & Street Typology Cross Section



Typology Attributes

*This typology is applicable to <u>all Functional road hierarchy classifications</u> adjoining the **Centre zone (all precincts)** on one side of the road reserve and **General residential zone (all precincts)** on the other side as permitted by the Planning Scheme.*

Carriageway: ✓

- Minimum width of 3.5 metres per traffic lane.

Line-marking is to be provided on this street type. Carriageway is to allow a minimum of two clear through lanes as well as cycle lanes. Stated reserve width allows for additional traffic lanes in either direction depending on traffic analysis.

Pathway: ✓

- Minimum width 5 metres on Centre zone side of carriageway.
- Minimum width 2 metres on other zone side of carriageway.

Cycle Lane: ✓

- Minimum width of 2 metres per cycle lane on each side of the carriageway.

Street Trees: ✓

- Minimum of 1 tree per lot frontage or 25m of street length whichever is the greater.

Verge: ✓

- 5 metres minimum width on Centre zone side of carriageway.
- 5.5 metres minimum width including pathway on other zone side of carriageway.

Where a verge contains a pathway, the front verge (between the edge of pathway and back of kerb) is to be a minimum of 2 metres wide, whilst the rear verge (between the edge of pathway and property boundary) is to be a minimum of 1.5 metre wide.

On Street Parking & Build Outs: ✓

Kerbside parallel parking bays are to be provided on the Centre zone side of the carriageway, formalised by street tree build outs.

Direct Lot Vehicle Access: ✓

- Direct lot vehicle access to this road type may be permitted dependent on detail design.

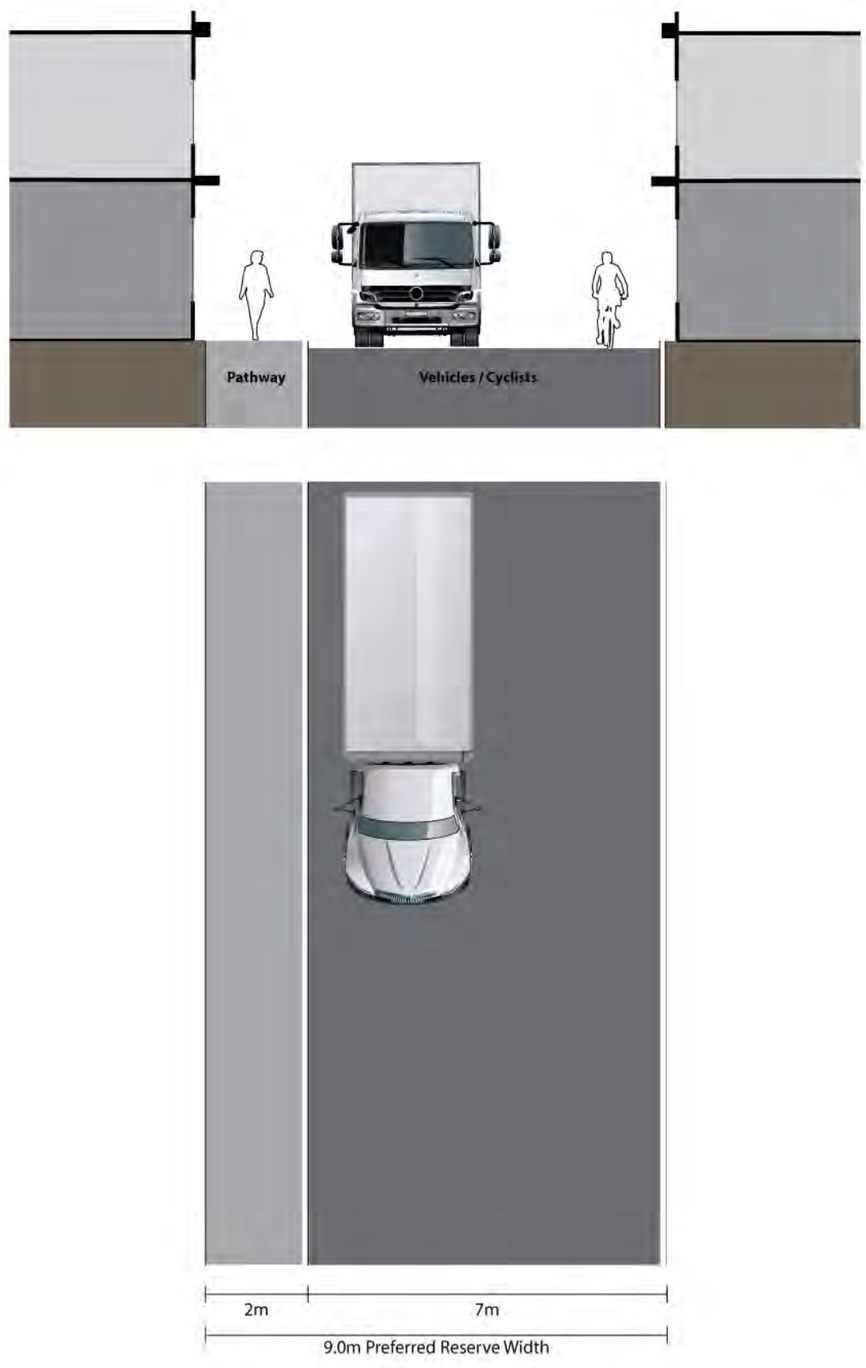
Median: x

- Not required unless identified through detailed design for safety reasons.

Possible Bus Route: ✓

5.14 Business Laneway

Indicative Road & Street Typology Cross Section



Typology Attributes

*This typology is applicable to Access Streets in the **Centre zone** where proposed to provide servicing, loading and rear parking access to development that otherwise fronts an alternative street type as permitted by the Planning Scheme.*

Carriageway: ✓
- Minimum 7 metre carriageway.

Centre line, traffic lane or parking lane line-marking is not required. Carriageway is to allow for informal kerbside short term loading and pickups to occur on both sides of the carriageway, whilst maintaining sufficient width to allow a refuse or emergency vehicle to pass unimpeded.

Pathway: ✓
- Minimum width 2 metres on one side of carriageway.

Cycle Lane: x
- Not required.

Street Trees: x
- Not required.

Verge: ✓
- Minimum width 2 metres on one side of carriageway where containing a pathway.

On Street Parking: x
- Not required.

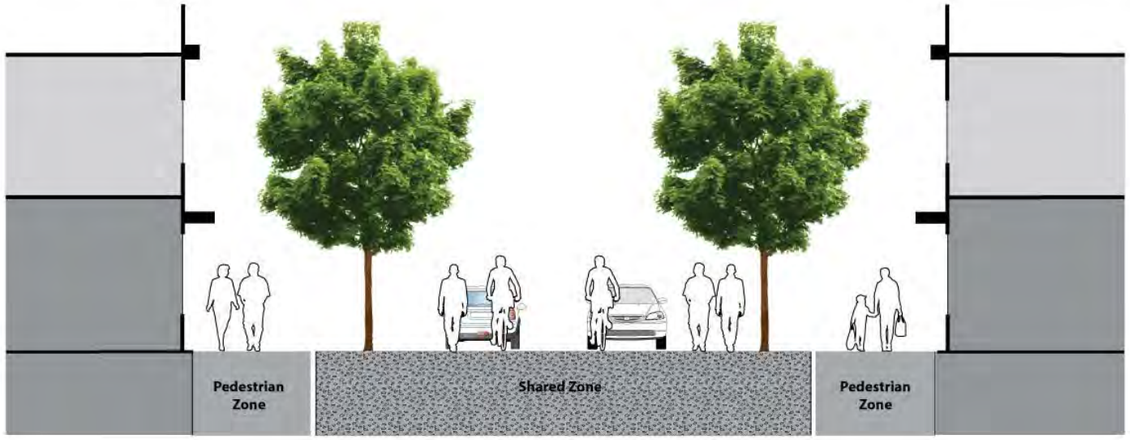
Direct Lot Vehicle Access: ✓
- Direct vehicle access is permitted.

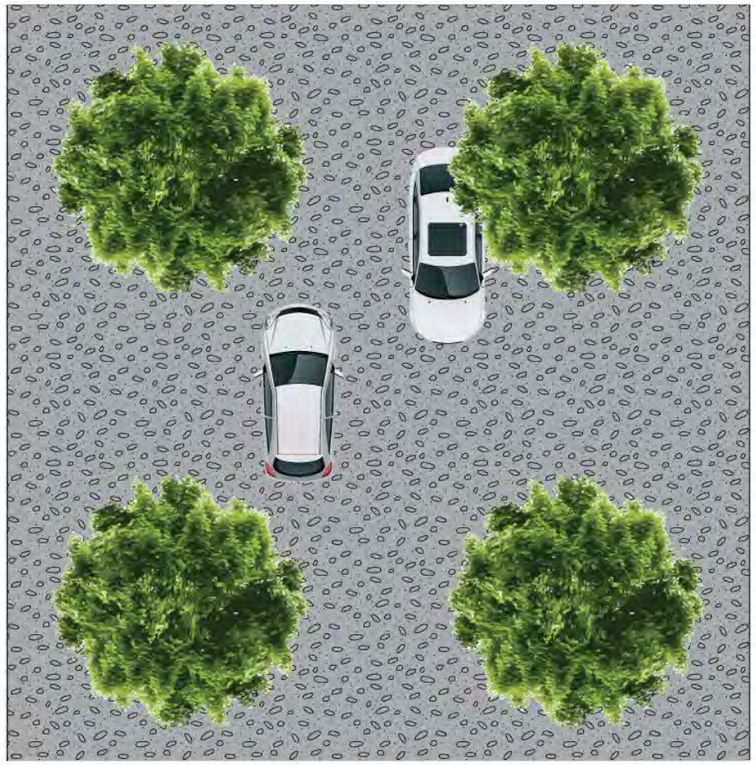
Median: x
- Not required unless identified through detailed design for safety reasons.

Possible Bus Route: x
- Not required.

5.15 Shared Business

Indicative Road & Street Typology Cross Section





Typology Attributes

*This typology is applicable to Access Streets within the **Centre zone (all precincts)** where identified as a Shared Zone within the planning scheme or as part of a master-planned centre permitted by the Planning Scheme.*

Carriageway: ✓
- Minimum width of 10m constructed shared zone

Line-marking is not required to be provided on this street type, however stenciling or alternative surface treatments are to be used to delineate between shared zones and dedicated pathway areas.

Pathway: ✓
- Minimum width 2.5 metres on both sides of carriageway.

Cycle Lane: x
- Not required.

Street Trees: ✓
- Minimum of 1 tree per 25m of street length.

Verge: x
- Not required. Total of 15 constructed road reserve.

On Street Parking: x
- On street parking is not to be provided on this street type.

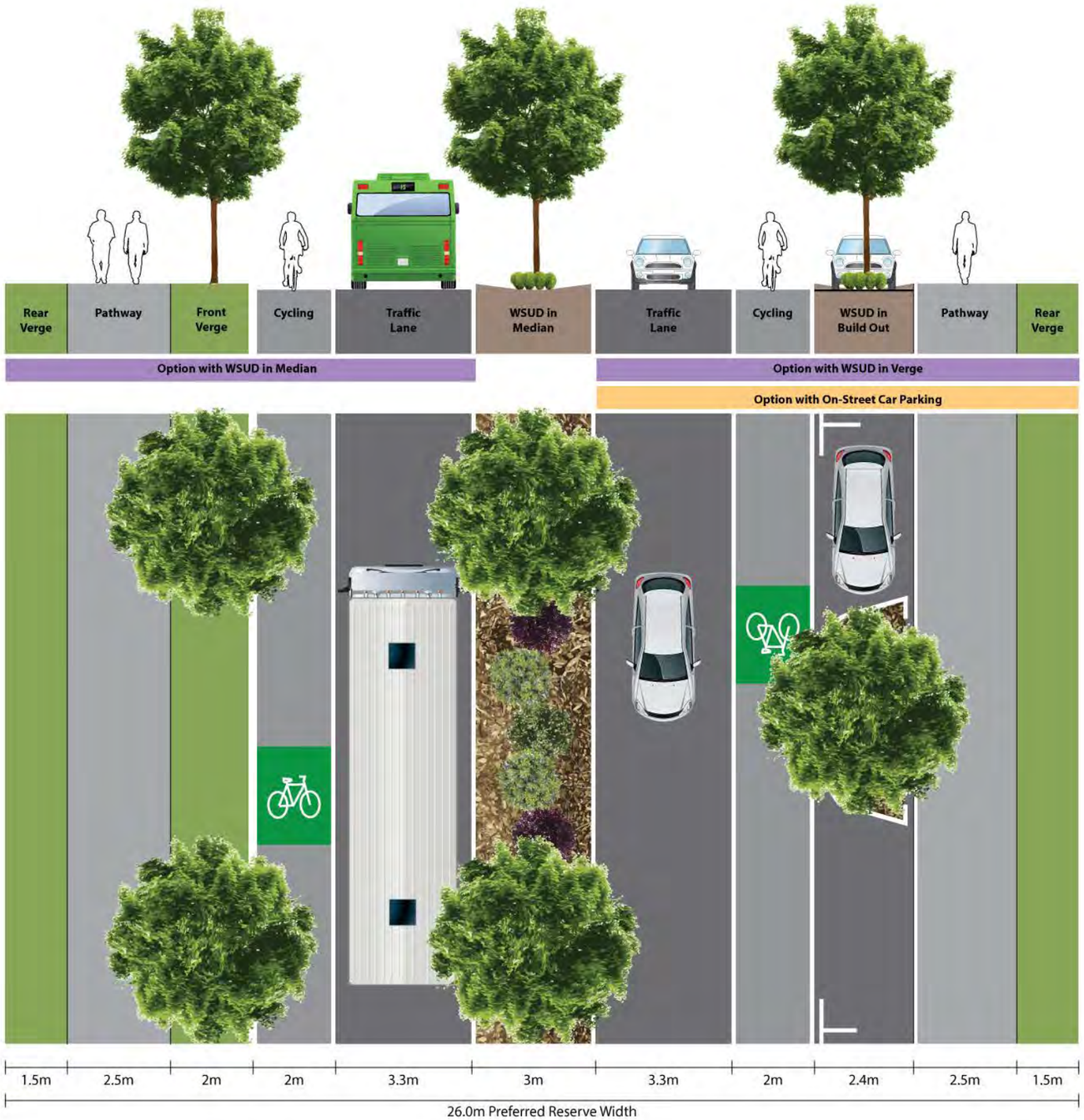
Direct Lot Vehicle Access: x
- Direct lot vehicle access to this road type is not to be provided to this road type.

Median: x
- Not required unless identified through detailed design for safety reasons.

Possible Bus Route: x
- Not required.

5.16 Boulevard - Single Carriageway

Indicative Road & Street Typology Cross Section



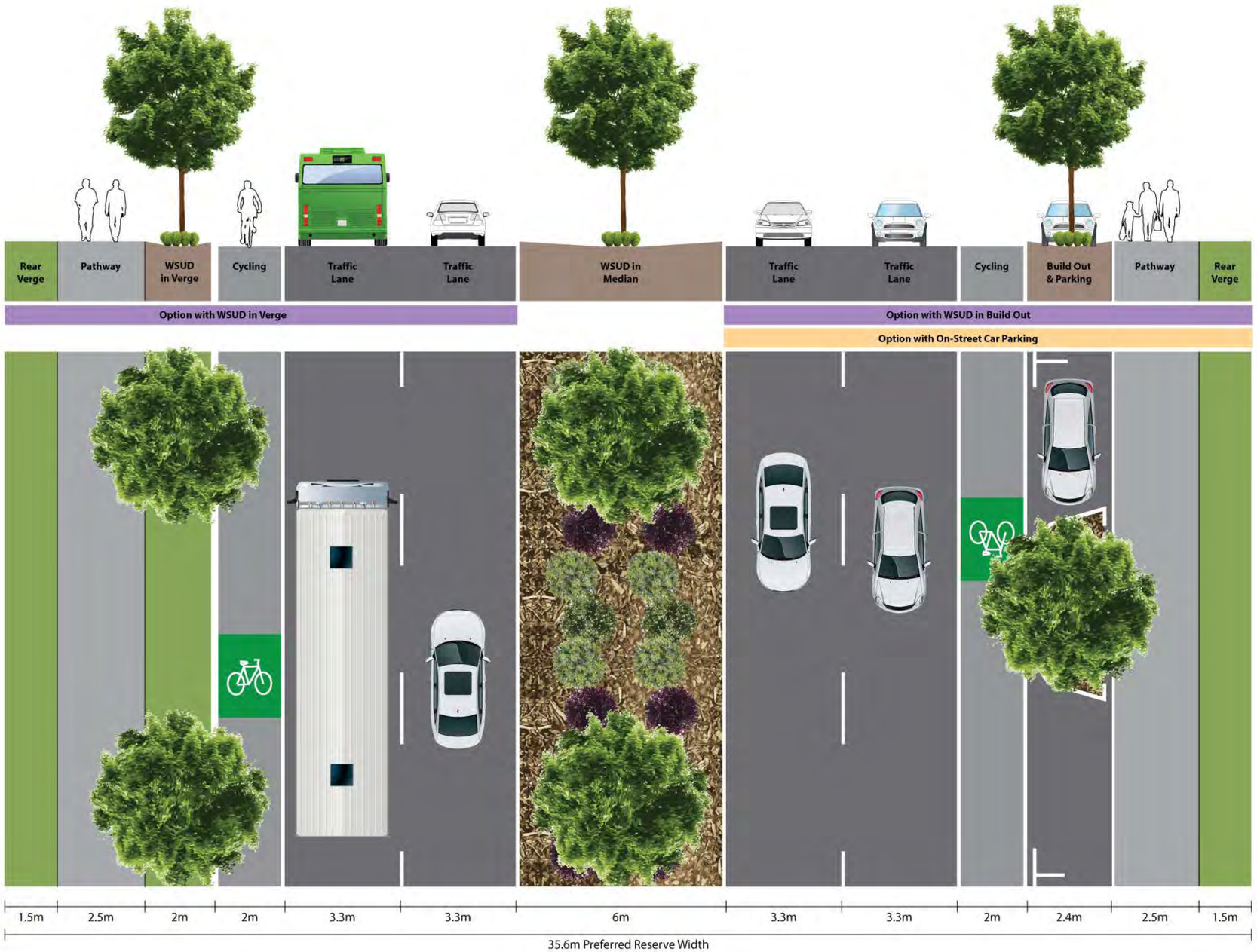
Typology Attributes

This typology is an indicative representation of a standard road or street type which has been treated as a boulevard by the addition of a landscaped centre median. The cross section shown is that of an Arterial or Sub-arterial road typology which has a 6m centre median but remains as a single traffic lane in each direction.

Additional traffic lanes can also be added to District collector or higher order functional road classifications where traffic carrying capacity necessitates. The overall width of reserve required is to be widened by the additional widths of required lanes or median. All other attribute widths remain as per the standard road typology attributes.

5.17 Boulevard - Dual Carriageway

Indicative Road & Street Typology Cross Section



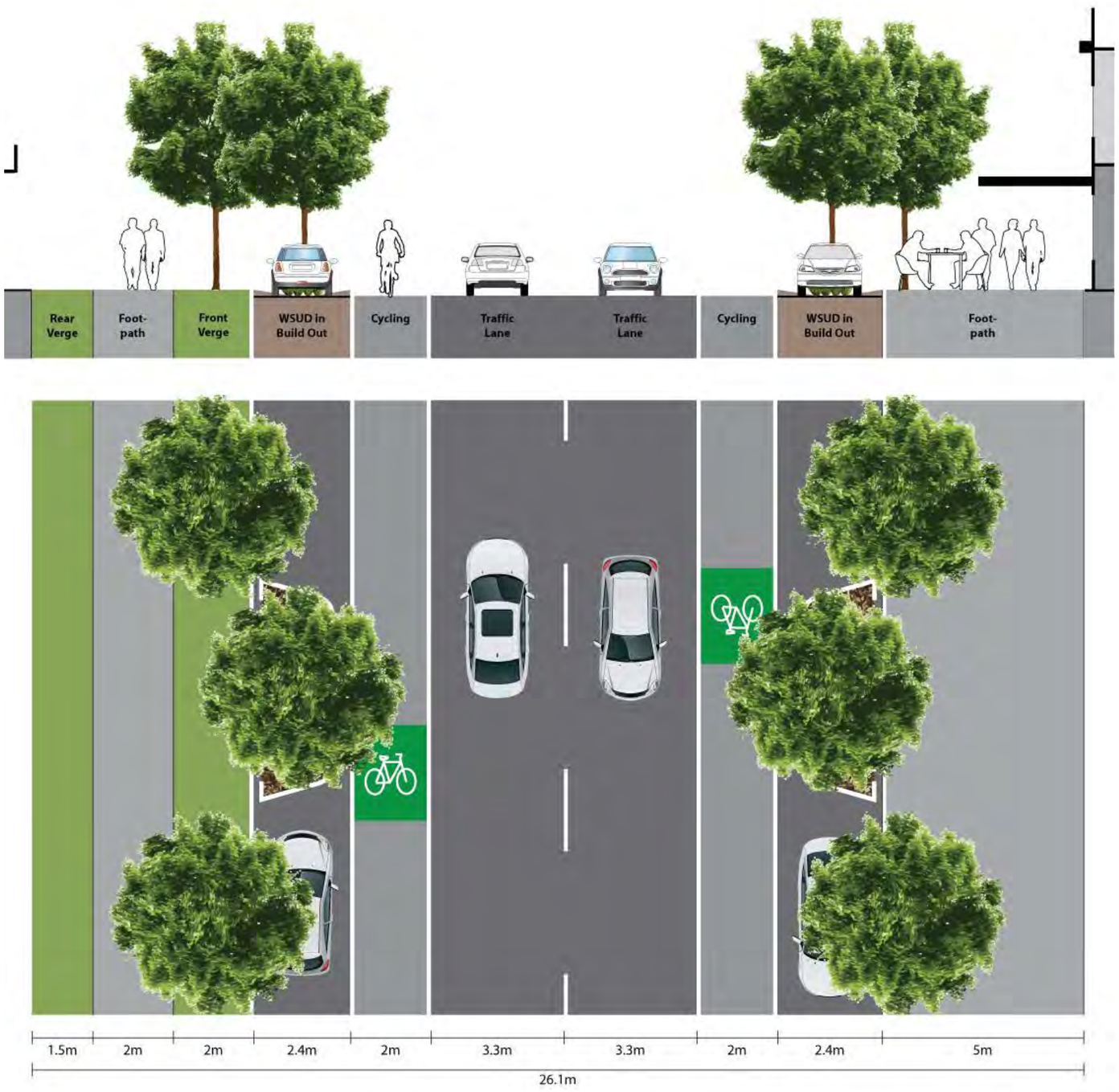
Typology Attributes

This typology is an indicative representation of a standard road or street type which has been treated as a boulevard by the addition of a landscaped centre median. The cross section shown is that of an Arterial or Sub-arterial road typology which has a 6m centre median and an additional traffic lane added.

Additional traffic lanes can also be added to District collector or higher road types where traffic carrying capacity necessitates. The overall width of reserve required is to be widened by the additional widths of required lanes or median. All other attribute widths remain as per the standard road typology attributes.

5.18 Caboolture West Main Street

Indicative Road & Street Typology Cross Section



Typology Attributes

This typology is applicable where identified as a 'Main Street' by the Road Typologies Figure in Caboolture West Structure Plan Area 1.

Carriageway: ✓

- Minimum width of 3.3 metres per traffic lane

Centre line, traffic lane and parking bay line-marking is to be provided on this street type. Carriageway is to allow for kerbside parallel parking to occur on both sides of the carriageway, formalized by street tree build outs, whilst maintaining a minimum of two clear through lanes for vehicle movement, and dedicated cycle lanes.

Pathway: ✓

- Minimum width 5 metres on centre sides of carriageway. Full constructed verge.
- Minimum width of 2 metres on other side of carriageway.

Cycle Lane: ✓

- Minimum width of 2 metres per cycle lane on each side of the carriageway.

Street Trees: ✓

- Minimum of 1 tree per 25m of street frontage.

Verge: ✓

- Minimum width 5 metres on centre side of carriageway.
- Minimum width 5.5 metres on other side of carriageway with the front verge (between the edge of pathway and back of kerb) being a minimum of 2 metres wide, and the rear verge (between the edge of pathway and property boundary) being a minimum of 1.5 metres wide.

On Street Parking & Build Outs: ✓

- Kerbside parallel parking bays at a minimum width of 2.4 metres are to be provided on both sides of the carriageway, formalised by street tree build outs.

Direct Lot Vehicle Access: x

- Direct lot vehicle access to this road type is not to be provided to this road type.

Consolidated access may be permitted dependent on detail design.

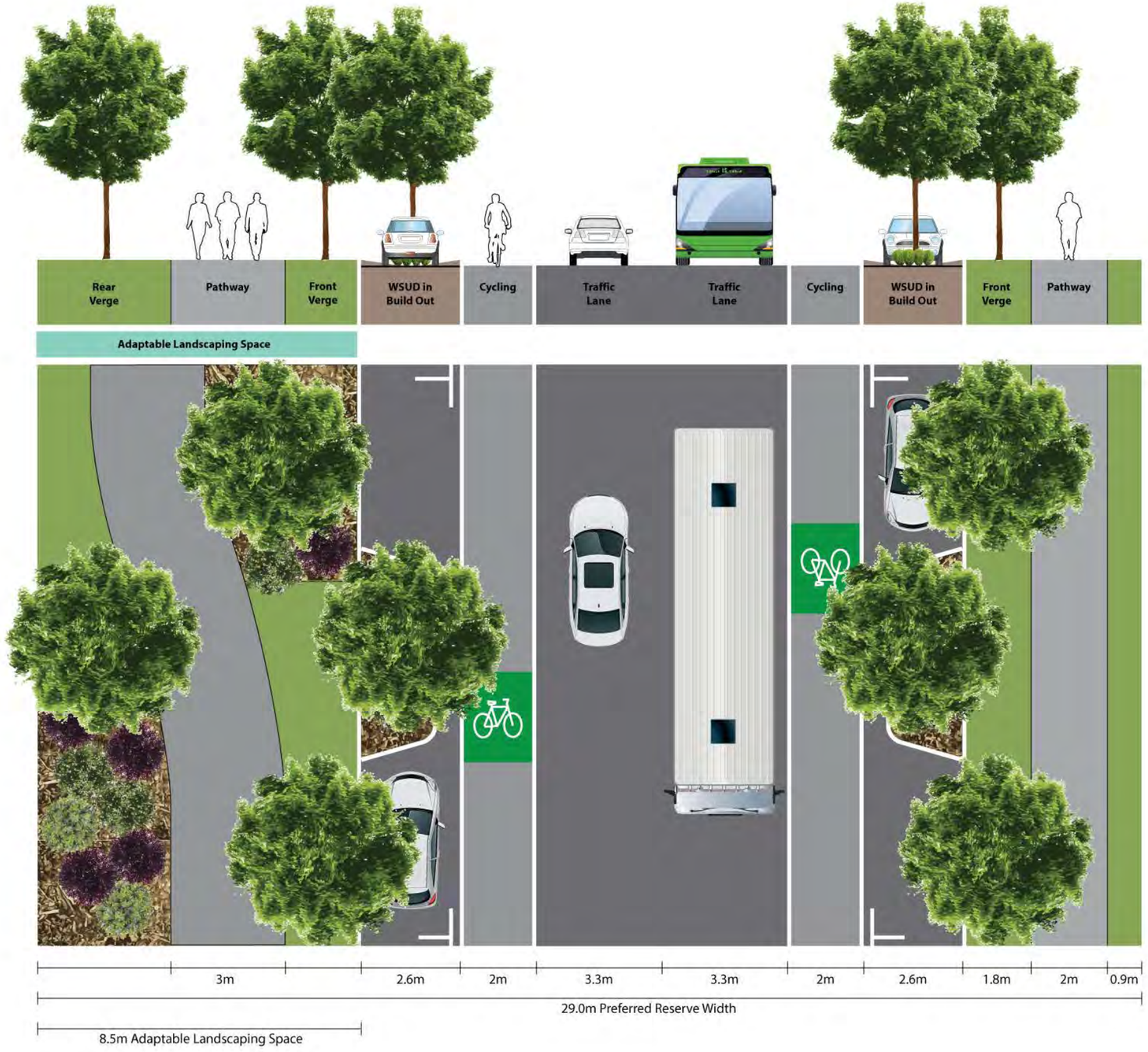
Median: x

- Not required unless identified through detailed design for safety reasons.

Possible Bus Route: ✓

5.19 Caboolture West Landscape Street

Indicative Road & Street Typology Cross Section



Typology Attributes

This typology is applicable where identified as a 'Landscape Street' by the Road Typologies Figure in Caboolture West Structure Plan Area 1.

Carriageway: ✓

- Minimum width of 3.3 metres per traffic lane

Centre line, traffic lane and parking bay line-marking is to be provided on this street type. Carriageway is to allow for kerbside parallel parking to occur on both sides of the carriageway, formalized by street tree build outs, whilst maintaining a minimum of two clear through lanes for vehicle movement, and dedicated cycle lanes.

Pathway: ✓

- Minimum width 2 metres on eastern side of carriageway.
- Minimum width 3 metres on western side of carriageway.

Cycle Lane: ✓

- Minimum width of 2 metres per cycle lane on each side of the carriageway.

Street Trees: ✓

- Minimum of 1 tree per 25m of street frontage.

Verge: ✓

- Minimum width 4.7 metres on eastern side of carriageway with the front verge (between the edge of pathway and back of kerb) being a minimum of 1.8 metres wide, and the rear verge (between the edge of pathway and property boundary) being a minimum of 0.9 metres wide.
- Minimum width 8.5 metres on western side of carriageway.

On Street Parking & Build Outs: ✓

- Kerbside parallel parking bays at a minimum width of 2.4 metres are to be provided on both sides of the carriageway, formalised by street tree build outs.

Direct Lot Vehicle Access: ✓

- Direct vehicle access is permitted.

Median: x

- Not required unless identified through detailed design for safety reasons.

Possible Bus Route: ✓

6. Typology Attributes Detail Criteria

6.1 Carriageway

i. Carriageways in a Laneway are to allow for sufficient maneuvering of vehicles to access garages on one or both sides of the carriageway. Where a laneway is to provide for refuse collection it is also to ensure adequate turning movements are provided for the appropriate refuse vehicle type as specified in Planning Scheme Policy - Waste Management.

6.2 Pathway Width

i. Pathway width may be narrowed to a width of not less than 1.5 metres for short distances to cater for the retention of existing trees or significant vegetation, accommodation of bus stops or street furniture, or due to significant topographical conflicts or safety concerns.

ii. Roads with a Functional road hierarchy classification of Arterial, Sub-arterial or District Collector are to be designed to accommodate active transport movement both on and off-road. The minimum width of an off-road shared path is 2.5m.

6.3 Cycle Lane

i. Street or road typologies that do not show on-road cycle lanes may still be required to provide them if the street is located on a Primary active transport route as identified on Overlay map - Active transport routes.

ii. Where a street or road typology requires on-road cycle lanes, the specified width of cycle lanes as indicated combined with the specified width of on-street parking bays provides for the required cycle lane width within the speed environment and a 0.4 m safety clearance to ensure cyclists are clear of any potential conflict due to car door openings. Any reduction in cycle lane width or adjacent parking pay widths must consider adequate buffering to ensure vehicle doors to not cause conflict with cyclists travelling within the cycle lane. Refer to Standard Drawings in Appendix H for further details related to on road cycle facilities.

6.4 Street Tree

i. Street trees located in the front verge are to be planted from 45 litre pot sizes and provided with a minimum of 1.2 metres of clear verge width within the front verge. Trees planted in build outs are to be planted from 100 litre pot sizes. Where sufficient clear space to locate a tree in front of a particular lot cannot be provided, the required tree is to be planted elsewhere within the same street. Street trees are to be planted a maximum of 25 metres apart in General Residential and Centre zones and 50 metres in the Industry zone. Refer to Standard Drawings in Appendix H for further details on street tree plantings.

6.5 On-Street Parking & Build Outs

i. Where a street typology requires build outs to formalise on-street parking bays, the build outs are to be provided at the same width as the parking bay, and at a maximum spacing of 50 metres along the street length unless otherwise specified.

ii. Where formalized parking bays/lanes and build outs are required on both sides of a carriageway, the overall width of the reserve is to be widened by the required width of the parking bay unless otherwise agreed to by Council.

iii. Parking spaces generated by lots accessed via a laneway are to be accommodated on the alternate street frontage of the lot and not within the laneway.

6.6 Direct Lot Access

i. Council may consider direct lot vehicle access on District Collectors and lower order roads dependent on the traffic environment modelled for the corridor. The following table provides a guide to where access may be appropriate based on the number of Vehicle Per Day subject to detail design.

Vehicles Per Day	1000	2000	3000	4000	5000	6000	7000	8000	9000	>10000
Direct Lot Vehicle Access	Allowed			At Councils discretion		Not Allowed				

6.7 Medians

i. Not withstanding the requirements of a specific street or road typology, where Medians are required for safety reasons (i.e. pedestrian crossing refuges, protected turning, intersection design, split grade carriageways, etc.) as a result of detailed design, or to create a boulevard, they can be accommodated on any Functional Road Hierarchy classification.

ii. The overall width of all road reserves as specified in the cross section attributes is to be widened by the required width of median unless otherwise agreed to by Council.

7. Recommended Posted Speed Limits

Zone / Precinct	Functional Road Hierarchy Classification	Recommended Posted Speed Limit *(KPH)*[1]
Centre	All Roads	50
General Residential	Arterials	-
	Sub-arterial	60 - 80
	District Collector	60
	Local Collector & Access Streets	50
Industry	Arterial & Sub-arterial	-
	District Collector	70
	Local Collector & Access Streets	50
Rural Residential	Arterial & Sub-arterial	-
	District & Local Collectors	60
	Access Streets	50
Other Zones	Local Collectors & Access Streets	50
	All other classifications	-

[1] All speeds are dependent on, but not limited to, detailed design, safe sight distances, proposed or existing pedestrian environment, adjoining lane uses, direct lot access arrangements and road geometry.

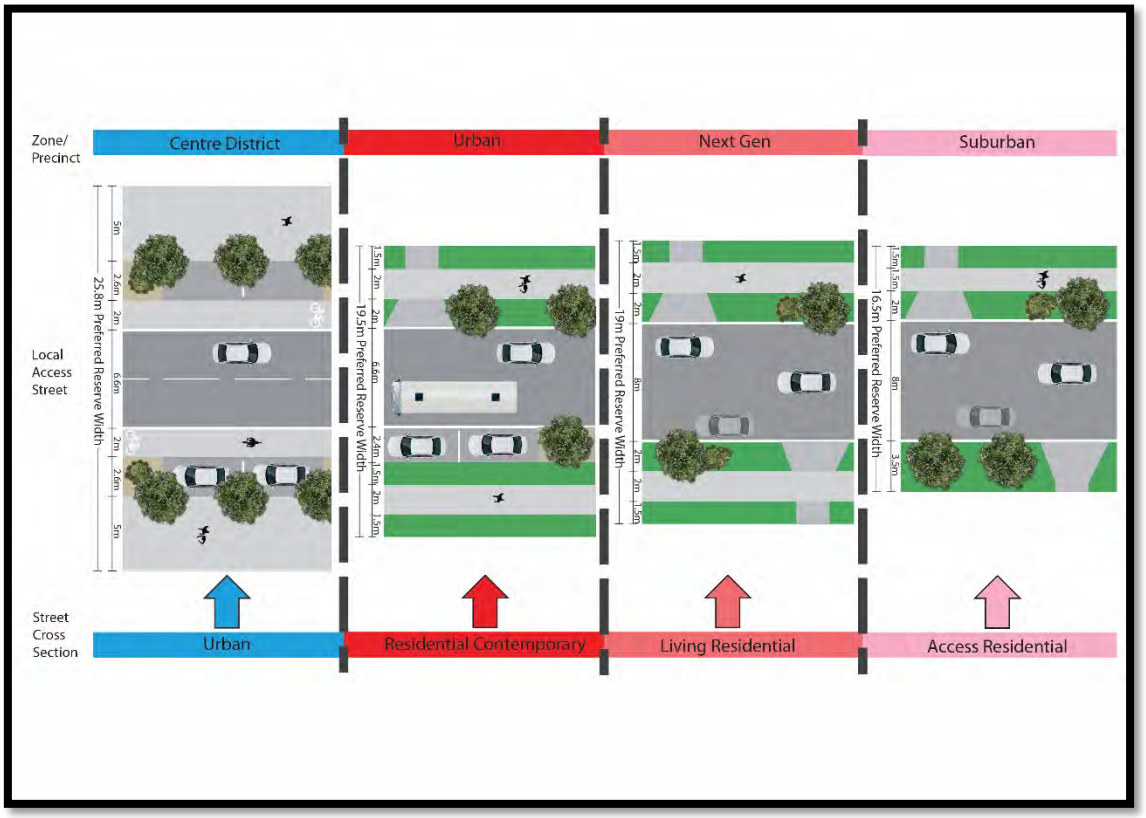
8. Primary and Secondary Active Transport Network

The primary and secondary active transport networks are identified on the Primary and Secondary Active Transport Network Overlay Map. These networks incorporate the most critical inter and intra-regional trips for cyclists and pedestrians. As development occurs, works and/or land may be required in the provision of these networks. A determination will be made as to the extent of works and/or land required as part of the development assessment process. In circumstances where the attributes of the primary or secondary active transport network vary from the pathway width and cycle lane attributes mentioned in other parts of Appendix A of the PSP - Integrated Design, the attributes contained in the table below prevail.

<table>
<tr><th>Zone & Precinct</th><th>Centre zone - Strathpine, Caboolture, Morayfield, Redcliffe & District centre precincts</th><th>General residential zone - Urban neighbourhood,
Next generation neighbourhood and Coastal communities precincts,
Industry Zone - all precincts
Rural Townships zone - all precincts.</th><th>Rural Residential zone
General residential zone - Suburban neighbourhood precinct
All other zones and precincts where not otherwise stated.</th></tr>
<tr><td>Functional Road Hierarchy Classification</td><td colspan="3">Shared paths both sides, width in metres</td></tr>
<tr><td>Arterial and Sub-arterial</td><td>Urban 5.0m,
Main street 6.0m</td><td>2.5m where street/road contains dedicated on-road cycle lanes
3.0m where street/road does not contain cycle lanes</td><td>2.5m</td></tr>
<tr><td>District collector</td><td colspan="2">2.5m</td><td>2.0m</td></tr>
<tr><td>Primary route on lower-order road
(Local collector and below)</td><td colspan="2">2.5m where street/road contains dedicated on-road cycle lanes,
3.0m where street/road does not contain cycle lanes.</td><td>2.0m where street/road contains dedicated on-road cycle lanes,
2.5m where street/road does not contain cycle lanes.</td></tr>
<tr><td>Primary route through open space</td><td>3.5m</td><td colspan="2">3.0m</td></tr>
<tr><td>Secondary route on lower-order road
(Local collector and below)</td><td colspan="3">2.0m where street/road contains dedicated on-road cycle lanes
2.5m where street/road does not contain cycle lanes</td></tr>
<tr><td>Secondary route through open space</td><td>3.0m</td><td colspan="2">2.5m</td></tr>
</table>

9. Transitions

The applicable cross section is to transition depending on its adjoining zone and precinct. As illustrated below, a single functional road and street classification such as a Local Access Street may have a different applicable cross section as it moves through different environments. How road and street types transition between each other will be specific to each situation, however, consideration needs to be given to safety for pedestrians, cyclists and vehicles as well as adjoining land uses and infrastructure. Generally, a higher order cross section is to be continued to the next intersection.



Where a street or road adjoins a different residential precinct on the either side of the street or road, the cross section required for the particular street type in the higher order precinct is to be provided. For clarification, the following table lists the priority of precincts for road and street type selection.

6.1 Precinct Priority

General Residential Zone
1. Urban Neighbourhood Precinct
2. Next Generation Neighbourhood Precinct
3. Suburban Neighbourhood Precinct
4. Coastal Communities Precinct

10. Retrofitting Existing Streets

Where establishment of a desired road or street typology cross section is to be achieved through retro-fitting of an existing reserve, the following is to be used as a guide to which elements of the road or street typology cross section could be reduced if the existing reserve is inadequate. Every endeavour Is to be made to maintain the existing alignment of kerbs, however the order of which elements are to be identified for modification will differ between those roads with a "place" function and those with a "movement" function as determined in Section 2 of this Appendix.
The hierarchy of modifications to be considered is as follows (with the elements to be considered for reduction appearing first in the listings below):

"Movement" types:

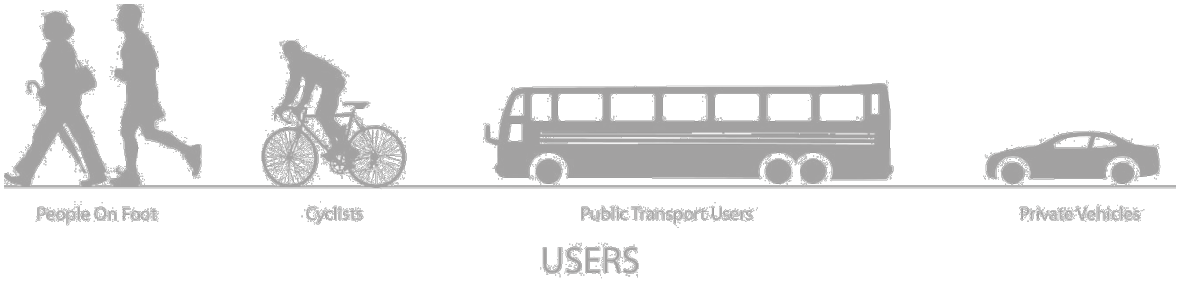
1. Reduce kerbside parking width (to a minimum of 2.4 metres).
2. Remove kerbside parking from one side.
3. Remove kerbside parking from both sides.
4. Reduce or remove "rear" verge (whilst maintaining a minimum 3.5 metre total verge width).
5. Reduce footpath (to a minimum of 2.0 metres whilst maintaining a minimum 3.5 metre total verge width).
6. Reduce cycle lanes (to a minimum of 1.5 metres where speed is not in excess of 60kph).
7. Reduce lane width to 3.3 metres.

"Place" types:

1. Reduce lane width to 3.3 metres.
2. Reduce cycle lanes (to a minimum of 1.5 metres where speed is not in excess of 60kph)
3. Convert cycle lanes to Cycle Awareness Zones (in conformance with technical standards)
4. Reduce or remove "rear" verge (whilst maintaining a minimum 4.5 metre total verge width)
5. Reduce kerbside parking width (to a minimum of 2.4 metres)
6. Remove kerbside parking from one side.
7. Remove kerbside parking from both sides.

Where the existing configuration includes a road and street reserve and/or pavement width is wider than required by the applicable typology cross section, council will determine how the additional space is to be best utilised.

Where kerbside parking is retained and verge width is constrained for tree planting, consideration will be given to including tree planting within the parking lane using permeable pavements and structural soils. Note every endeavour must be made to retain existing vegetation within road and street design including through tunnel boring (utility services), raised footpaths / bike paths with pier foundations to avoid tree root severance / damage.



11. Pedestrian Crossings Design and Location

Zone & Precinct	Functional Road Hierarchy Classification	Pedestrian Crossing Type	Maximum Pedestrian Crossing Separation
CENTRE ZONE			
All precincts	**Arterial**	Signalised, Zebra or Refuge. If > 2 lanes, signalised only	100m where identified as a main street within a movement diagram or structure plan; Or 200m where not identified as a main street within a movement diagram or structure plan; Or Other appropriate distance as required by council taking into account safe sightlines, concentrations of activity, adjoining land uses and likely pedestrian desire lines.
	Sub-arterial	Signalised, Zebra, Refuge or Shared Zone. If > 2 lanes, signalised only	
	District Collector	Signalised, Zebra, Raised Platform, Shared Zone or Refuge	
	Local Collector	Zebra, Raised Platform or Refuges as required by Council, taking into account safe sightlines, concentrations of activity, adjoining land uses and likely pedestrian desire lines.	
	Access Street		
GENERAL RESIDENTIAL ZONE			
Suburban Neighbourhood & Coastal Communities	**Arterial**	Zebra or Refuge where approved by Council, otherwise signalised. If > 2 lanes, signalised only	At all signalised intersections, where identified as a primary or secondary Active Transport Route, or 600m, whichever is the lesser.
	Sub-arterial	Zebra, Refuge or Shared Zone where approved by Council, otherwise signalised. If > 2 lanes, signalised only	
	District Collector	Zebra, Raised Platform, Shared Zone or Refuge	
	Local Collector	Refuges where identified as a primary or secondary active transport route. Uncontrolled crossings where sightlines are adequate.	Where identified as a primary or secondary Active Transport Route, or 200m, whichever is the lesser.
	Access Street	**Not required**	
Next Generation Neighbourhood	**Arterial**	Zebra or Refuge where approved by Council, otherwise signalised. If > 2 lanes, signalised only	At all signalised intersections, where identified as a primary or secondary Active Transport Route, or 400m, whichever is the lesser.
	Sub-arterial	Zebra, Refuge or Shared Zone where approved by Council, otherwise signalised. If > 2 lanes, signalised only	
	District Collector	Zebra, Raised Platform, Shared Zone or Refuge	
	Local Collector	Zebra or raised platform where identified as a primary or secondary Active Transport Route. Uncontrolled crossings where sightlines are adequate, otherwise Refuges.	Where identified as a primary or secondary Active Transport Route, or 200m, whichever is the lesser.
	Access Street	**Not Required**	
Urban Neighbourhood	**Arterial**	Zebra or Refuge where approved by Council, otherwise signalised. If > 2 lanes, signalised only	At all signalised intersections, where identified as a primary or secondary Active Transport Route, or 400m, whichever is the lesser.
	Sub-arterial		
	District Collector	Zebra, Raised Platform, Shared Zone or Refuge	
	Local Collector	Zebra or raised platform where identified as an active transport route. Refuges otherwise.	Where identified as a primary or secondary Active Transport Route, or 200m, whichever is the lesser.
	Access Street	Zebra, Raised Platform, Refuges or Uncontrolled as required by Council, taking into account concentrations of activity, adjoining land uses and likely pedestrian desire lines.	Where identified as a primary or secondary Active Transport Route, or 100m, whichever is the lesser.
INDUSTRY ZONE			
All Precincts	**Arterial**	Zebra or Refuge where approved by Council, otherwise signalised. If > 2 lanes, signalised only	At all signalised intersections or 400m, whichever is the lesser.
	Sub-arterial		
	District Collector	Zebra, Raised Platform, Shared Zone or Refuge	
	Local Collector	Refuges or Uncontrolled as required by Council, taking into account concentrations of activity, adjoining land uses and likely pedestrian desire lines.	Where identified as a primary or secondary Active Transport Route, or 200m, whichever is the lesser.
	Access Street	**Not Required**	

Zone & Precinct	Functional Road Hierarchy Classification	Pedestrian Crossing Type	Maximum Pedestrian Crossing Separation
RURAL TOWNSHIP ZONE			
Township Centre & Convenience	**Arterial**	Zebra or Refuge where approved by Council, otherwise signalised. If > 2 lanes, signalised only	400m; 400m; Or 100m where identified as a main street; or Other appropriate distance as required by council taking into account safe sightlines, concentrations of activity, adjoining land uses and likely pedestrian desire lines.
	Sub-arterial		
	District Collector	Zebra, Raised Platform, Shared Zone or Refuge	
	Local Collector	Zebra or Refuges as required by Council, taking into account safe sightlines, concentrations of activity, adjoining land uses and likely pedestrian desire lines.	
	Access Street		
Township Industry	**All**	Refuges or Signalised. Uncontrolled only where permitted by Council, taking into account safe sightlines, concentrations of activity, adjoining land uses and likely pedestrian desire lines. If Arterial, Sub-arterial > 2 lanes, Signalised only.	400m; At all signalised intersections, where identified as a primary or secondary Active Transport Route, or 600m, whichever is the lesser.
Township Residential	**Arterial, Sub-arterial**	Zebra or Refuge where approved by Council, otherwise signalised. If > 2 lanes, signalised only	At all signalised intersections, where identified as a primary or secondary Active Transport Route, or 400m, whichever is the lesser.
	District Collector	Zebra, Raised platform or Refuge Uncontrolled only where permitted by Council, taking into account safe sightlines, concentrations of activity, adjoining land uses and likely pedestrian desire lines.	
	Local Collector and Access Streets	**Not Required**	
EMERGING COMMUNITY ZONE			
Transition Precinct	**Arterial**	Signalised, Zebra or Refuge If > 2 lanes, signalised only	At all signalised intersections, where identified as a primary or secondary Active Transport Route, or 400m, whichever is the lesser.
	Sub-arterial	Signalised, Zebra, Refuge or Shared Zone If > 2 lanes, signalised only	
	District Collector	Zebra, Raised Platform, Shared Zone or Refuge	
	Local Collector	Zebra or raised platform where identified as a primary or secondary Active Transport Route. Uncontrolled crossings where sightlines are adequate, otherwise Refuges.	Where identified as a primary or secondary Active Transport Route, or 200m, whichever is the lesser.
	Access Street	**Not Required**	

12. Intersection Management

Function Road Hierarchy Classification	Intersection Type and Design[2]
Where intersecting with an Arterial or Sub-arterial Road	
Arterial or Sub-arterial Roads	Signalised or as per AusRoads
District Collector or Local Collector Streets	Signalised or Left-in Left-out access to and from the Collector
Access Streets	No vehicular access, Pedestrians and cyclists only
Where intersecting with a District Collector	
District Collector	Stop, Give-way to be used with priority assigned to suit local circumstances (sight lines, etc.) or Single lane roundabout
Local Collector or Access Street	Single lane roundabout or Give-way on lower order street.
Where intersecting with a Local Collector	
Local Collector	Alternating give way priority treatment along street length or single lane roundabout
Access Street	Single lane roundabout or give-way on access street.
Where intersecting with Access Street	
Access Street	Alternating give-way priority along street length or Single lane roundabout.

[2] Council may accept alternative intersection designs where appropriate in consideration of, but not limited to, existing locations, local conditions, detailed design, safe sight distances, proposed or existing pedestrian environment, adjoining lane uses, direct lot access arrangements, speed environment and road geometry.

13. Pavement Design and Construction

13.1 Pavement and Median Crossfall

Roads and streets on straight alignment shall be designed with a normal crossfall of pavement and shoulders of 3%. Where steeper or flatter crossfalls than the normal are required, for example on superelevated curves at intersections or turning areas, the maximum and minimum permissible pavement crossfalls shall be 5% and 2% respectively with consideration of high vehicles turning.

At intersections and cul-de-sac heads contour details are required to demonstrate that there is no ponding of water. Where minimum crossfall cannot be achieved the longitudinal grades may be used to shed the water.

The desired maximum crossfall for grassed medians on divided roads shall be 1 in 6 with an absolute maximum of 1 in 4. At median openings, the pavement crossfall is to be checked for vehicle stability and is recommended to not exceed 5%.

Split level and divided roads/streets are to be avoided. Where this is not possible, prior written approval shall be obtained from Council's nominated representative.

13.2 Pavement Tapers

Pavement tapers to existing construction shall be designed in accordance with the current AUSTROADS based on the design speed as accepted by Council's nominated representative. Detailing is to include lengths, typical section(s), linemarking and signing. Tapers shall be constructed to the same standard as the proposed full road pavements.

13.3 Kerb and Channel

Kerb or kerb and channel shall be provided on both sides of road pavements on all urban and rural residential roads unless otherwise approved by Council.

Kerb and channel or concrete lined table drains shall be provided on all Rural roads when grades are in excess of 10%. For soils which are easily eroded, kerb and channel or concrete lining will be required when the grades of rural roads are greater than 7%.Consideration may be given to using kerb and channel through deep cuttings.

Unless otherwise approved, the type of kerb and channel used shall be as listed below and shall be designed in accordance with IPWEAQ Standard Drawings for Kerb Profiles:

a) Industrial and Commercial areas and Park frontages - Barrier kerb (B1 300)
b) Traffic islands – Semi-Mountable (SM3) Modified to key in 125mm below pavement surface
c) Roundabouts – SM5
d) Non-channelled roads – edge beam M6 or ER2
e) All other locations – Mountable kerb (M3)

The desirable minimum longitudinal grade for kerb and channel shall be 0.5%. Pavement of minimum depth of 125mm is to extend a minimum of 150mm behind kerb and channel.

Where proposed construction adjoins existing kerb and channel Council's nominated representative shall decide whether the existing profile shall be extended or whether the new construction will be tapered smoothly to the existing kerb and channel.

13.4 Subsoil Drainage

Subsoil drains shall be provided beneath all kerb and channel. On roads with no kerb and channel, subsoil drainage will be required where poor subgrade drainage exists and at locations directed by Council's nominated representative. Subsoil drainage is to be provided in accordance with I.P.W.E.A.Q. Standard Drawings subject to the details described below:

a) Pavement of minimum depth of 125mm is to extend a minimum of 150mm behind kerb and channel; and
b) Subsoil drainage trench backfill is to extend to the underside of the kerb.
c) Width of subsoil trench to be 300mm

Trimming and compaction of subgrade is to be completed and approved before subsoil drains and service conduits are constructed. The trenches shall then be excavated, and the excavated material placed on the footpath and not the subgrade.

Where subsoil drains pass under service conduits, the side drains are to be deepened and graded out to a normal depth at a minimum grade of 1:250.

For roads without kerb and channel the subsoil drainage trench is to be 300mm wide and positioned such that the outer edge of the trench is in line with the outer edge of the pavement seal. The subsoil drainage is to be centrally located within the trench.

In dispersive, soluble or fine grained soils, the developer's representative is to evaluate whether geofabric wrapped subsoil drains are required. Where geofabric wrapped subsoil drains are proposed the developer's representative is to provide details for approval by Council's nominated representative.

Road subsoil drainage must be 'daylighted' and discharged to an approved legal point of discharge. Caps are to be provided to upstream ends of subsoil drains.

13.5 Pedestrian and Cycle Infrastructure

Pedestrian and Cycle infrastructure is to be provided for as identified in the Road and Street Typology Cross Section. Refer to AUSTROADS for additional guidance in relation to detailed design and construction requirements.

Pathway construction is to be in accordance with I.P.W.E.A standard drawings. Where applicable the pathway is to be removed and replaced with a standard crossover. The crossover is to give priority to the footpath profile. New concrete pathways are to be pinned to adjacent concrete infrastructure.

All new concrete pedestrian and cycle infrastructure is to be pinned to adjacent existing concrete infrastructure (driveways, pathways, etc.) using N12 dowel bars in accordance with Council's Standard Drawings and subject to the following requirements:

a) The dowel bars are to be placed along the pathway midway between joints at 300mm centres.
b) The dowel bar end within the existing concrete is to be epoxy bonded to the existing concrete and the section of the bar within the new concrete is to be greased.

Asphaltic concrete (A.C.) and gravel path locations and depths are to be approved by Council's nominated representative. Where approved, pathways are to have 25mm thick A.C. surfacing on Class 2.3 gravel of an approved depth (minimum 100mm).

13.6 Kerb Ramps

Kerb ramps are to be provided at all intersections, at all kerb returns and at the end of all pathways i.e. between lots, park access, etc. At intersections, the ramps are to be located in accordance with AS1428 Design for Access and Mobility to align with existing or future pathways. Tactile indicators are to be installed in accordance with AS 1428.4.

Kerb Ramps are to be constructed in accordance I.P.W.E.A.Q. Standard Drawings. Kerb ramps are to be directional in all instances.

13.7 Grassing

Minimum fifty (50) millimetres compacted thickness of approved topsoil shall be placed over the balance areas of all verges, where the subsoil has the capacity to support sustained grass growth. In known problem soils, depth of topsoil is to be increased to 100mm. As a minimum the verge is to be fully turfed. Landscaping of verge areas is to be approved by Council's representative, however, all balance areas of the verge are to be turfed. Refer to the Appendix D – Landscape Design and Street Trees.

13.8 Road Edge Guide Posts and Guardrails

Road edge guideposts shall be provided at all locations where kerb and channel is not constructed e.g. half road construction, tapers, ends of roads, etc. in accordance with Department of Main Road Manual of Uniform Traffic Control Devices. Guard rail locations and installation is to be as per AUSTROADS Guide to Road Design.

13.9 Pavement Design

This section is intended to facilitate the checking and approval of proposed pavement designs for roadworks associated with subdivisions, building development and re development works. It is not intended to be used in lieu of design manuals. Pavement designs are to be submitted and approved by Council.

The pavement is to be designed in accordance with AUSTROADS Guide to Pavement Technology including design parameters, subgrade evaluations, laboratory testing and design charts. The design pavement depth does not include the asphaltic concrete (A.C.) surfacing where the A.C. surfacing thickness is less than 50mm.

The proposed pavement design is to be submitted for approval at least five (5) days prior to a subgrade inspection.

13.10 Determination of Subgrade Strength

A design California Bearing Ration (CBR) is to be determined for each identifiable unit defined on the basis of topography, geological and drainage condition of the site. The four day soaked CBR at a compaction of 100% Standard compaction is to be the standard test. Tests are to be carried out in a NATA registered laboratory (National Association of Testing Authorities).

The test results are to be submitted with the proposed pavement design. The design CBR is to be detailed on plans.

The sampling is to be randomly located within each length of the proposed roadway with constant subgrade material. It is required that a minimum of 1 test per material type be carried out. The location of material type variances are to be detailed in accordance with sample test and adjoining lot. For less than five results the design CBR shall be the least estimated insitu CBR result. For more than four results, the design CBR shall be the 10th percentile of all estimated insitu CBR results. The samples shall be taken generally in the position of the outer wheel path on both sides of the proposed road. A sketch plan showing the location of all tests is to be submitted with the test results for pavement design approval.

13.11 Design Basis

The design traffic in Table 13.11 below shall be adopted unless the developer's representative submits to Council, and has approved, alternative design traffic values. To determine the design traffic the developer's representative shall use the methodology in the AUSTROADS design manuals.

Street and Road Pavements shall be designed in accordance with AUSTROADS Design Manuals, utilising such amendments and additional criteria stated in this manual. The pavement design life adopted for all roads is to be 20 years. The minimum pavement depth is 200mm. The minimum pavement depth does not include the asphaltic concrete surfacing. The minimum pavement layer thickness for minor roads is 100mm and for major roads is 125mm.

Where pavement widening is required, testing/onsite inspection is to be undertaken to demonstrate that there is existing quality gravel in the road pavement to a depth that satisfies the classification typology

of the road. Where this is evident the widening is required to be constructed to full pavement depth as approved by Council's nominated representative in accordance with the classification typology of road. Where existing quality gravel of suitable depth cannot be demonstrated the road must be constructed with full depth pavement. Where a development permit does not condition a minimum width, the road must be constructed with full pavement and seal to the (ultimate) centre line of the road or a minimum of 3 metres, whichever is the greater.

13.12 Pavement Materials

Pavement Materials shall be in accordance with Main Roads Technical Specifications (MRTS 05) for Unbound Pavements. The minimum gravel material types for lower sub-base, upper sub-base and base are 2.5, 2.3 and 2.1, respectively. Where a single sub-base layer is nominated Type 2.3 material shall be used. The use of recycled unbound pavement material is subject to a Council product approval. Alternative product proposals shall receive written product approval from Council prior to use.

A copy of the material grading and CBR are to be provided to the nominated representative prior to acceptance of on maintenance. Compaction testing results are to be recorded and provided to the nominated representative upon their request and as part of the on maintenance documentation. If these details are not available the Contractor shall carry out testing suitable to verify the stability and quality of the pavement layers and submit these results to Council as part of the on maintenance documentation.

13.13 Surfacing

In urban and rural residential areas, the Asphaltic Concrete (A.C.) surfacing thickness is to be:

a) 25mm (BCC Type 2) on Access streets and Laneways;
b) 50mm (BCC Type 3) for Arterial and Sub Arterial roads; and
c) 40mm (BCC Type 3) for all other streets.

In Commercial and Industrial areas the minimum A.C. surfacing thickness is to be 40mm.

Where stencilled or patterned surface treatments are proposed an additional 10mm shall be added to the design thickness of the surfacing. The A.C. Binder type is to be in accordance with AUSTROADS. A.C. Surfacings are to be constructed in accordance with Brisbane City Council Standards (BCC S310 Supply of Dense Graded Asphalt and S320 Laying of Asphalt).

Primers seals are required to be placed under all asphalt surfaces. Primer seals shall consist of cutback bitumen (AMC4) or bitumen emulsion to Main Roads Specification (MRTS 11 Sprayed Bituminous Surfacings excluding Emulsions) and MRTS 12 Sprayed Bituminous Emulsion Surfacings) with 10mm aggregate. Where cutback bitumen is used the minimum curing time before the next sealed layer (asphalt) can be placed will be fourteen (14) days. Where bitumen emulsion is used the minimum curing time before the next sealed layer (asphalt) can be placed will be four (4) days.

Application rates of primer binder and aggregate are to be designed in accordance with the current edition of AUSTROADS Practitioners Guide to Design of Sprayed Seals.

In rural areas bitumen spray seal surfacing is to be provided in the form of a 2 coat Polymer Spray Seal (14mm/7mm) in accordance with Main Road Technical Specifications (MRTS 18 Polymer Modified Binders, MRTS 11 Sprayed Bituminous Surfacings excluding Emulsions).

The Degree of Saturation of base course prior to surfacing is to be less than 65%. Test results demonstrating degree of saturation are to be provided to Council's nominated representative at the preseal inspection and as part of the on maintenance documation.

For Rigid pavements, concrete and gravel thicknesses are to be designed in accordance with AUSTROADS Design Manuals. Notwithstanding the above, unless otherwise approved by Council's nominated representative, the minimum thickness of the reinforced concrete pavement shall be 175mm with a minimum of 100mm type 2.3 gravel.

Where the rigid pavement section being designed is less than 25m in length and is abutted by flexible pavement which is greater than 275mm, then the combined thickness of the rigid pavement and its

supporting sub base shall be equivalent to the combined thickness of the abutting flexible pavement base, sub base and select material courses.

Colouring of stencilled or patterned concrete shall be subject to approval of Council's nominated representative. Particular attention is to be given to the selection of surface treatments which ensure that appropriate skid resistance is maintained. Where colouring o the rigid pavement is proposed, the complete pavement mix is to be coloured. Light colours are to be avoided.

13.14 Pavement for Low Subgrade CBR

If the Design CBR determined for the subgrade is less than the minimum CBR 3, then the following is required:

- replacement with 300mm, minimum CBR 15 replacement material; and
- re-design pavement based on CBR 3 or design in accordance with AUSTROADS.

Alternative designs incorporating geogrids and geofabrics will be considered when submitted for approval by an appropriately qualified and experienced engineer.

13.1 Design Basics

Road Typography ESA	Function Road Hierarchy	Design Traffic
Roundabout additional 0.5x10^4	Access Street	Allow
Roundabout additional 1x10^4	Local Collector and above	Allow

13.15 Construction

Each pavement course is not to be commenced until the previous course, i.e. subgrade, sub base/s, base or existing pavement, has been inspected and approved and certified by the consultant with respect to compaction, finished levels and texture of finish. Compaction tests of each layer are required and consultants must ensure that all tests are satisfactory before proceeding to the next layer. All test results are be provided to Council's nominated representative prior to surfacing.

13.16 Subgrade Preparation

Subgrade is to be trimmed to an even surface free from loose material and graded to be free-draining. Unsuitable material such as organic matter is to be removed. Subgrade affected by rainfall after final trimming shall not be accepted until appropriate drying out treatment has been affected. Appropriate management of subgrade with moderate to high shrink/swell index.

13.17 Unbound Pavement Course Placement

Unbound pavement course material is to be placed only on underlying layers maintained at the correct moisture content. Prepared subgrades and preceding layers of base course shall be moistened immediately prior to spreading the next course.

Pavement material is to be maintained at the specified moisture content prior to and during spreading. The leading edges of the pavement material are to be kept moist. Minimum compacted layer thickness shall be 100 millimetres and maximum compacted thickness shall be 150mm.

13.18 Compaction Testing and Frequency

Determination of the compaction performance of the subgrade and pavement gravel materials – laboratory reference density, field density, optimum moisture content, field moisture content -shall be carried out in accordance with AS1289 Methods of Testing Soils for Engineering Purposes, in particular the E series tests. The laboratory reference density shall be:

a) Natural Subgrade - 100% Standard Maximum Dry Density (MDD)
b) Pavement upper and lower sub base layers – 100% Standard Maximum Dry Density (MDD)
c) Pavement base layer - 102% Standard Maximum Dry Density (MDD)

The minimum frequency of testing shall be in accordance with Council's Planning Scheme Policy Operational Works Inspections, Maintenance and Bonding procedures.

A minimum of three (3) tests per project will be required. A sketch plan showing the location of the tests is to be submitted with the results. All tests are to be distributed reasonably evenly through the full depth and area of pavement.

The testing frequencies stated above are based on a "not one to fail" basis. Failure of compaction tests on any layer will require:

a) Removal or reworking of material; and
b) Re-testing; and
c) Resubmission of failed test results, successful test results and description of remedial treatment undertaken at the developer's representative's directions to Council's nominated representative prior to the relevant inspection.

13.19 Pavement Depth Verification

Pavement depths shall be verified by the provision of as constructed levels of the subgrade and pre-seal stage (or top of kerb if installed) at a frequency of three (3) levels (right hand side, centre and left hand side) every 50 metres. The surveyed information is to be provided in a tabulated format and is to be certified by both the surveyor and consulting engineer provided with on maintenance submission.

Table 13.11 Design Basis

Zone & Precinct	Functional Road Hierarchy Classification	Design Traffic ESA
All Zones		
All Precincts	Arterial	1.5×10^7
	Sub-arterial	3×10^6
	Driveways	2.5×10^3
General Residential		
Coastal community & Suburban neighbourhood	Access Street	8×10^4
	Local Collector	2.5×10^5
	District Collector	8×10^5
Next generation neighbourhood	Laneway	2×10^4
	Access Street	1.2×10^5
	Local Collector	3×10^5
	District Collector	8×10^5
Urban neighbourhood	Laneway	2×10^4
	Access Street	1.5×10^5
	Local Collector	3×10^5
	District Collector	8×10^5
Centre Zone		
All Precincts	All Classifications	To be determined in accordance with Austroads Guide to Pavement Technology.
Industry Zone		
All Precincts	Access Street	3×10^6
	Local Collector	1×10^7
	District Collector	1.5×10^7
Rural Residential Zone		
N/A	Access Street	2.0×10^5
	Local Collector	2.5×10^5
	District Collector	3.5×10^5
Where not otherwise specified		
N/A	All Classifications	To be determined in accordance with Austroads Guide to Pavement Technology.

14. Driveways, Vehicle and Pedestrian Crossovers

Note - Where self-assessable crossover works are undertaken:

a) the construction is the responsibility of the property owner;
b) the construction is at the risk of the property owner;
c) the construction of the kerb and channel (where required by the Planning Scheme) is considered part of the construction of a vehicle crossover and is therefore the responsibility of the property owner;
d) it is recommended "Dial Before You Dig" is contacted if excavation is required;
e) any damage caused by crossover works or damage not notified to Council prior to commencing crossover works will be repaired at the property owners expense;
f) crossovers that do not comply with the criteria as listed below, and where an approval has not been sort from Council, the applicant may be directed to undertake modifications at the property owner's expense;

14.1 Vehicular crossover and driveway

For the purpose of this Planning scheme policy, the following terms are defined as:

a) *vehicle crossover* is a constructed access crossing connecting a property boundary with the carriageway;
b) *driveway* is an access crossing connecting the on-site vehicle accommodation or standing area to the property boundary.

For the purpose of constructing a vehicle crossover, Moreton Bay Regional Council grants permission to carry out work on a Road Reserve or on Council Owned Land, subject to the following criteria:

14.1.1 Dwelling houses

This section provides the self-assessable criteria for the location, design and construction of vehicle crossovers and driveways associated with Dwelling houses.

14.1.1.1 Location

a) vehicle crossovers and driveways are located so as to provide a clear view of passing pedestrians, cyclists and vehicles.
b) vehicle crossover of one allotment does not encroach on the frontage of an adjacent allotment;
c) vehicle crossovers do not directly adjoin painted or concrete traffic islands on the road;

d) vehicle crossovers are setback a minimum 1m from any stormwater pit, electricity pole or road sign;
e) vehicle crossovers are setback a minimum 3m from any street tree;
f) vehicle crossovers and driveways do not disturb, cover or restrict access to:
    i. a survey mark;
    ii. water meters, fire hydrants or valves;
    iii. the water supply pipe between the main and the meter;
    iv. a Council or public sector entity easement;
    v. utility corridors and pits (e.g. Telstra, NBN, Gas)
g) vehicle crossovers and driveways are setback a minimum 10m of the approach side of a bus stop;
h) vehicle crossovers and driveways are located clear of the prohibited locations as referenced in AS2890.1.

14.1.1.2 Design

a) where for a Dwelling house subject to the Dwelling house code:
    i) vehicle crossover widths are a maximum 40% of the frontage access is being obtained from, or 4.8m whichever is the lesser. No maximum for a laneway lot.
    ii) driveways do not include a reversing bay, manoeuvring area or visitor parking spaces (other than tandem spaces) in the front setback
b) where for a Dwelling house not subject to the Dwelling house code, vehicle crossover widths are in accordance with the relevant standard drawing - (RS-049, RS-050) or RS-056.
c) vehicle crossovers are designed in accordance with the relevant standard drawings in Appendix H of Planning scheme policy - Integrated design;
d) vehicle crossovers match the level of the existing concrete footpath or finished ground level where there is no footpath;
e) where a driveway services multiple allotments, the design traffic ESA of vehicle crossovers is to be 2.5 x 10^3 per property serviced.

14.1.1.3 Construction

a) vehicle crossovers are to be constructed from concrete (includes plain, coloured or stencilled/stamped concrete and exposed aggregate concrete), asphalt or bitumen
b) adequate warning of the presence of works on a Road Reserve or Council Owned Land shall be given in accordance with the Manual of Uniform Traffic Control Devices (MUTCD). The MUTCD is available free from Transport and Main Roads website: http://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Manual-of-uniform-traffic-control-devices
c) between sunset and sunrise such warning is to consist of a barrier with warning flags or a warning sign on each side of the crossover works;
d) any steps necessary for the protection of the public shall be taken by the applicant at the applicant's expense;
e) all vehicle crossover works shall proceed without any interruption to traffic. If traffic lane closure is required, the person carrying out the works shall have the "Notification of Temporary Road Closure" form approved prior to any road closure occurring. Works shall be carried out in accordance with the MUTCD
f) the vehicle crossover works are to be backfilled, consolidated and the surface reinstated immediately after the works are completed;
g) any subsidence or other damage which occurs and is attributable to the vehicle crossover works are to be repaired by the applicant;
h) the applicant is to obtain a Public Liability Insurance Policy or not less than $20 million covering any risk arising from the proposed vehicle crossover work.
i) a minimum 1.5m pedestrian throughway shall be maintained at all times during the vehicle crossover works. This pedestrian throughway shall be of equivalent standard to adjoining or closest existing footpath.

14.1.1.4 Rear of allotment driveways

a) Access handles for rear lots are to contain a driveway and provision for services appropriate to the use. The driveway is to be designed with a loading of 2.3 x 10^3 ESA for each lot entitled to use the driveway. The driveway is to be sealed for a minimum width of 3.0 metres. Additional width or passing bays maybe required on long driveways to facilitate vehicles passing along the length of the driveway. For urban residential driveways the construction shall be reinforced concrete slabs or interlocking concrete pavers. For non-urban residential driveways the construction shall be reinforced concrete slabs or a 2 coat sealed gravel pavement or 25mm asphalt sealed gravel pavement. The minimum gravel pavement shall be of type 2.1 gravel with compacted thickness of 150mm.

b) Appropriate longitudinal drainage, cross drainage and scour/erosion protection works must be provided. The appropriate longitudinal and cross drainage design requirements can be located within Planning Scheme Policy Integrated Design Appendix C. The general maximum longitudinal grade shall be 16%. Consideration is to be given to the maintainability of unsealed sections of the access handle and appropriate longitudinal and cross-sectional grades.

c) Conduits are to be installed for underground electricity supply and telecommunications, including draw wires within, for the entire length of the access handle.

d) Bin pads are to be provided for lots with rear of allotment driveways, shared driveways or lots that do not have sufficient frontage to allow waste vehicle access to the kerb. Bin pads are to be constructed from 125mm thick reinforced concrete within the front verge immediately behind the back of kerb. Bin pads are to be 2 metres long x 1 metre wide for each allocated lot to allow for general and recycling waste collection and are to be located at the closest reasonable location to the allocated lot. Bin pads are to be clear of crossover flares and other utilities and street trees in the footpath area.

e) Bin pads are to be painted with house numbers (not lot numbers) to show allocated lots prior to the acceptance of off maintenance. Adequate waste vehicle access to the adjacent lot where the bin pads are located must also be demonstrated and the space available to the adjacent lot for waste collection must not be compromised. Council may require that an additional bin pad is also constructed for the adjacent lot whose frontage is being used for bin pad construction.

14.1.2 Industrial and commercial uses

This section provides the self-assessable criteria for the location, design and construction of vehicle crossovers associated with industrial and commercial uses.

14.1.2.1 Design

a) vehicle crossovers are designed in accordance with the relevant standard drawings in Appendix H of Planning scheme policy - Integrated design;

b) vehicle crossovers match the level of the existing concrete footpath or finished ground level where there is no footpath;

c) vehicle crossovers are designed to cater for the following service vehicles:

Frontage Road	Minor Road	Major Road	Major Road
Development Generated Traffic	N/A	≤100 vpd	>100 vpd
Design Service Vehicle from Table SC8.1.1	Type of crossover		
Small Rigid Vehicle	General Wide Flared (6.5m)		Centre Island W1 - 5.5m, W2 - 5.0m
Medium Rigid Vehicle	General Wide Flared (7.5m)		Centre Island W1 - 5.5m, W2 - 5.0m
Heavy Rigid Vehicle	General Wide Flared (7.5m)		Centre Island W1 - 5.5m, W2 - 5.0m
Articulated Vehicle	General Wide Flared (9.0m)		Centre Island W1 - 9.0m, W2 - 7.5m

14.1.2.2 Construction

a) adequate warning of the presence of works on a Road Reserve or Council Owned Land shall be given in accordance with the Manual of Uniform Traffic Control Devices (MUTCD). The MUTCD is available free from Transport and Main Roads website: http://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Manual-of-uniform-traffic-control-devices
b) between sunset and sunrise such warning is to consist of a barrier with warning flags or a warning sign on each side of the crossover works;
c) any steps necessary for the protection of the public shall be taken by the applicant at the applicant's expense;
d) all vehicle crossover works shall proceed without any interruption to traffic. If traffic lane closure is required, the person carrying out the works shall have the "Notification of Temporary Road Closure" form approved prior to any road closure occurring. Works shall be carried out in accordance with the MUTCD
e) the vehicle crossover works are to be backfilled, consolidated and the surface reinstated immediately after the works are completed;
f) any subsidence or other damage which occurs and is attributable to the vehicle crossover works are to be repaired by the applicant;
g) the applicant is to obtain a Public Liability Insurance Policy or not less than $20 million covering any risk arising from the proposed vehicle crossover work.
h) a minimum 1.5m pedestrian throughway shall be maintained at all times during the vehicle crossover works. This pedestrian throughway shall be of equivalent standard to adjoining or closest existing footpath.

14.1.3 Pedestrian crossover and paths

For the purpose of this Planning scheme policy, the following term is defined as:

- *Pedestrian crossover* is a constructed access crossing connecting the property boundary with the footpath and is located in the rear verge between the property boundary and the footpath.

For the purpose of constructing a pedestrian crossover, Moreton Bay Regional Council grants permission to carry out work on a Road Reserve or on Council Owned Land, subject to the following criteria:

14.1.3.1 Location

a. pedestrian crossovers do not disturb, cover or restrict access to:
   i) a survey mark;
   ii) water meters, fire hydrants or valves;
   iii) the water supply pipe between the main and the meter;
   iv) a Council or public sector entity easement;
   v) utility corridors and pits (e.g. Telstra, NBN, Gas)

14.1.3.2 Design

a) pedestrian crossovers are a maximum of 1.5m wide and are designed in accordance with the relevant standard drawing in Appendix H of Planning scheme policy - Integrated design

14.1.3.3 Construction

a) pedestrian crossovers are to be constructed from concrete (includes plain, coloured or stencilled/stamped concrete and exposed aggregate concrete);
b) the footpath is to remain unobstructed at all times during the pedestrian crossover works. Where there is no footpath, a minimum 1.5m pedestrian throughway shall be maintained at all times during the pedestrian crossover works;
c) between sunset and sunrise such warning is to consist of a barrier with warning flags or a warning sign on each side of the pedestrian crossover works;
d) any steps necessary for the protection of the public shall be taken by the applicant at the applicant's expense;
e) the pedestrian crossover works are to be backfilled, consolidated and the surface reinstated immediately after the works are completed;
f) pedestrian crossovers are to be pinned to adjacent existing concrete infrastructure (driveways, pathways, etc.) using N12 dowel bars in accordance with Council's Standard Drawings and subject to the following requirements:
   i) The dowel bars are to be placed along the pathway midway between joints at 300mm centres.
   ii) The dowel bar end within the existing concrete is to be epoxy bonded to the existing concrete and the section of the bar within the new concrete is to be greased.
g) any subsidence or other damage which occurs and is attributable to the pedestrian crossover works are to be repaired by the applicant;
h) the applicant is to obtain a Public Liability Insurance Policy or not less than $20 million covering any risk arising from the proposed vehicle crossover work.

15. Street Lighting and Public Utilities

15.1 General Requirements

Unless stated otherwise, the Developer is responsible for the design of public utility services including liaison with the relevant public utility authorities, supply and installation of all service conduits, including the provision of all services and/or conduits along the full length of any rear allotment access or access easement. The Developer must also meet the cost of any alterations to the public utility mains, existing mains, services or installations required in connection with the development. This includes the relocation of any fire hydrant and/or valves from within the limits of the development's vehicular crossings, if applicable.
If road or street widening is required along the frontage of the development, the Developer must relocate the services onto the correct alignment within the verge. In some instances, the services may need to be lowered to provide sufficient cover when the footpath is regraded to the design profile.

Services crossing existing arterial and sub-arterial roads are to be tunnel bored. Council may require that other Functional road hierarchy classifications be tunnel bored, depending on the condition of the existing road or street.

The service corridors, alignments and depths must conform to the relevant Standard drawings contained in Appendix H – Standard Drawings.

15.2 Street Lighting

15.2.1 Principal Consultant

The Developer must appoint a suitably qualified Principal Consultant to liaise with Council for the approval of street lighting and electrical reticulation. The Principal Consultant must be a RPEQ and hold professional indemnity insurance to the value of not less than $1,000.000.

15.2.2 Standards

Unless specified otherwise in this chapter or as directed by Council, the provisions and detailed design of street lighting installations must conform to the following standards.

15.2.3 Lighting Category

The lighting categories referred to in *AS 1158* are broadly described as follows:

a) Category V lighting. Lighting which is applicable to roads on which the visual requirements of motorists are dominant, e.g. traffic routes.
b) Category P lighting. Lighting which is applicable to roads on which the visual requirements of pedestrians are dominant, e.g. local roads and public activity areas.

15.2.3 Lighting Categories

Functional Road Hierarchy Classification	AS1158 Lighting Category
Arterial Road	V3
Sub-arterial Road	V5
Urban Road (all other zones)	
District Collector	P4
Local Collector Street	P4
Access Street and Laneways	P5
Rural & Rural Residential Zone	
All roads	P5 Refer to locational requirements in section 9.3.5 (i) below.
Pathways	
Between residential lots	P4
Open and civic space area	P4
Commuter links	P4
Other locations	As advised by Council

15.2.4 Alignment

Within access streets serving 20 lots or less, the streetlights are to be located on one side of the street only. Where a pathway is only located on one side of the street, the lighting is to be provided along the same side of the street as the pathway.

Within other access streets the streetlights are to be installed alternatively on opposite sides of the street (staggered arrangement).

The location of light poles are to avoid the likely vehicle conflict points, minimise the risk of damage to both poles and vehicles and injury to vehicle occupants, minimise glare complaints, and minimise conflicting with driveway locations.

The following factors are to be considered when determining the street lighting alignment:

a) The potential for vehicle collision on built to boundary lots and rear access lot driveways.
b) The pole type installed is to be in accordance with the requirements of the relevant Australian Standards have regard for the pole location and speed environment
c) Locate street light poles in line with abutting property boundaries or on truncation points at intersections. In cul-de-sac locations, the alignment is measured along a line projected lot side boundary to the kerb.
d) Locating poles in cul-de-sac adjacent to narrow property frontages is undesirable due to possible conflict with adjoining driveways.
e) Lighting poles must be located in accordance with the relevant Standard Drawings. See Appendix H – Standard Drawings.
f) The centre of the street lighting pole must be located 0.9 metres behind the kerb invert.

g) The preferred configuration of lighting at a roundabout is for the light poles to be located on the approach side of each intersection street without poles in the central median island. Lighting poles must be located as far as practicable, away from the intersection. Council would only consider the installation of central island lights if the aforementioned preferred lighting arrangement cannot be achieved, then the poles are of the cantilever (pivot arm) type and satisfactory maintenance vehicle access is provided clear of landscaping.

h) For bikeways, the lighting column must be located 1.2 meters from the edge of the bikeway pavement.

i) The proposed light must be at least 7.0 metres clear from any existing street trees.

15.2.5 Subdivisions & Other Developments

The specific requirements of new developments, in particular subdivisions, are as follows:

a) The lighting design must be cost effective in regard to minimising the annual operating costs and where possible, the installation capital costs. The Developer is responsible for all capital costs associated with the design and installation of the street lighting scheme. Where it may be advantageous for the Developer to install lighting work outside the specified limits at the time of development, Council may contribute towards some of the capital costs, but these must be specifically agreed between the Council and the Developer. Council will only bear operating costs under Rate 2 of Energex's Public Lighting Tariff.

b) Where the new development adjoins an existing street, the new poles/lights must match the existing types to the maximum practicable extent. This is not applicable when the existing road or street contains GI poles.

c) Where the development requires partial road or street construction (typically when the development adjoins an undeveloped site), the lighting must be designed for the full width. However the lights on the development side only would need to be installed (assuming a staggered arrangement is required). In this instance conduits must be placed for future lighting on the non-constructed side.

d) Where major traffic routes (i.e. Category V road) are not likely to carry high volumes of traffic until the future stages are developed and occupied, either one of the following options is acceptable.

    i) Install half the ultimate lighting with the provision of conduits for the remainder lighting in the future.
    ii) Install smaller pole/lower wattage luminaries in the final position for upgrading at a later date. The use of base plate or rag bolt mounted columns in this case may be advantageous.

e) The lighting design for the development must integrate aesthetically with the adjoining / developments / estates / stages. Also, the design must incorporate as far as practicable, the future planning of the area.

f) An aero screen luminaire on an integral 0.5 metre outreach must be used on a pedestrian laneway. The light will generally be located midway along the laneway at abutting property boundaries. If the laneway exceeds 60.0 metres then more than one light may be required. Hinging Base Plate Mounted (HBPM) columns must be used in this instance for maintenance purposes.

g) Underground electricity supply pillars must be provided at 150 metre intervals along park frontages for future supply to internal park lighting and other electrical park equipment.

h) Pedestrian underpasses require special consideration. The Principal Consultant must contact the Council Lighting Officer for site specific requirements before the commencement of design.

i) For subdivisions in the Rural zone and where allotment reticulation electrical supply is provided, suitable flag street lighting is to be provided in the following situations:

    i) Intersections & cul-de-sacs
    ii) Sharp bends
    iii) Traffic control devices

iv) Culverts and bridges
v) Identified traffic hazards

j) Provision of access for maintenance of lighting is to comply with the specific requirements of the energy provider. Suitable vehicle access is to be provided for light poles no further than 100 metre walking distance from the service vehicle.

k) For subdivisions in the Rural residential zone, suitable street lighting to the required lighting category is to be provided in the following situations:

i) Intersections & cul-de-sacs
ii) Sharp bends
iii) Traffic control devices
iv) Culverts and bridges
v) Identified traffic hazards

l) Notwithstanding all the above items a) – k), Council may vary the required street lighting category for any street or road in consideration of special circumstances or require additional lighting in situations such as:

i) Intersections.
ii) Roundabouts.
iii) Sharp bends.
iv) Traffic control devices.
v) Pedestrian crossings/refuges.
vi) Cul-de-sacs.
vii) Bridges (minimum Category V5 at abutments and minimum Category P4 on deck).
viii) Night time accident locations.
ix) Frequently used night time bus stops.
x) Areas that may generate pedestrian traffic or vehicle night traffic.
xi) Wildlife movement and crossing locations

15.2.6 Decorative Lighting

Decorative lighting must not be used on Category V traffic routes. Council will not accept any decorative light or supporting pole for the lighting of public roads and laneways unless it is a standard stock item of Energex. If the development is an extension of an existing estate already installed with Nostalgia units, then the Developer must continue to use matching Nostalgia units.

15.3 Electricity

15.3.1 General

In the context of these guidelines, 'underground electricity' means the installation of conduits and supply of services such as electrical reticulation (up to and including 11 kV), pilot cables, street lighting, traffic signals and public lighting to transport facilities, parks, bikeways and telephone booths, etc.

15.3.2 Approval Process

a) All the design and construction work on the electricity supplier's (Energex) assets must be carried out by the electricity supplier or an approved electricity supplier's consultant/contractor.

b) Prior to the Council's endorsement of any survey plan proposing;

i) the creation of an additional lot; or
ii) substantial changes to a boundary of an existing lot, sufficient to affect the provision of reticulated electricity to an existing lot,

a copy of the subdivider supply agreement or certificate of electricity supply from the electricity supplier to provide the necessary services in accordance with approved electricity reticulation plans, must be submitted to Council concurrent with any application seeking the Council to endorse the survey plan.

15.3.3 Subdivisions/Developments in the Rural Zone.

The specific requirements of new developments, where within the Rural zone are as follows:

a) **Development within 500 metres of the existing Electricity supply network.**
Where development is within 500 metres of an existing electricity supply network, the development is to connect to the existing network via underground or above ground connection in accordance with any Energex standards and approvals.

b) **Development not within 500 metres of the existing Electricity supply network.**
No minimum connection standard prescribed.

15.3.4 Subdivisions/Developments in all other zones.

The specific requirements of new developments other than the Rural zone are as follows:

a) **Development Involving the Dedication of New Road**

i) For development other than in the Rural zone involving the dedication of new road for both freehold and community titled lots, full underground electricity reticulation including consumer service pillars must be provided within the road reserve to all allotments including adjacent parkland.

ii) Where necessary the Developer is to supply conduits across the road for the extent of any new road construction.

b) Development on **Existing Dedicated Roads (Including Road Widening)**

i) Where development adjoins or is opposite a Park, foreshore area or Humpybong Reserve, the lot voltage (240V single phase / 415V three phase) and 11 kV must be converted to underground for the development frontage and the development/allotments supplied from consumer service pillars. The existing overhead lines and power poles are to be removed for the length of the development frontage (subject to Energex approval).

ii) Where development does not adjoin or is not opposite park, foreshore area or Humpybong Reserve, and overhead electricity reticulation exists along the frontage of the development, and the development is to take access off the existing dedicated road:

A) The supply for the new development may be taken from existing overhead mains provided the development is not for a rear lot subdivision, the supply does not traverse another property outside the boundaries of the development, or require the installation of new overhead conductors across the road, or extended spans of overhead lines down pathways/driveways to new underground terminations. The supply must be taken either underground from the nearest existing overhead pole or traversed outside the development boundary. Private property poles will not be supported.

B) Where the development cannot achieve the above criteria, the lot voltage (240V single phase / 415V three phase) and 11 kV must be converted to underground and all allotments supplied underground from consumer service pillars.

C) Where the existing overhead lines do not continue to service other existing properties, the redundant lines and power poles are to be removed (subject to Energex approval), with the exception of small frontage (i.e. the development frontage lies wholly within 2 consecutive electricity poles spaced less than 100.0 metres apart) where the existing overhead lines may remain in parallel.

iii) Where the overhead electricity reticulation exists along the frontage of the development, but the proposed development/allotments are to take access and have electricity supply from an internal road system:

A) The low voltage (240V/415V) component of the existing overhead system along the external frontage of the development must be converted to underground and all allotments supplied underground from consumer service pillars.

B) Where the existing overhead lines do not continue to service other existing properties, the redundant lines and power poles must be removed (subject

to Energex approval) with the exception of small frontages (i.e. the development frontage lies wholly within 2 consecutive electricity poles spaced less than 100.0 metres apart) where the existing overhead lines may remain.

C) Conduits must be installed for either the future undergrounding of the existing 11 kV component or new proposed future Low Voltage (240V/415V).

iv) Where necessary the Developer must supply conduits across the road for the extent of any new road construction.

c) Existing Houses/Buildings

i) Where an existing dwelling/building is to remain within the limits of a development, and all other lots/development is to be supplied by new underground reticulation, then any existing overhead electricity (and telecommunication) service to the building must be converted to underground.

d) High Voltage Feeders (33 KV and Higher)

i) All existing conductors of 33kV or higher may remain overhead. However, if the Developer wishes to remove high voltage feeder lines, the necessary approvals must be obtained direct from Energex/Powerlink and Council.

ii) New or relocated > 33kV systems may by overhead at the discretion of Energex/Powerlink.

e) Transformers (PMT and PT)

i) Generally, all new transformers required for a development must be the pad mounted transformer (PMT) type even if their location is remote from the development, except under the following circumstances:

A) For a small development in a fully developed area, the use of a PT and extension of 11 kV may be considered upon request. This option is mainly restricted to industrial developments.

B) Existing pole transformers are not to be upgraded for supply of electricity to new subdivisions.

C) PMT locations are to be in addition to the nominated road reserve. Any PMT's located adjacent to park area are to be excised from the park area.

f) Low Voltage Supply (240V/415V)

i) Where an existing Low Voltage Overhead supply traverses an existing parcel of land that is to be subdivided into smaller allotments, the supply to the newly created lots is to be serviced through the road fronting the development and any existing low voltage supply traversing the lots to be terminated. Council will not favour wayleave arrangements for electrical supply traversing lots on any new developments.

g) Spare Conduits

i) Council reserves the right to specify spare conduits for future use on half/full width road crossings for the extension of service to/from adjacent existing and future developments. (Note: Where rear access lots or lots with a narrow access easements are proposed, future electrical and telecommunication conduits are to be installed for the full length of the access handle or easement before any concrete driveways are installed).

ii) It is the responsibility of the electricity supplier to ensure that the quantity of conduits installed within the development will also cater for any future mains upgrade.

h) Costs

i) The Developer is responsible for all the design (including that pertaining to item 9.6.3 b) iii) above) and construction costs including any relocation of Energex assets, if required as part of the development.

15.4 Gas

If underground gas is to be supplied to the new development, these service conduits must be shown on the engineering plans. Gas services are in accordance with the service provider's requirements.

15.5 Telecommunications

a) Underground telecommunication services must be provided separate to the electricity service, to all allotments. Where overhead telecommunication lines exists along the development frontage, the same conditions as per electricity will apply as per Section 15.6.3 i) & ii).
b) Prior to signing and sealing of the survey plan, a copy of a letter of agreement from the telecommunication carrier to supply the necessary services must be submitted to Council.
c) Telecommunication cabinets are to be located in widened sections of the road or street reserve.
d) Telecommunication services are in accordance with the service provider's requirements.

15.6 Sewer

15.6.1 Service connection

a) Where in the Centre zone, Community facilities zone, Emerging community zone - Transition precinct, General residential zone, Industry zone, Recreation and open space zone, Township zone, Redcliffe Kippa-Ring Local Plan and Caboolture West Local Plan - Urban living precinct where on a serviced lot, all development is to be connected to the reticulated sewerage system in accordance with South East Queensland Water Supply and Sewerage Design and Construction Code and the relevant Water Service Association of Australia (WSAA) codes and standards.
b) Where in all other zones and local plan precincts:
    i) Where the development is in a sewerage connection area or sewerage future connection area as detailed in the Unitywater Connections Policy, all allotments are to be connected to the reticulated sewerage system.
    ii) Where the development is not in a sewerage connection area or sewerage future connection area as detailed in the Unitywater Connections Policy, each allotment is to contain and be serviced by an appropriate onsite sewerage facility.
        A) A site and soil evaluation report may be required where an on-site sewerage facility is proposed. Reports are to be prepared in accordance with AS/NZS 1547 On-site domestic wastewater management and the Queensland Plumbing and Wastewater Code. The report is to include a review of the existing on-site effluent disposal system including setback requirements.
        B) On-site sewerage facility in the Water supply buffer on Overlay map - Infrastructure network must comply with the relevant assessment criteria.

15.6.2 Trade waste

a) Trade waste is to be pre-treated on site prior to discharging into the reticulated sewerage network.

15.7 Water

a) **Service connection**
    i) Where in the Centre zone, Community facilities zone, Emerging community zone - Transition precinct, General residential zone, Industry zone, Recreation and open space zone, Township zone, Redcliffe Kippa-Ring Local Plan and Caboolture West Local Plan - Urban living precinct where on a serviced lot, all development is to be connected to the reticulated water supply system in accordance with South East Queensland Water Supply and Sewerage Design and Construction Code and the relevant Water Service Association of Australia (WSAA) codes and standards.

ii) Where in all other zones and local plan precincts:

A) Where the development is in a water connection area or water future connection area as detailed in the Unitywater Connections Policy, all allotments are to be connected to the reticulated water system.

B) Where the development is not in a water connection area or water future connection area as detailed in the Unitywater Connections Policy, each allotment is provided with a potable water supply of at least 45,000 litres by way of on-site storage which provides equivalent water quality and reliability to support the user requirements of the development.