

Planning Scheme Policy Flood Hazard, Coastal Hazard and Overland Flow

Post Consultation Version 2019



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

This policy supports the Moreton Bay Regional Council Planning Scheme and has been made by Council in accordance with Chapter 2, Part 3, Division 2 of the *Planning Act 2016*.

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, ~~or~~ 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 assessment benchmarks in the Flood hazard overlay code, Coastal hazard overlay code and Overland flow path overlay code.

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.

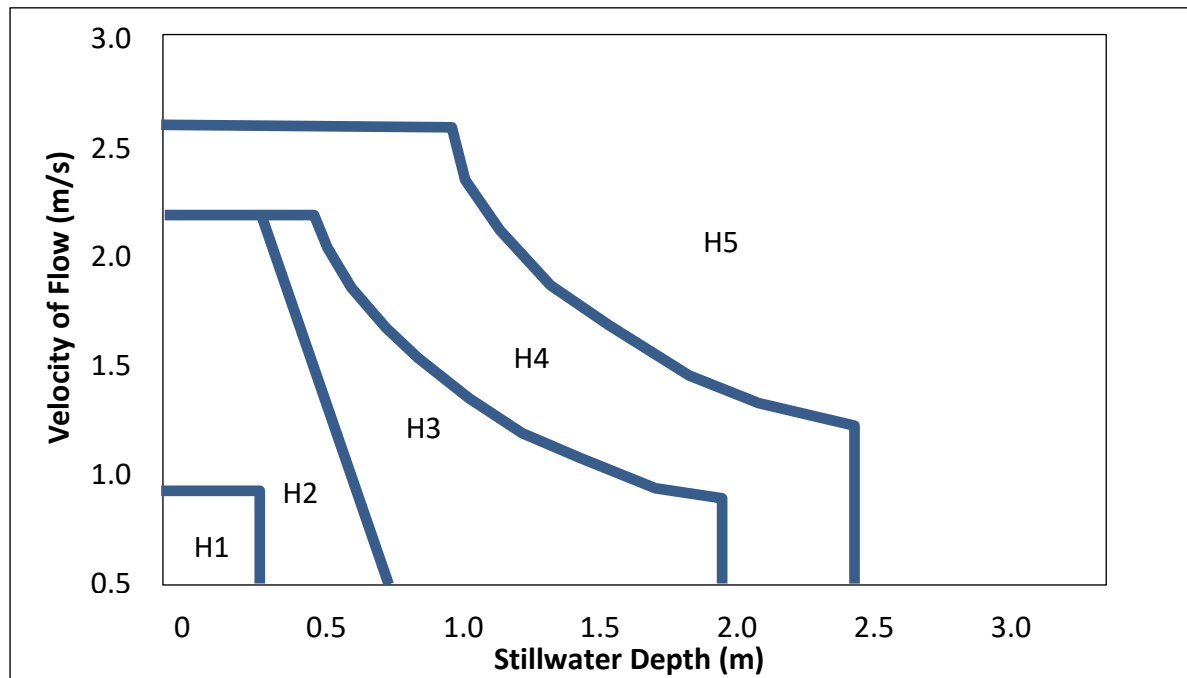
Council has adopted the following risk categorisation consistent with the State Planning Policy – State Interest Guideline: Natural Hazards Risk and Resilience (August 2014) –

- 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.

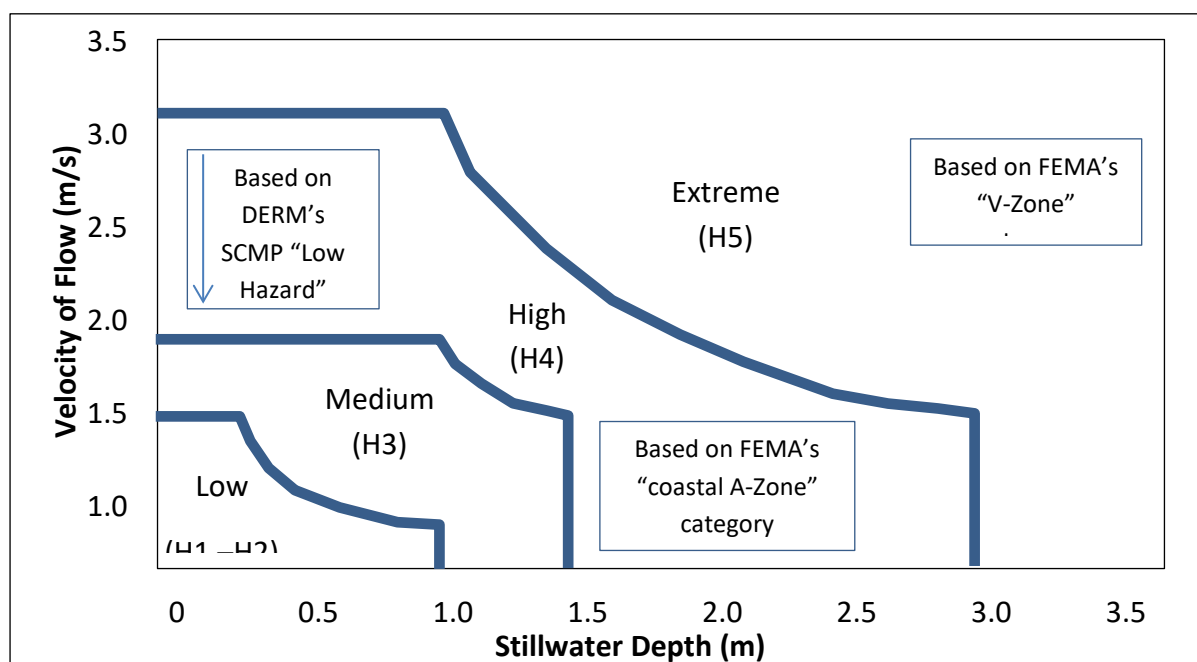
Figures 1 and 2 demonstrate the derivation of hydraulic hazard categories, which relate to the depth and velocity of flood waters for flood (river and creek) and storm tide events, respectively. The river and creek hydraulic hazard categories H1-H5 were derived from the Newcastle Concept Flood Planning 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 ~~(River and Creek)~~)



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	

El-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 (El-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 benchmarks 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) and Medium risk storm tide inundation areas c) Erosion prone area Site Based (Localised) Coastal Engineering Report: a) High risk storm tide inundation area b) Erosion prone area only	Structural Engineering Design Report: a) High risk area* b) and Medium risk areas* * 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: a) High risk storm tide inundation area	Structural Engineering Design Report: a) High risk area	Site Based (Localised) Overland Flow Report

Development	Coastal hazard overlay	Flood hazard overlay	Overland flow path overlay
	b) and Medium risk storm tide inundation areas c) Erosion prone area	b) and Medium risk areas * Where maximum flow velocity exceeds 1.5m/s	
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:

- development of a new building in a High risk storm tide inundation area, ~~or~~ Medium risk storm tide inundation area, ~~or~~ Erosion prone areas, as defined in the ~~Flood hazard overlay~~ ~~or~~ Coastal hazard overlay;
- development of a new building in High risk area or Medium risk area, as defined in the Flood 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 risk storm tide inundation area, ~~or~~ Medium risk storm tide inundation area, ~~or~~ Erosion prone areas, as defined in the ~~Flood hazard overlay~~ ~~or~~ Coastal hazard overlay;
- minor building works (extensions) in a High risk area or Medium risk area, as defined in the Flood 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:

- the flood or coastal hazards that can potentially occur at the development site;
- the structural design approach utilised to accommodate the flood or coastal hazards;
- 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:

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

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

- structural members to accommodate building loads;
- floor levels relative to design flood conditions as specified in the relevant overlay code;
- footings to maintain foundation requirements including allowance for scour;
- flood resistant building materials;
- integration of utilities; and
- 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>); <http://www.abcb.gov.au/Resources/Publications/Education-Training/Constructionof-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 **storm tide inundation area, or Erosion prone 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 causing 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 indicate how flood impacts of the development can be mitigated 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 criteria for defining adverse off-site impacts is to be confirmed with Council prior to undertaking the flood investigation.~~

~~Existing flooding and storm tide information on a lot-by-lot basis is available from Council. Council has prepared detailed flood models of all minor basins across the local government area, as well as a storm tide study, which have been integrated into a consolidated Regional Flood Database. The localised flood investigation documented in the Site Based (Localised) Flood Report is to utilise appropriate information from Council's existing regional flood database as relevant inputs to the assessment. For larger sites, the use of Council flood models for assessment purposes is appropriate.~~

~~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:~~

- ~~— Australian Rainfall and Runoff — updates and revisions being released periodically;~~
- ~~— Moreton Bay Regional Council Floodplain Risk Management Framework Volume 1 and Volume 2 (Practice Notes) (GHD and Molino Stewart, 2013);~~
- ~~— State Planning Policy — state interest guideline: Natural hazards, risk and resilience;~~
- ~~— State Planning Policy — state interest guidance: Natural hazards, risk and resilience — Technical~~

- ~~Manual, An example: Terms of reference for undertaking a flood hazard investigation;~~
- ~~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;~~
- ~~Queensland Urban Drainage Manual (DEWS, 2013);~~

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, ~~existing~~ 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, ~~with~~ flowpaths and inundation extents ~~and levels for the existing and proposed conditions;~~
- ~~e) the data used for modelling purposes;~~
- ~~f) a flood model layout, including ground elevations, adopted surface roughness and structures;~~
- g) the proposed site layout, including an earthworks plan, ~~the proposed development levels and mitigation measures etc;~~
- ~~h) a description of the modelling methodology (including software, modelling parameters, assumption and limitations) adopted which should use the Council’s existing models of assessing a large site;~~
- i) the ~~flood behaviour~~ model ~~files and~~ results ~~for flood behaviour~~ (levels, velocities, hazards) ~~showing 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 a range of flood events up to the DFE for Flood and Storm Tide, where applicable, including scenarios incorporating projected climate change;~~
- ~~j) confirmation that flood behaviour in rare events up to 0.1% Annual Exceedance Probability (AEP) does not significantly change;~~
- k) discussion and assessment of impacts of flooding on the proposed development;
- l) 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;~~
- m) 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.

~~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 assessment.~~

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 (DEWS, 2013).

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) habitable floor levels for the development are higher than the 1% AEP overland flow level plus freeboard requirement;~~
- c) 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 for a material change of use not involving a dwelling house, reconfiguring a lot or operational work of premises in the General residential zone — Next generation precinct or the General residential zone — Urban residential precinct located in a Drainage investigation area identified on Figure 8.2.2.1-8.2.2.10 of the Flood hazard overlay code requires the preparation of a 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 (DEWS, 2013), 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 the *PSP - Stormwater Management Planning Scheme Policy* and *PSP - Integrated Design Planning Scheme Policy*.

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
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	No filling HAT2100 (max)		
	Medium	No filling	No filling	No filling Minimum HAT2100	Minimum flood planning level HAT2100 (min)		
	Balance coastal planning area	No filling	No filling	No filling Minimum flood planning level	Minimum flood planning level DFE (min)		

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:

- any physical alteration to a watercourse or floodway affecting its flow capacity;
- any native vegetation clearing;
- any increase in the rate of release of stormwater runoff from the premises to the area of inundation for the Defined Flood Event;
- altering the existing surface levels to adversely impact flood immunity of surrounding properties;
- 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
- 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 m³) does not exceed the volume (in m³) 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

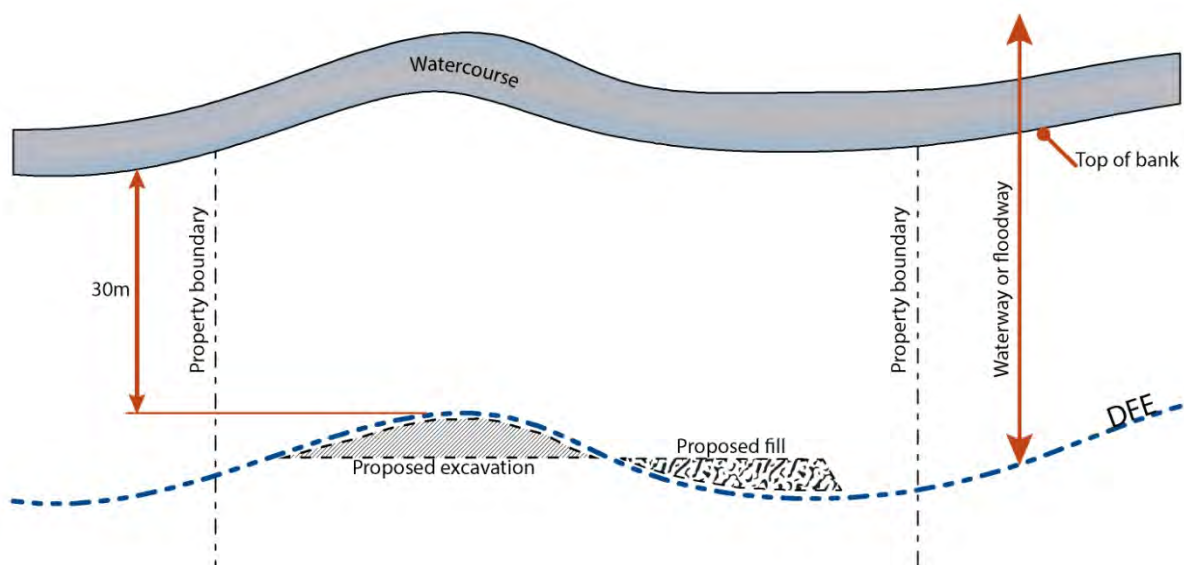


Figure 5 *Unacceptable compensatory earthworks*

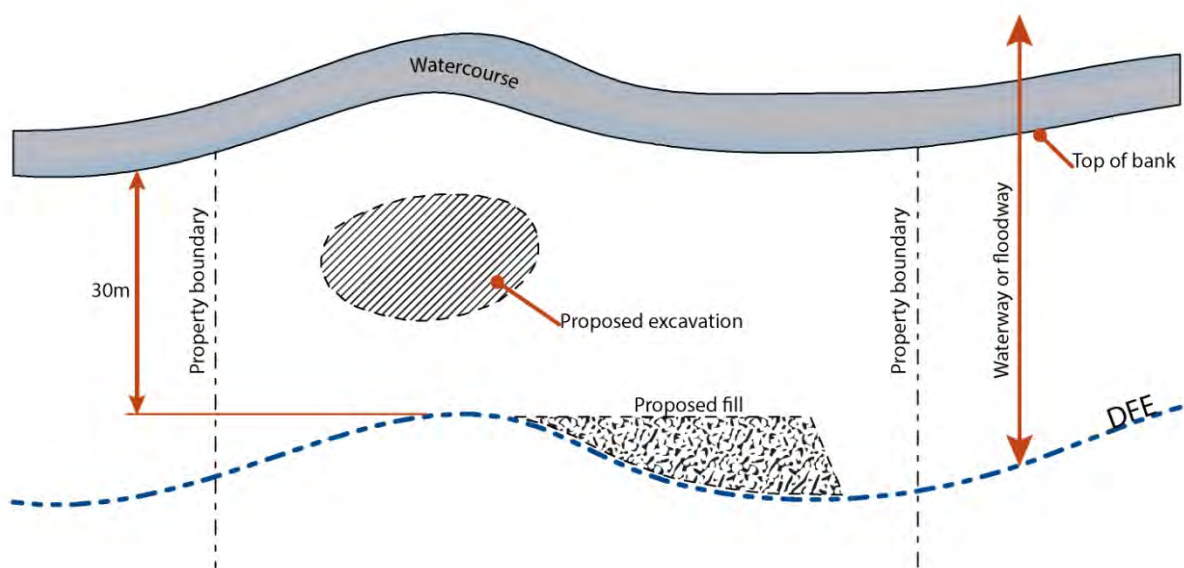
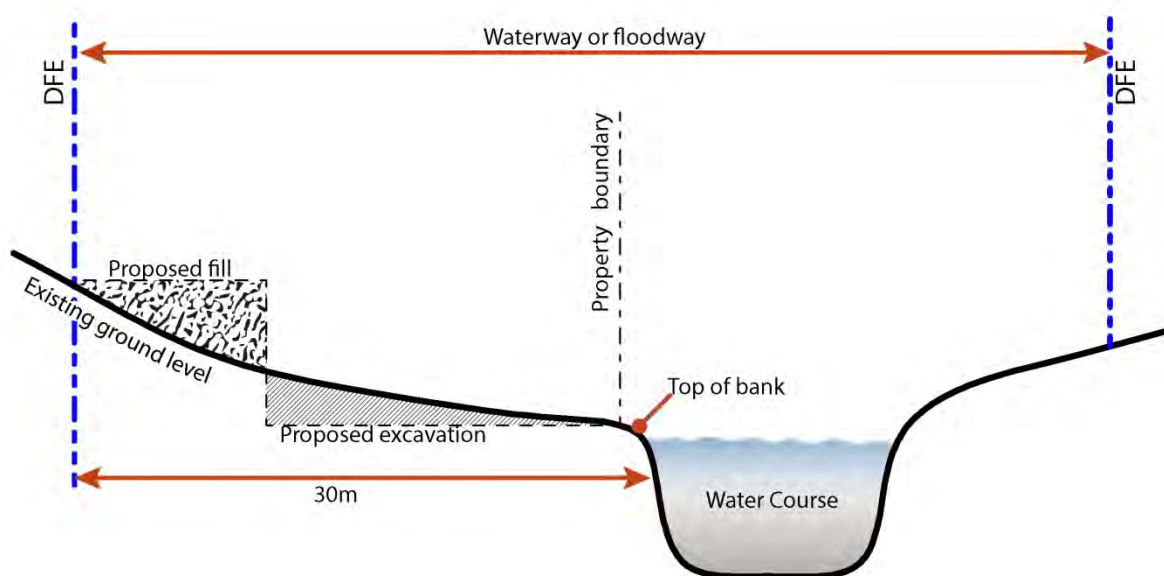


Figure 6 *Unacceptable compensatory earthworks*



End Notes

Amendment Number: 2
Adopted: 27 June 2017
Effective from: 3 July 2017

Planning Scheme Policy Reference	Summary of amendment
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-	<ul style="list-style-type: none"> Amendment to reflect the terminology used in the <i>Planning Act 2016</i>, the <i>Planning Regulation 2017</i> and related state planning instruments.
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Appendix 1

Drainage Investigation Areas having a Council adopted Drainage Master Plans

Column 1 Item	Column 2 Drainage investigation area in Figure 8.2.2.1–8.2.2.10 of the Flood hazard overlay code	Column 3 Drainage Master Plan
None-applicable	None-applicable	None-applicable

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.

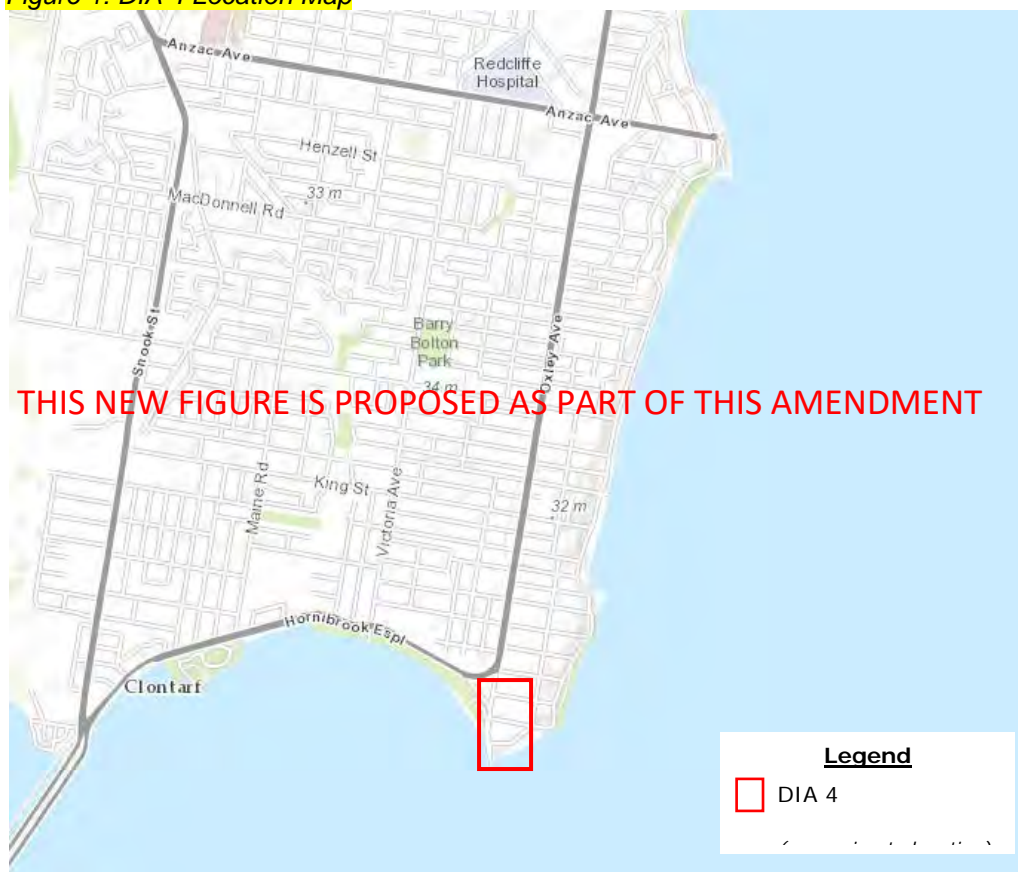
This DMP does not apply to development identified as exempt in Part 5.10.2 Categories of development and assessment - Flood hazard overlay.

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 60,000m² 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 2.2: 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	<p>The entire allotment/development site area and meeting the following:</p> <p>(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);</p> <p>(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</p> <p>(c) ensure no worsening of flood impacts to other properties beyond known flood impacts at the date of adoption of the planning scheme.</p>	<p>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:</p> <ul style="list-style-type: none"> 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.

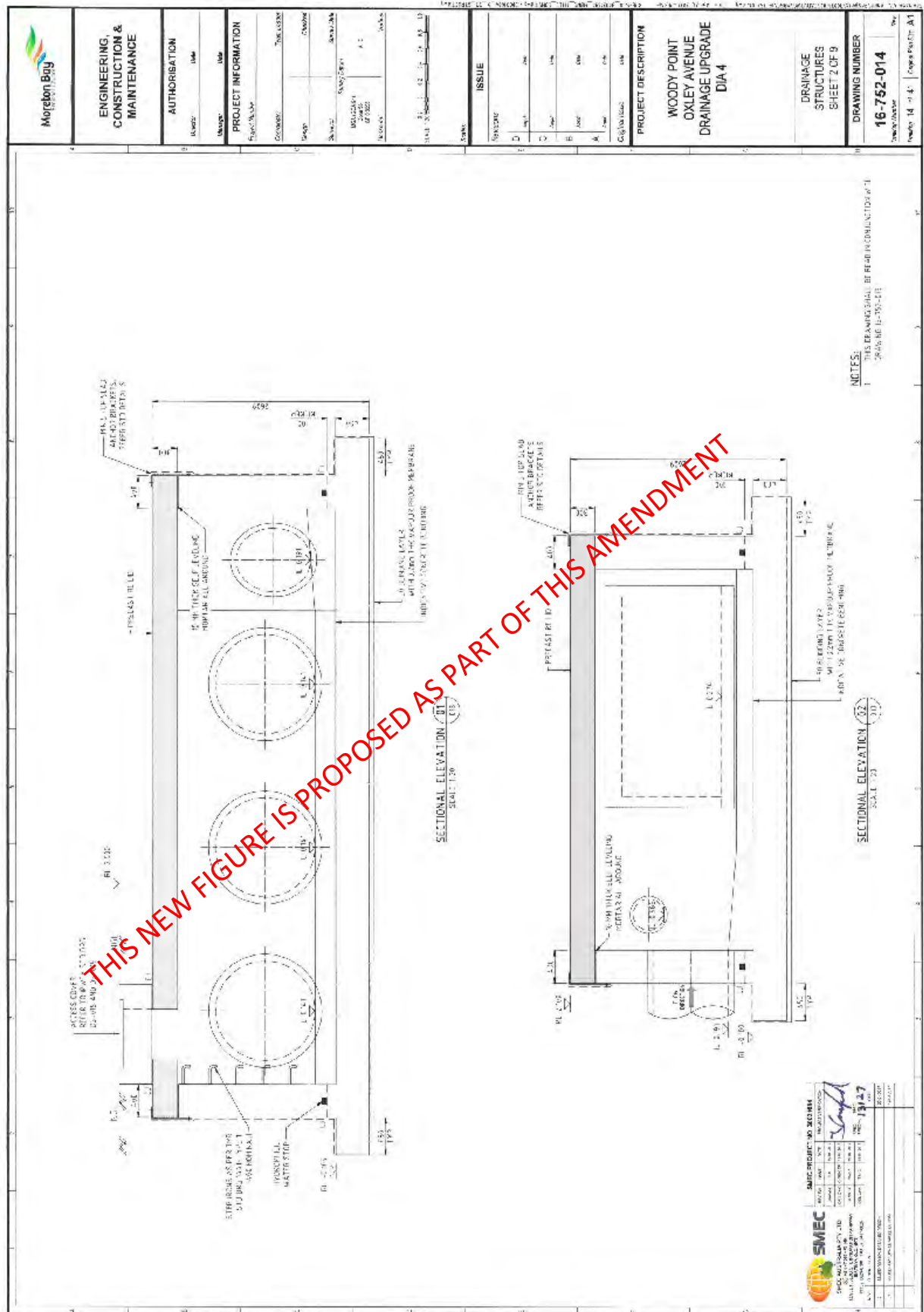
Aspect of Development	Filling Requirements	Minimum Fill Level	Minimum Extent of Filling	Notes
Reconfiguring a lot where for a boundary realignment	Filling is permitted but not mandatory	N/A	N/A	<p>Filling is permitted and minimum fill levels are not regulated by the DMP for this aspect of development. Note: Maximum fill to DMP levels is encouraged.</p> <p>Where filling occurs, other applicable code requirements apply in the MBRC Planning Scheme. This may include consideration of, but not limited to:</p> <ul style="list-style-type: none"> ▪ 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.

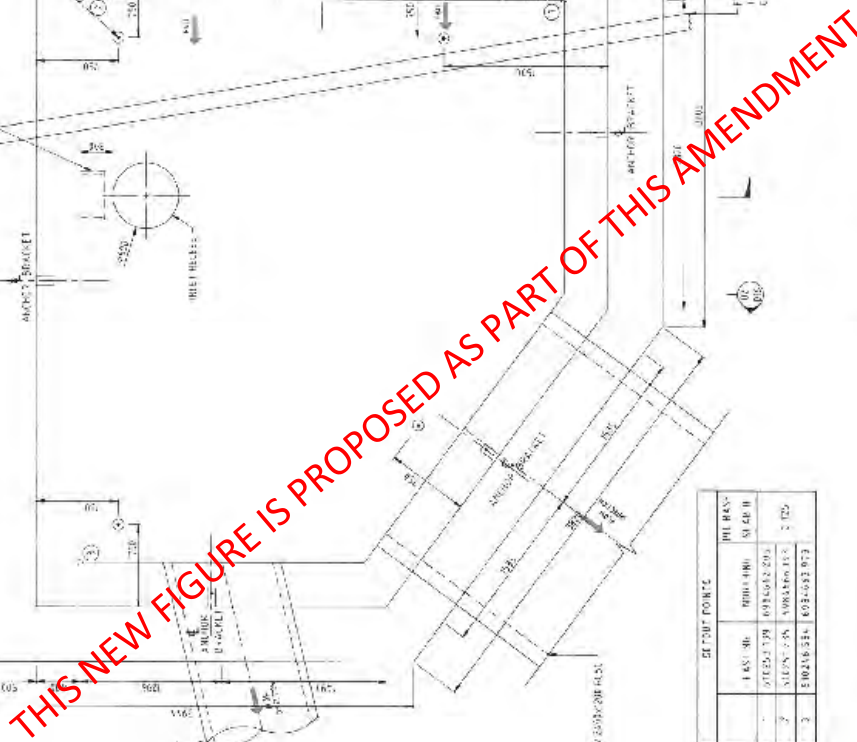
Aspect of Development	Filling Requirements	Minimum Fill Level	Minimum Extent of Filling	Notes
Operational work (filling or excavation only)	Filling is mandatory	Flood Planning Level	<p>The entire allotment/development site area and meeting the following:</p> <p>(a) provide a minimum 1:100 uniform cross fall shaped to contains flood waters to the street and drainage network with the exception of meeting (b) and (c);</p> <p>(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</p> <p>(c) ensure no worsening of flood impacts to other properties beyond known flood impacts at the date of adoption of the planning scheme.</p>	<p>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:</p> <ul style="list-style-type: none"> 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.

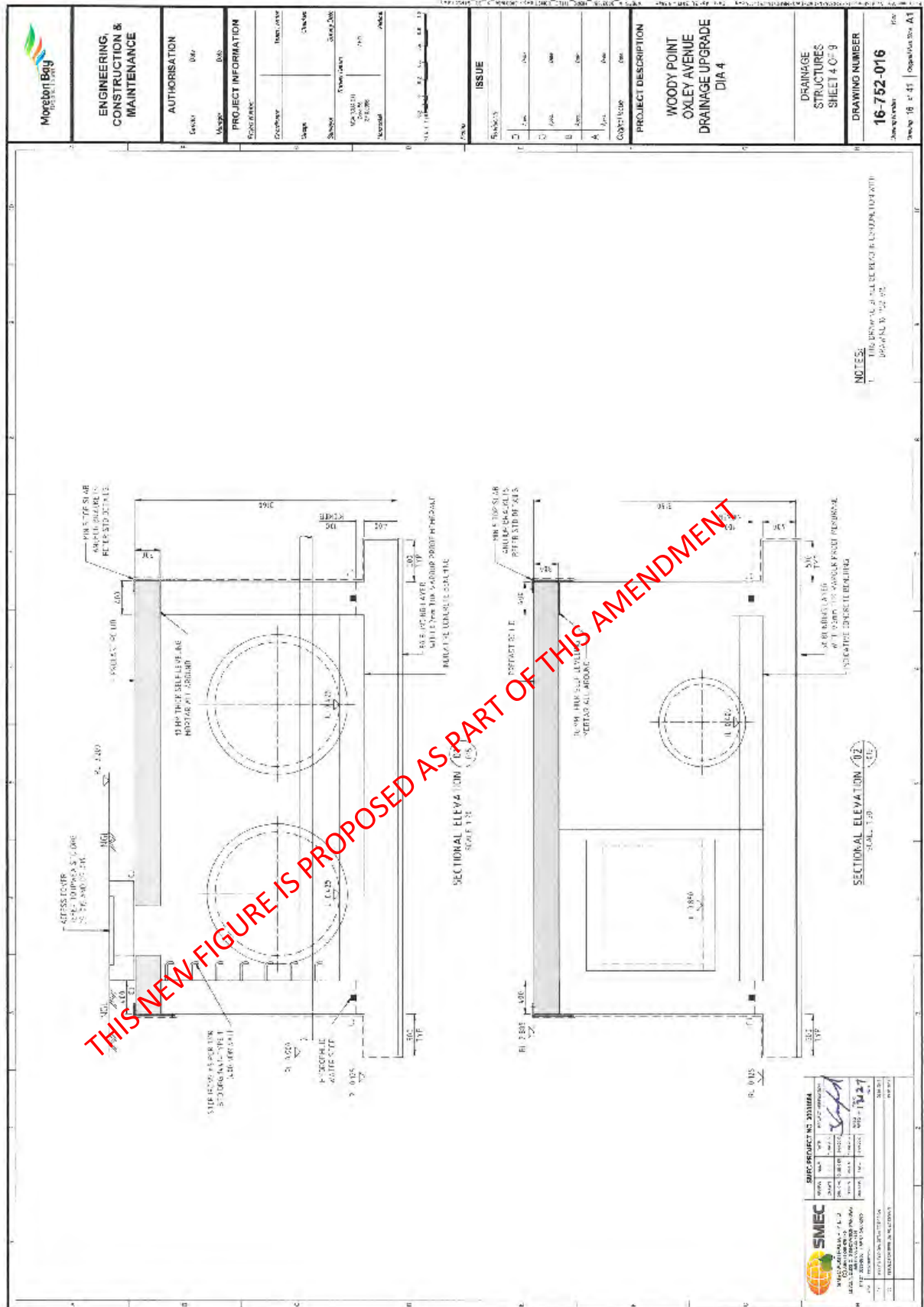
Aspect of Development	Filling Requirements	Minimum Fill Level	Minimum Extent of Filling	Notes
All other operational work where not associated with a material change of use or reconfiguring a lot	Filling is permitted but not mandatory	N/A	N/A	<p>Filling is permitted and minimum fill levels are not regulated by the DMP for this aspect of development.</p> <p>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:</p> <ul style="list-style-type: none"> ▪ 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	<p>Filling is permitted and minimum fill levels are not regulated by the DMP for this aspect of development.</p> <p>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:</p> <ul style="list-style-type: none"> ▪ 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.

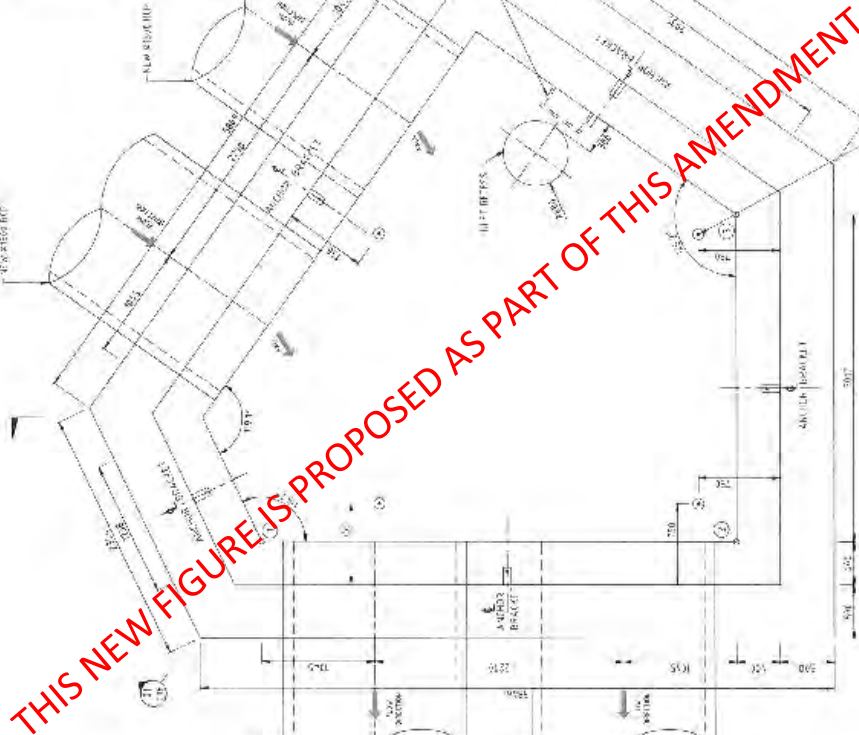
Appendix A - Flood Risk Mitigation to be undertaken by Council

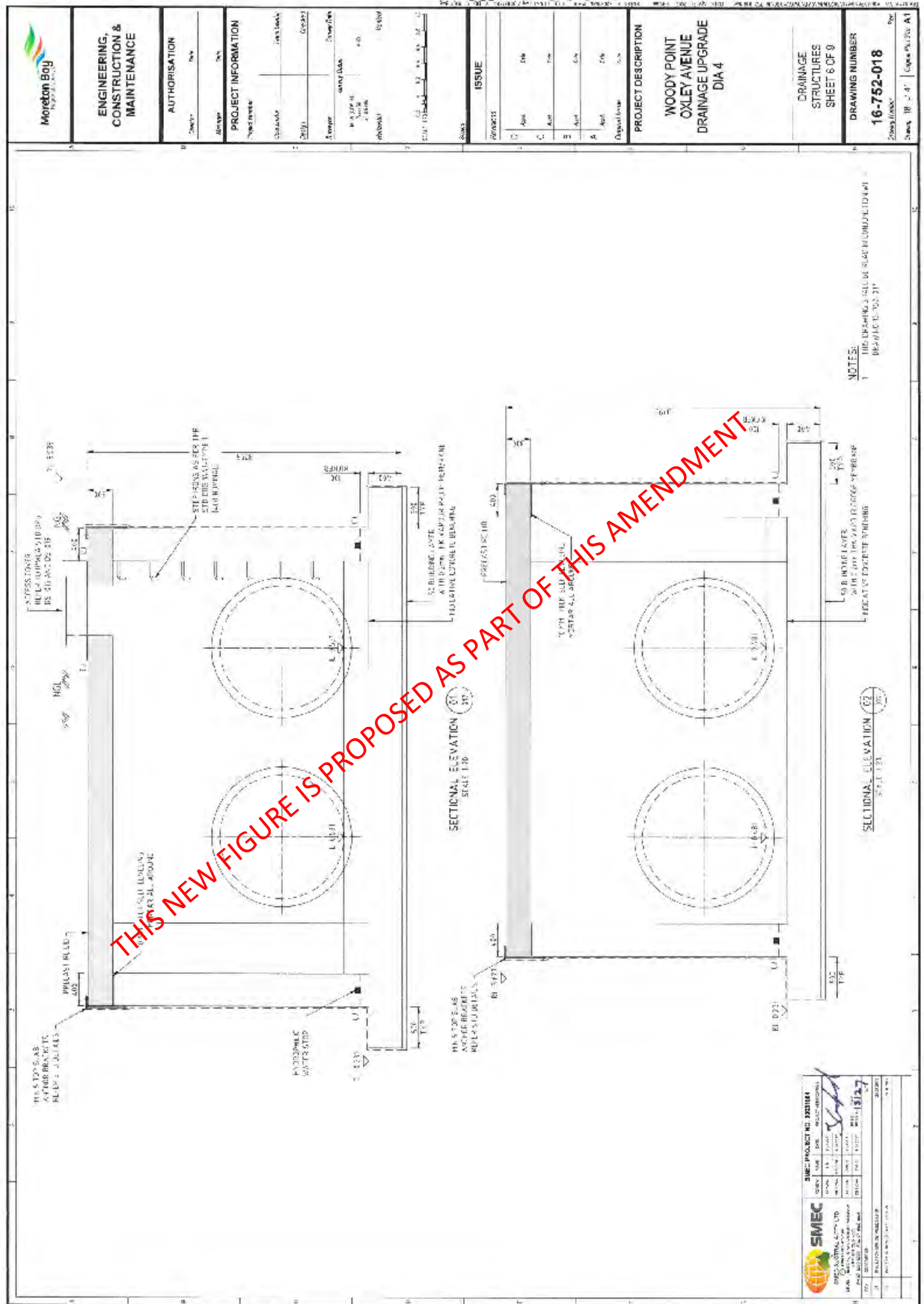
Detailed Design DIA4

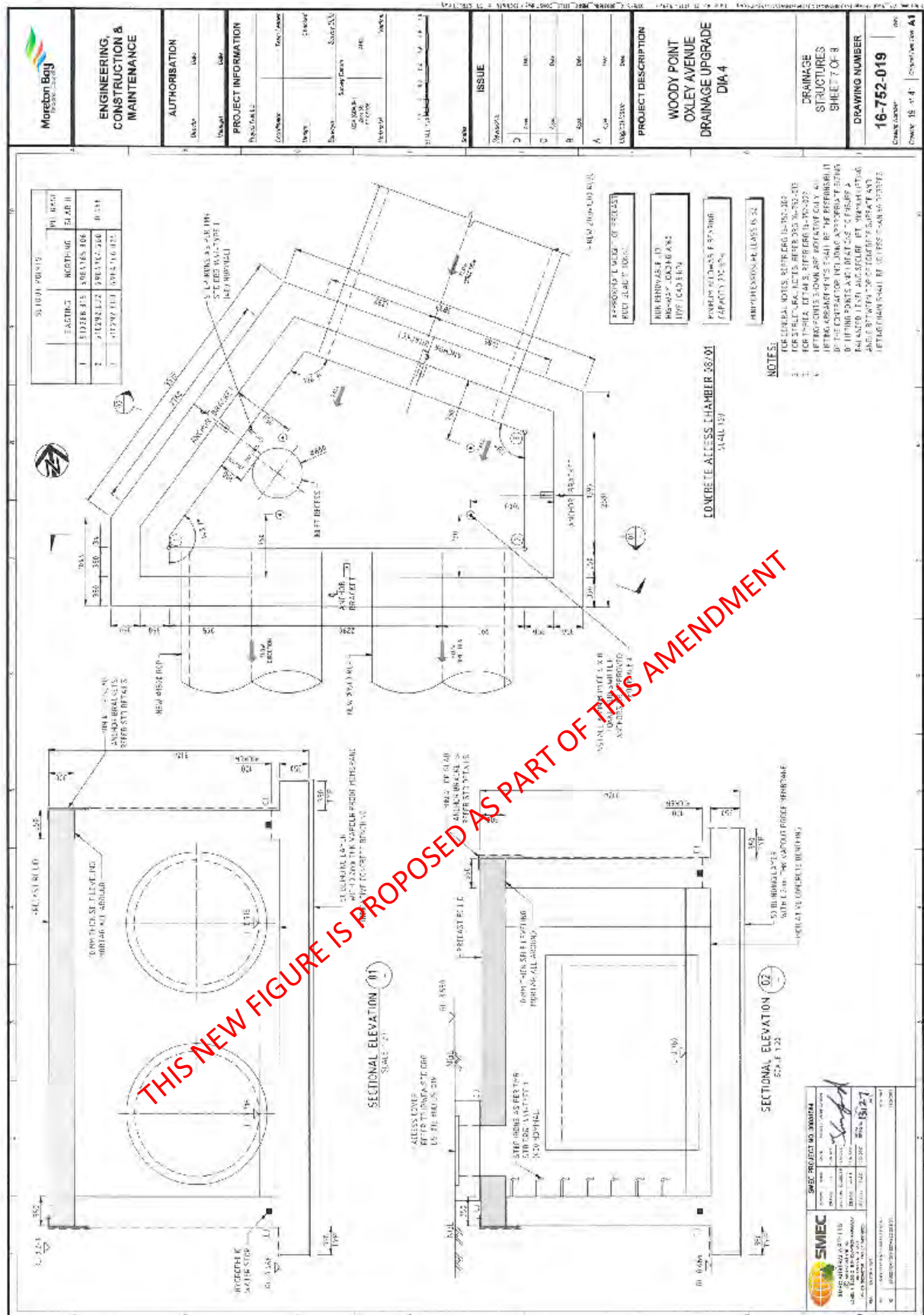


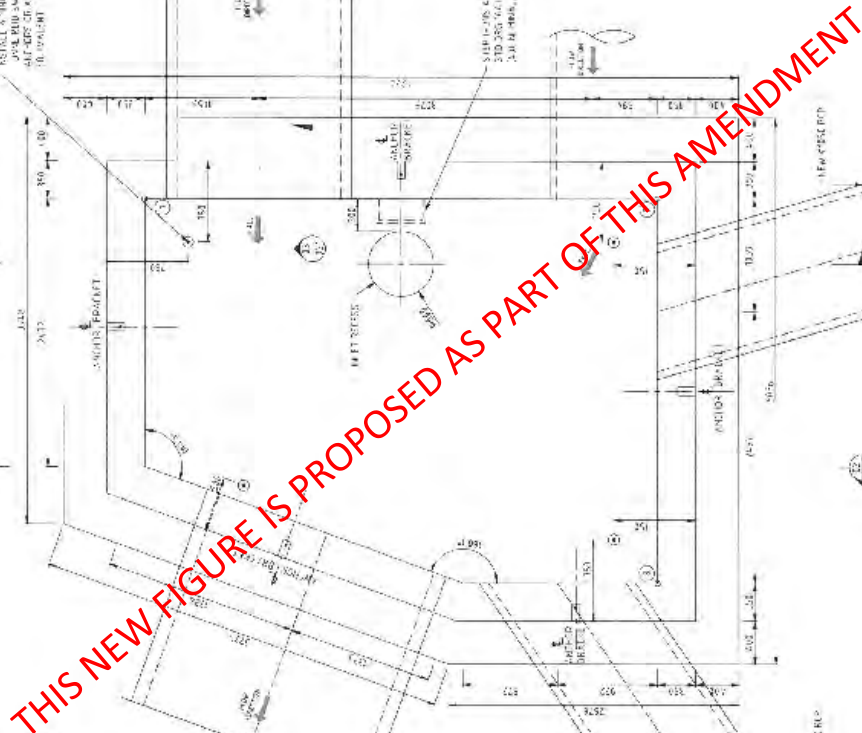


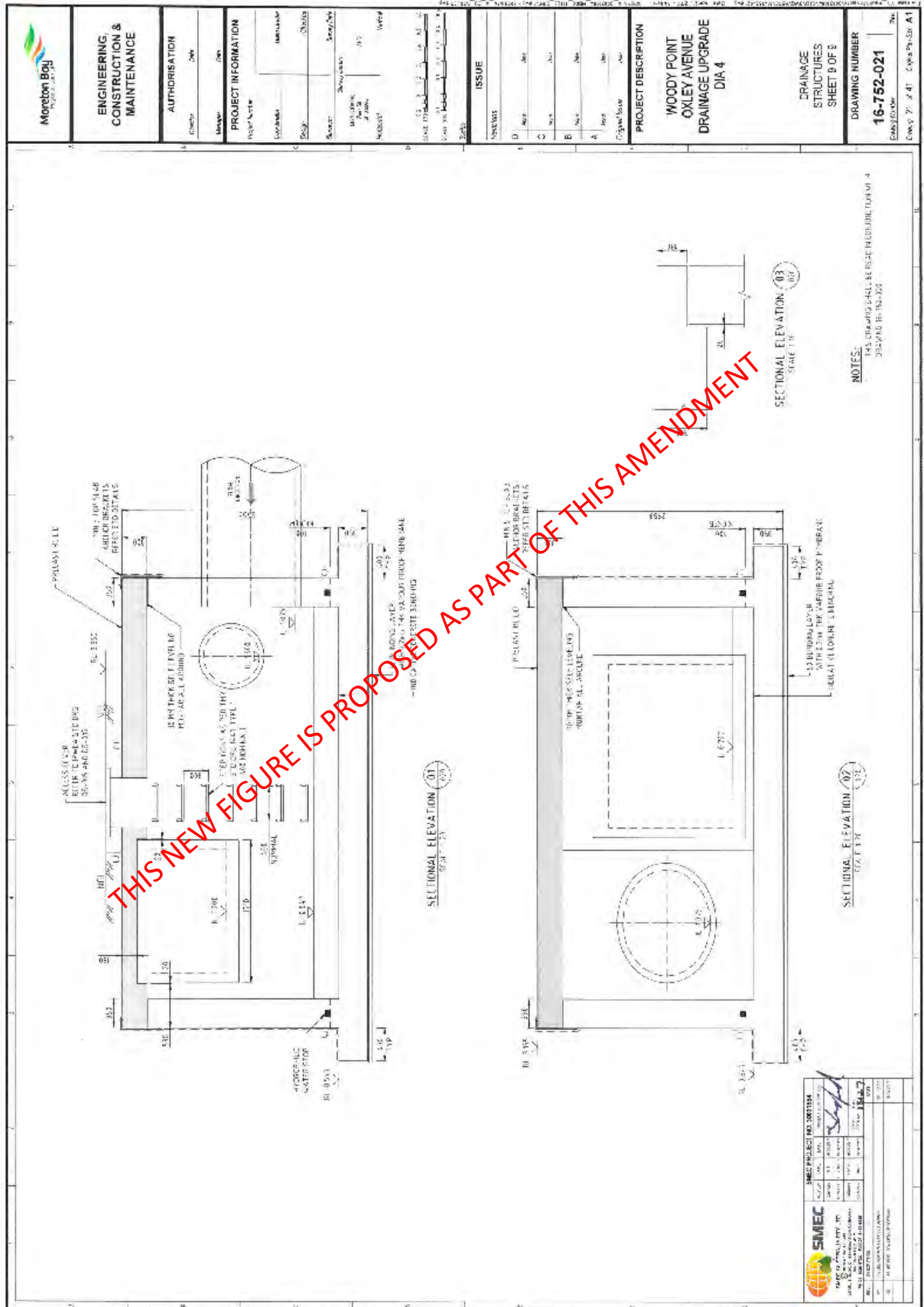


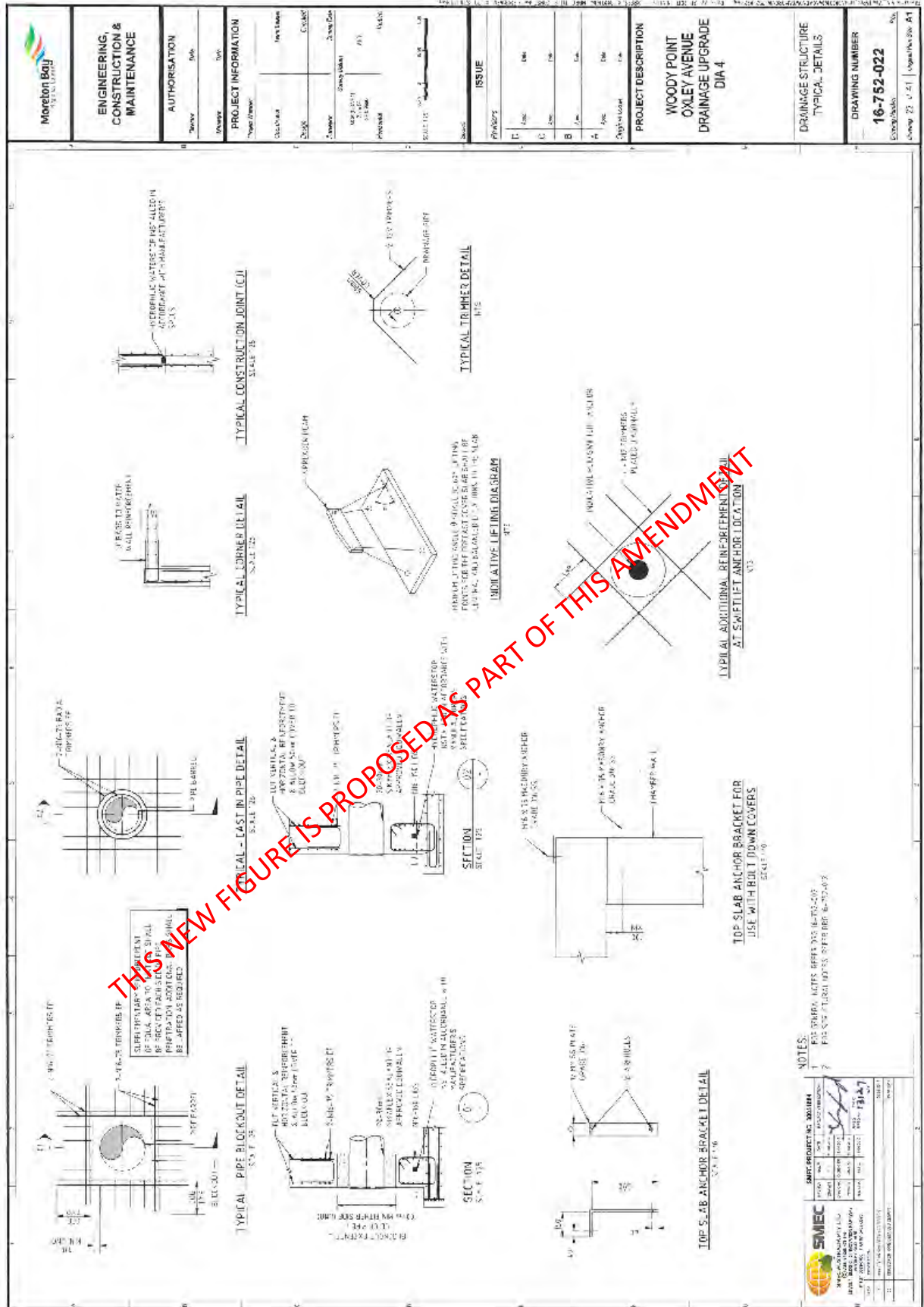


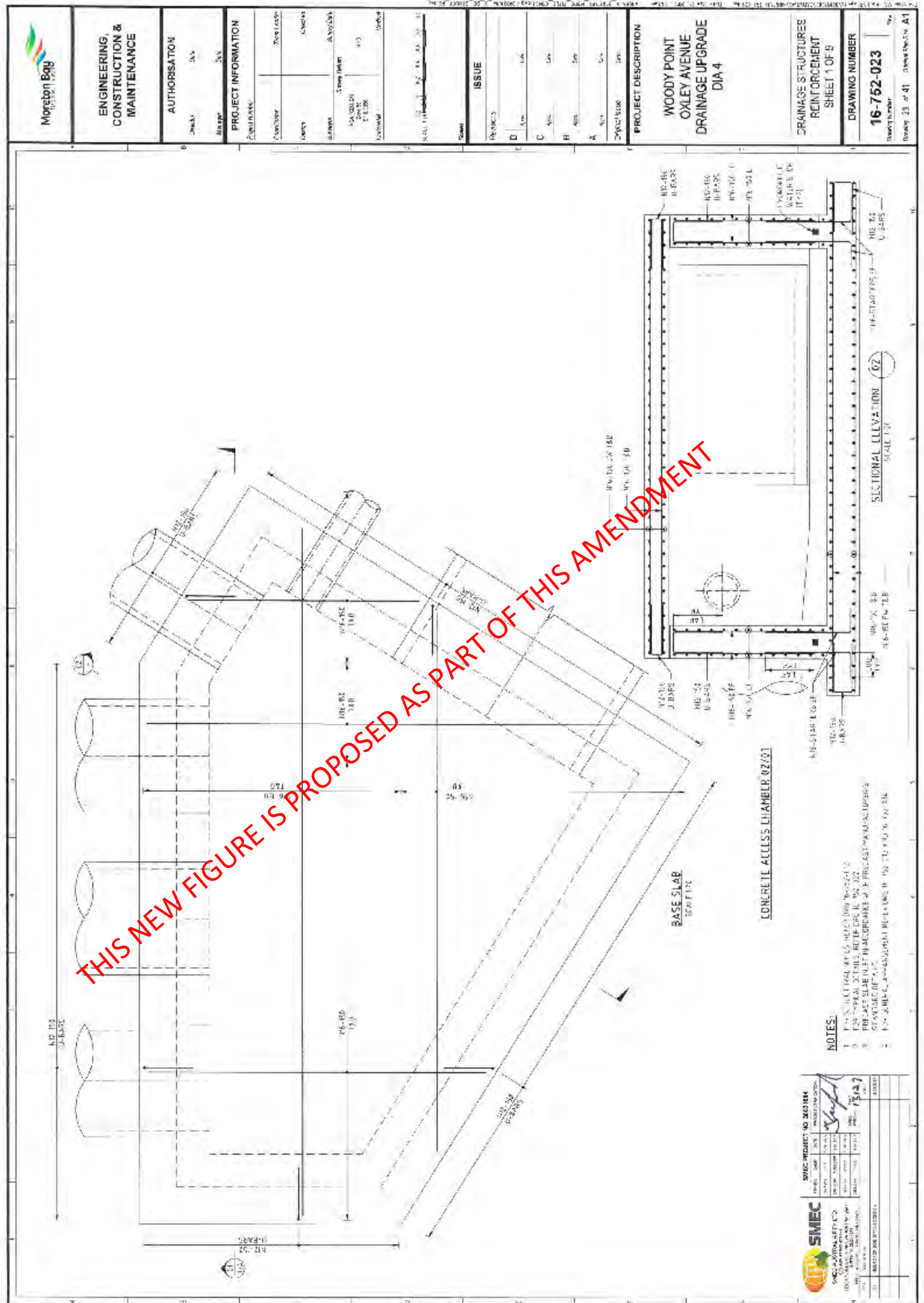


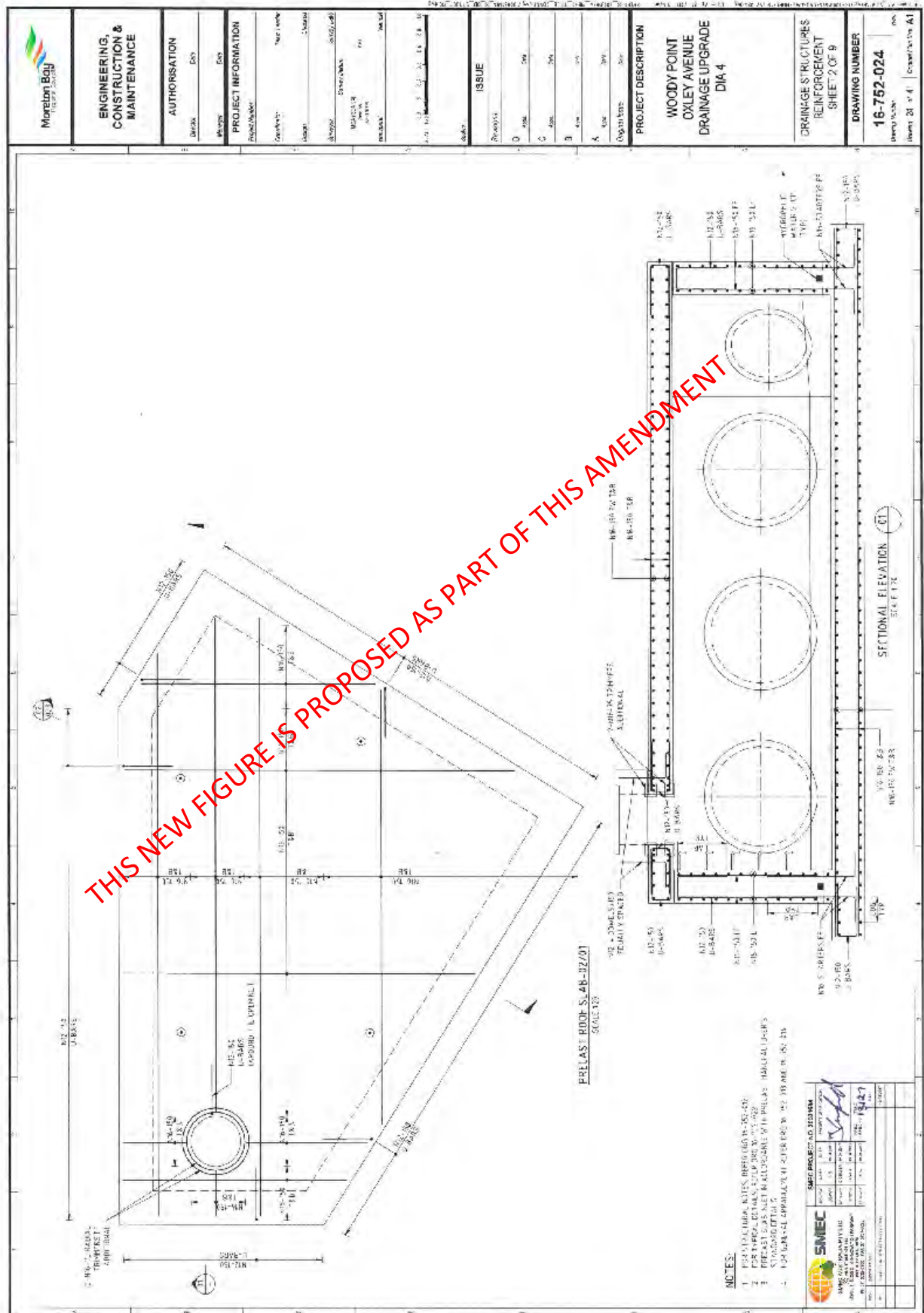


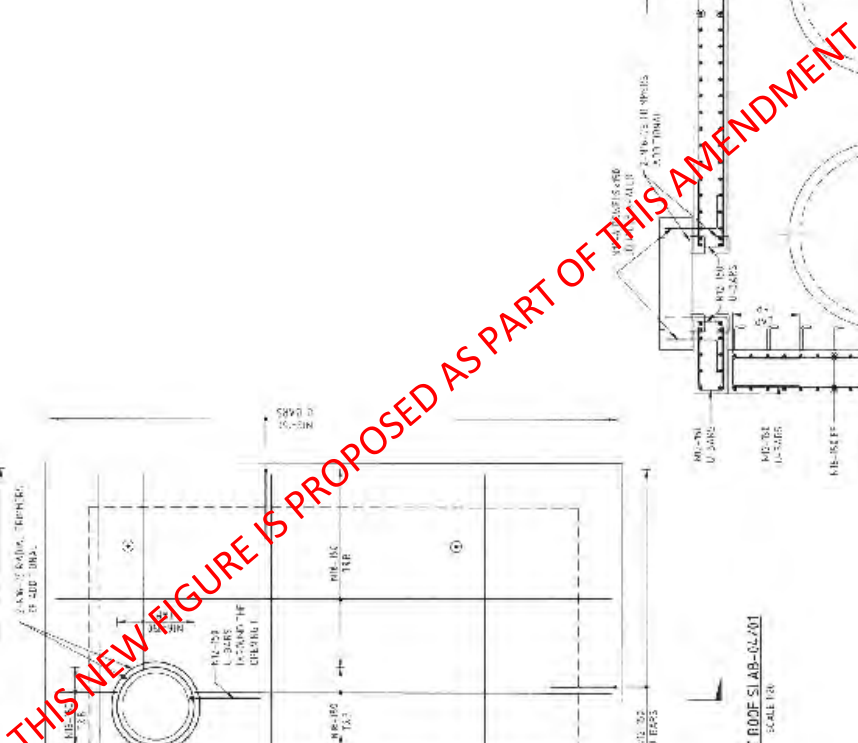


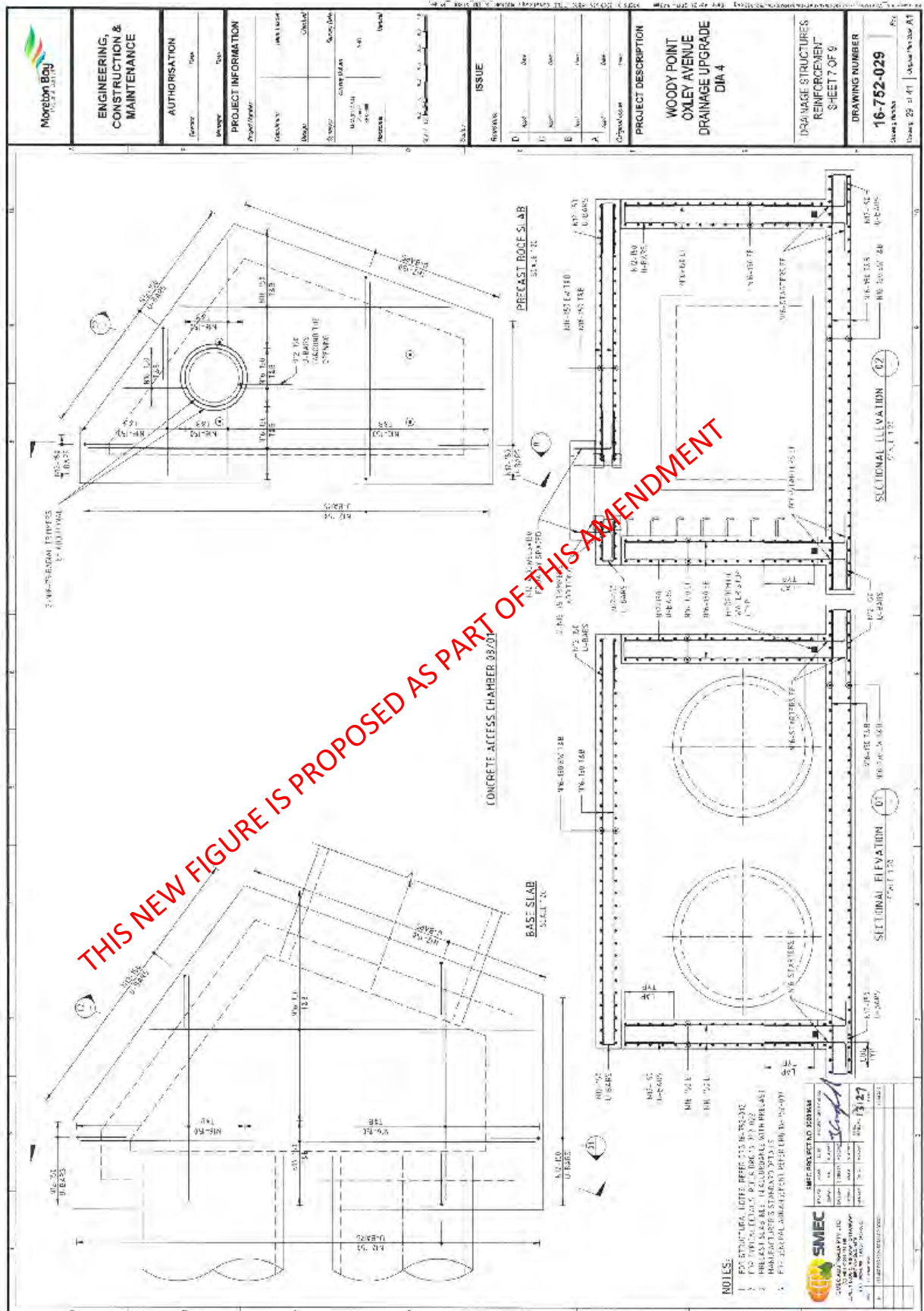


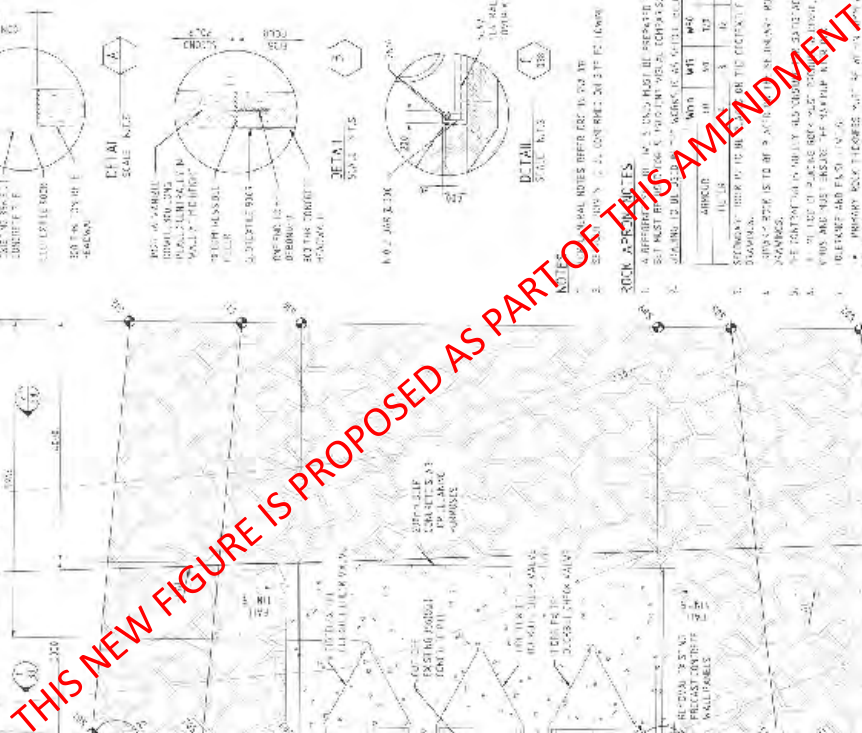












DRAINAGE MASTER PLAN

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.

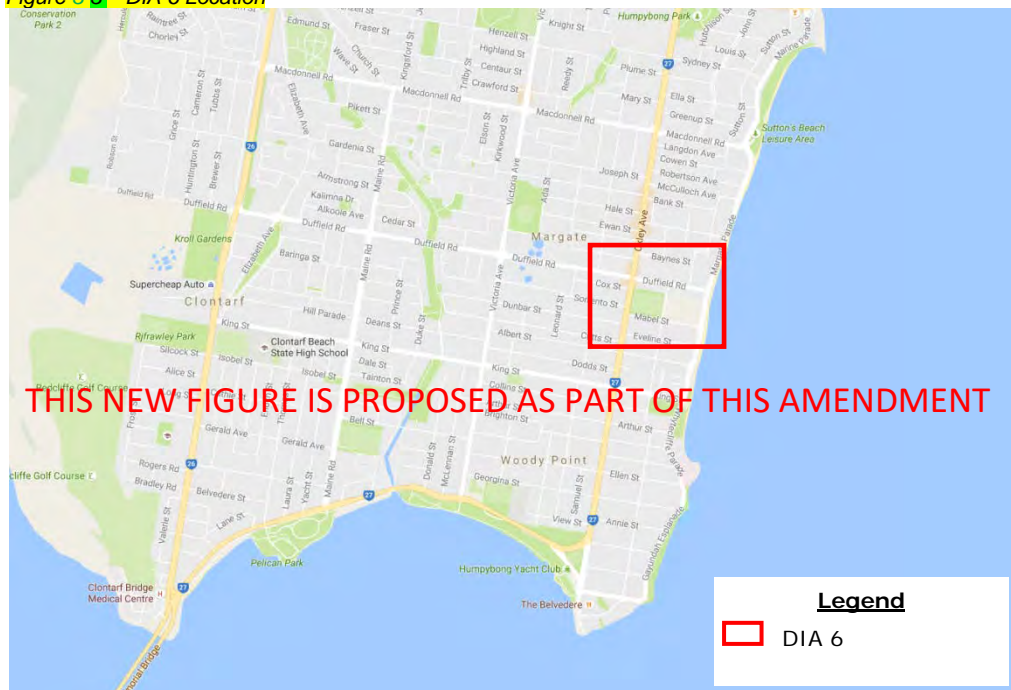
This DMP does not apply to development identified as exempt in Part 5.10.2 Categories of development and assessment - Flood hazard overlay.

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 33 – DIA 6 Location



Source: Google Maps, 2016

DIA 6 comprises an area of approximately 78,500m² 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 44 - DIA 6



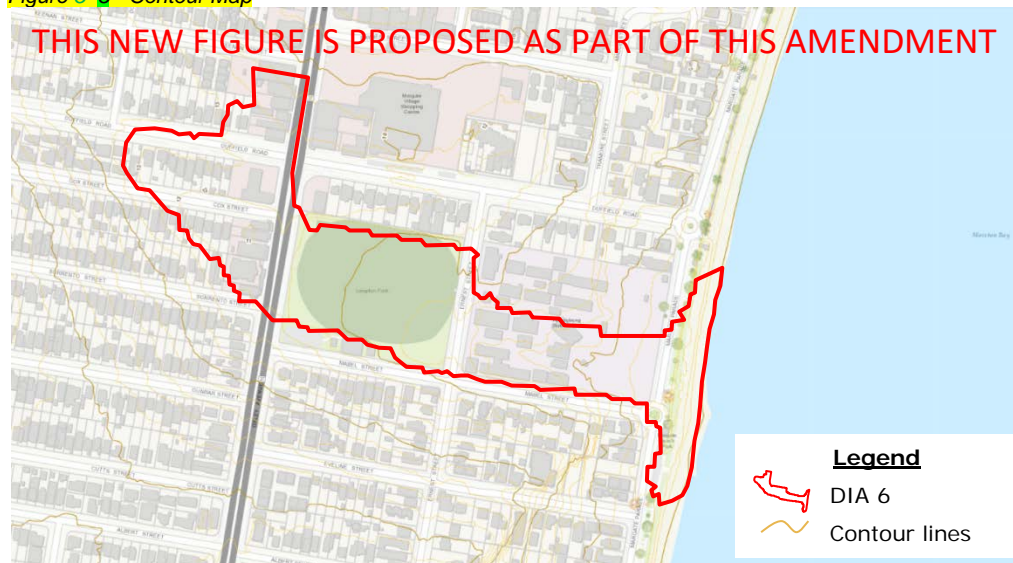
Source: MBRC Interactive Mapping, 2016

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 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 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
<p>If located west of Oxley Avenue and involving:</p> <p>Material change of use</p> <p>and/or</p> <p>Reconfiguring a lot (other than a boundary realignment)</p>	Filling is mandatory	Flood Planning Level	<p>The entire allotment/development site area and meeting the following:</p> <p>(d) provide a minimum 1:100 uniform cross fall shaped to contain flood waters to the street and drainage network with the exception of meeting (b) and (c);</p> <p>(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</p> <p>(f) ensure no worsening of flood impacts to other properties beyond known flood impacts at the date of adoption of the planning scheme.</p>	<p>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:</p> <ul style="list-style-type: none"> 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
<p>If located west of Oxley Avenue and involving:</p> <p>Reconfiguring a lot where for a boundary realignment</p>	Filling is permitted but not mandatory	N/A	N/A	<p>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.</p> <p>Where filling occurs, other applicable code requirements apply in the MBRC Planning Scheme. This may include consideration of, but not limited to:</p> <ul style="list-style-type: none"> ▪ 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
<p>If located west of Oxley Avenue and involving:</p> <p>Operational work (filling or excavation only)</p>	Filling is mandatory	Flood Planning Level	<p>The entire allotment/development site area and meeting the following:</p> <p>(d) provide a minimum 1:100 uniform cross fall shaped to contain flood waters to the street and drainage network with the exception of meeting (b) and (c);</p> <p>(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</p> <p>(f) ensure no worsening of flood impacts to other properties beyond known flood impacts at the date of adoption of the planning scheme.</p>	<p>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:</p> <ul style="list-style-type: none"> 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.

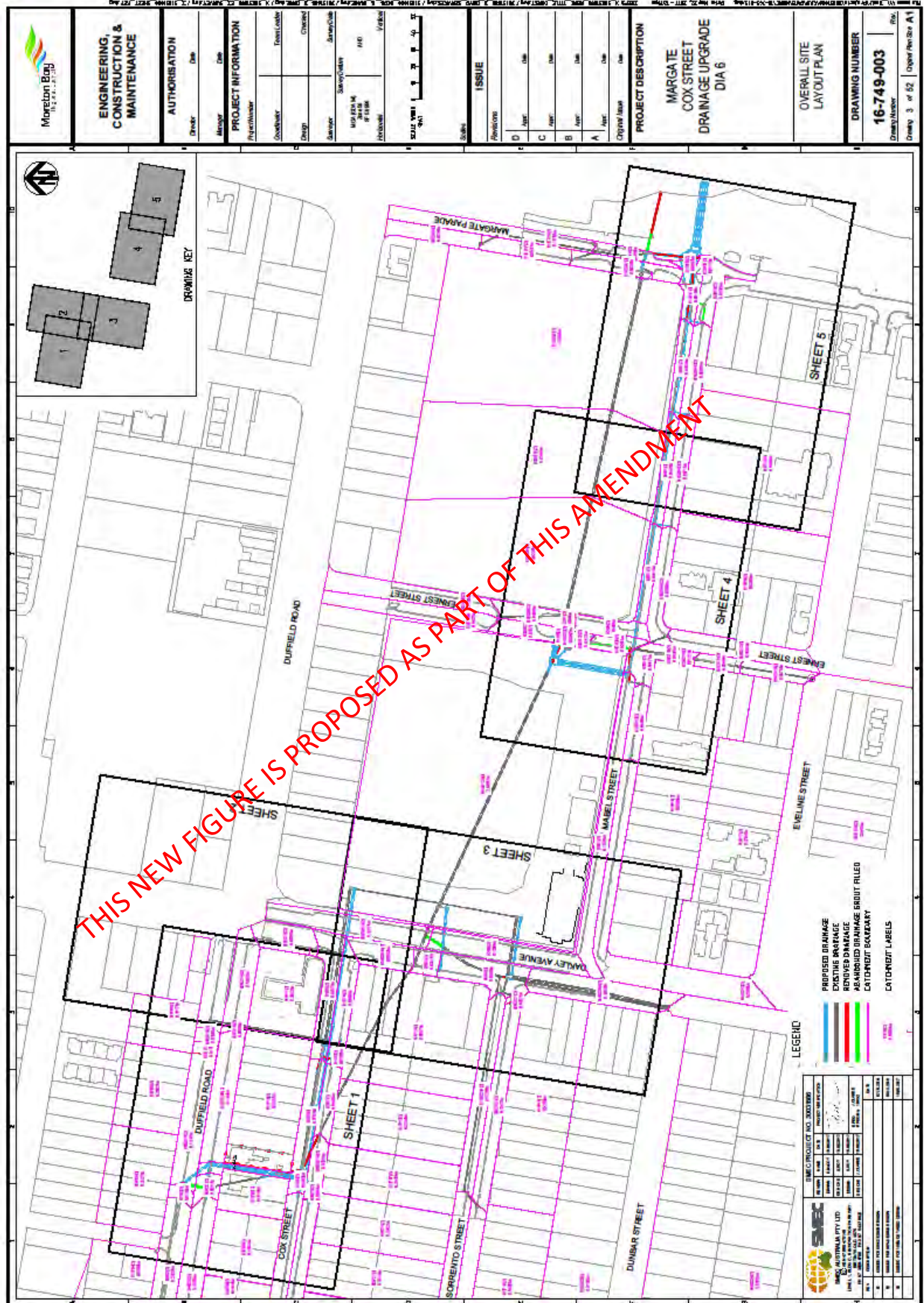
Aspect of Development	Filling Requirements	Minimum Fill Level	Minimum Extent of Filling	Notes
<p>If located west of Oxley Avenue and involving:</p> <p>All other operational work where not associated with a material change of use or reconfiguring a lot</p>	Filling is permitted but not mandatory	N/A	N/A	<p>Filling is permitted and minimum fill levels are not regulated by the DMP for this aspect of development.</p> <p>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:</p> <ul style="list-style-type: none"> ▪ 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.
<p>If located west of Oxley Avenue and involving:</p> <p>Building work where not associated with a material change of use</p>	Filling is permitted but not mandatory	N/A	N/A	<p>Filling is permitted and minimum fill levels are not regulated by the DMP for this aspect of development.</p> <p>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:</p> <ul style="list-style-type: none"> ▪ 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.

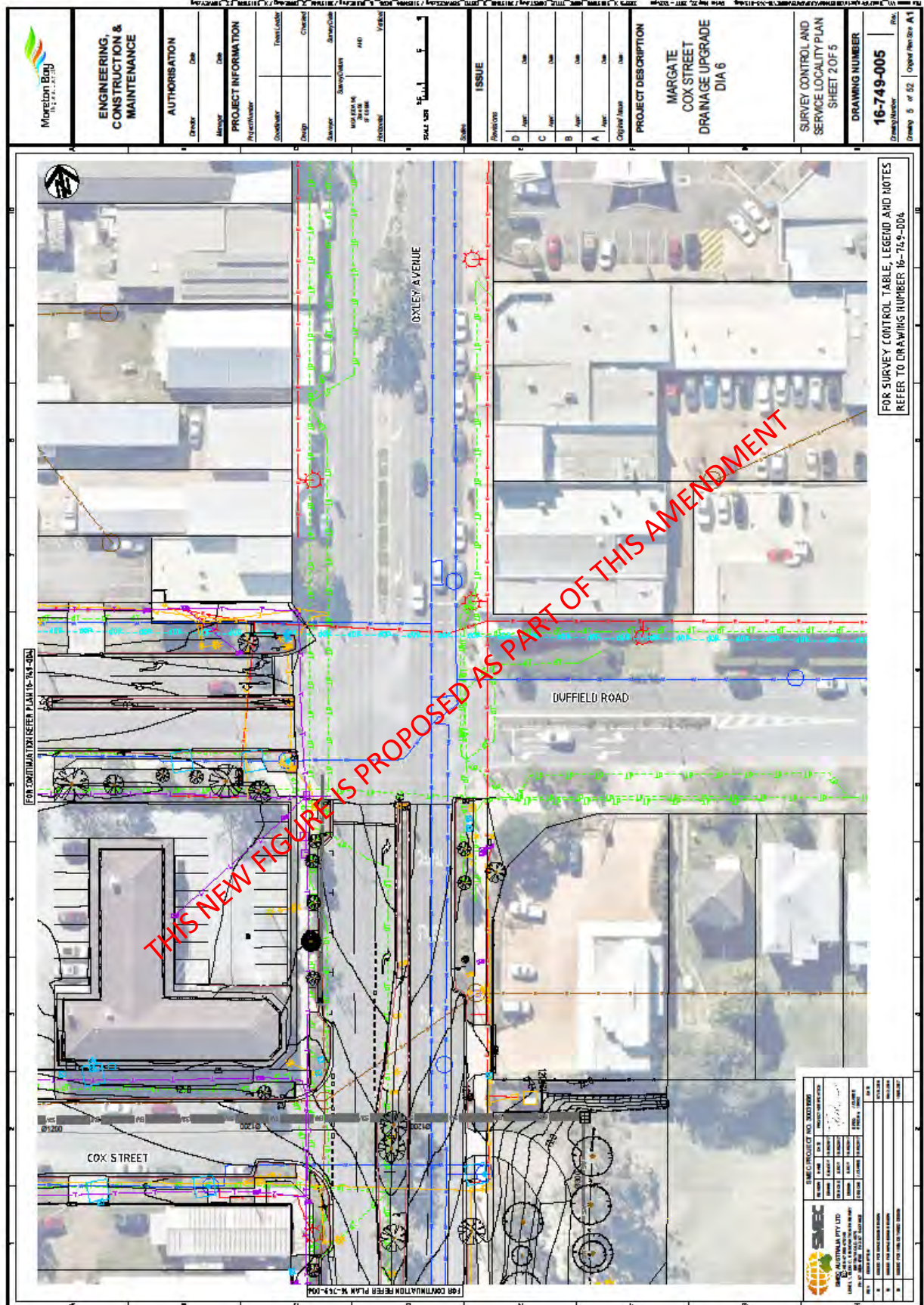
Aspect of Development	Filling Requirements	Minimum Fill Level	Minimum Extent of Filling	Notes
<p>If located east of Oxley Avenue:</p> <p>All aspects of development</p>	Refer to the Flood Hazard Overlay Code			Filling associated with development located east of Oxley Avenue is not regulated by the DMP. 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.

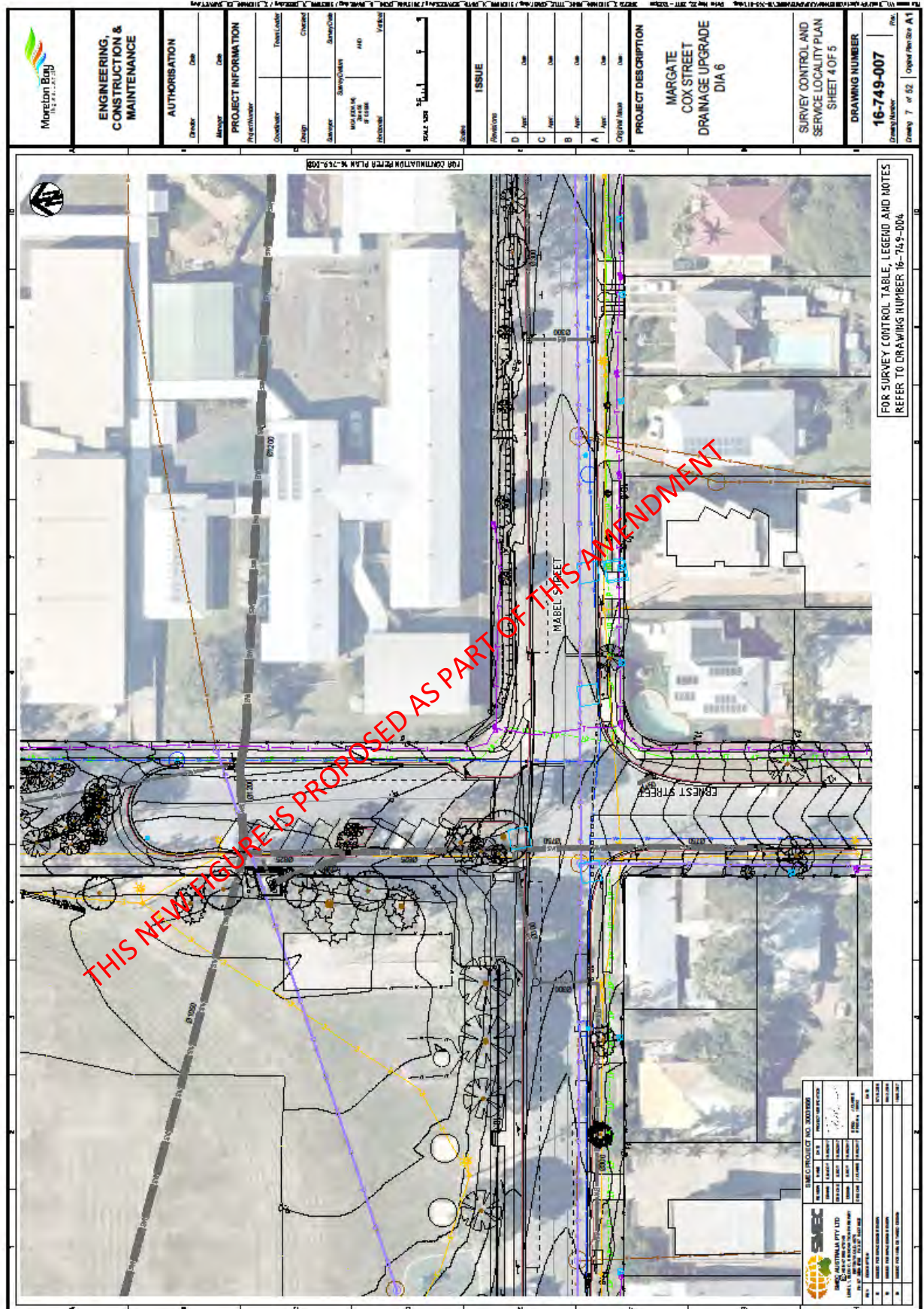
Appendix A - Flood Risk Mitigation to be undertaken by Council

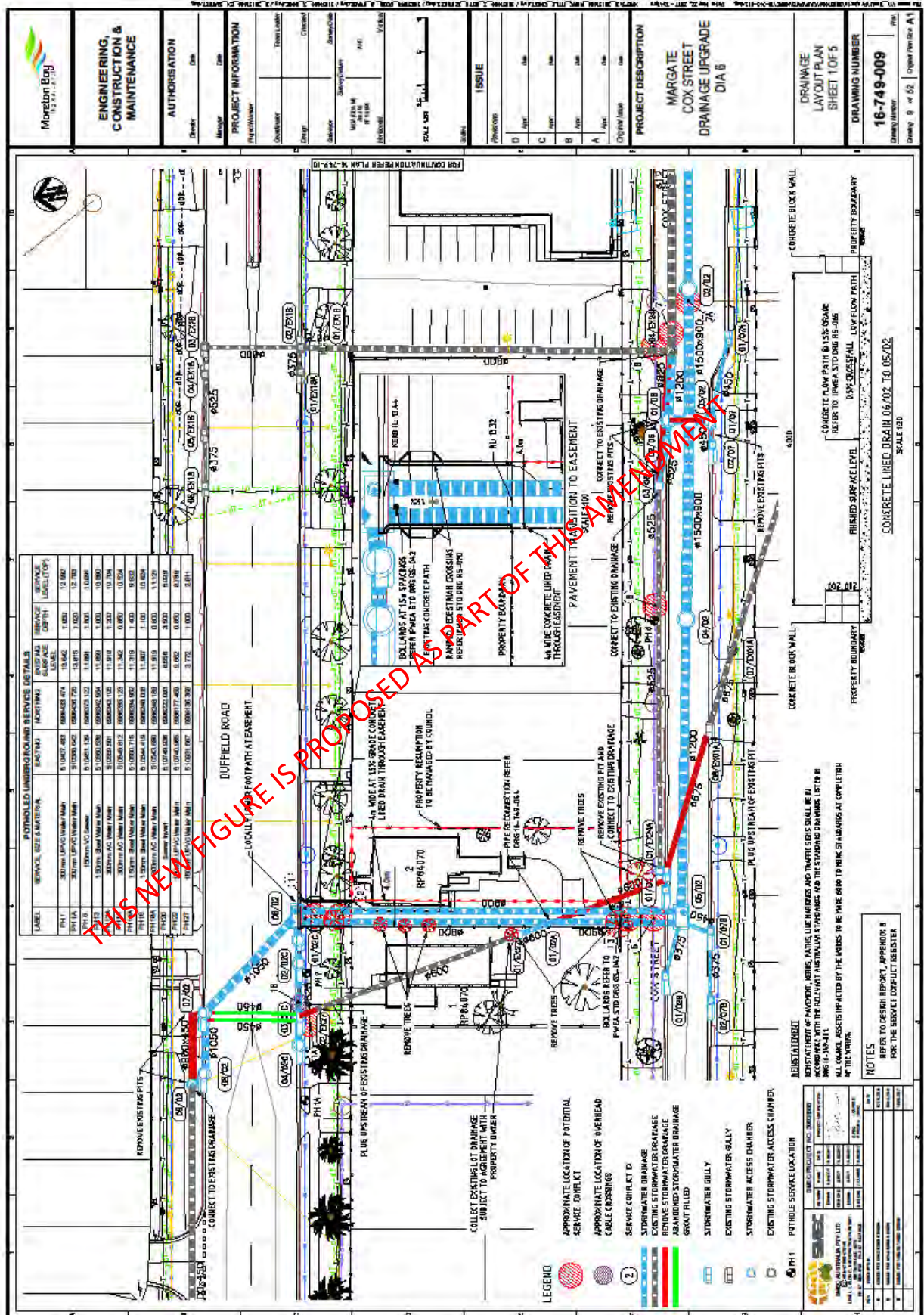
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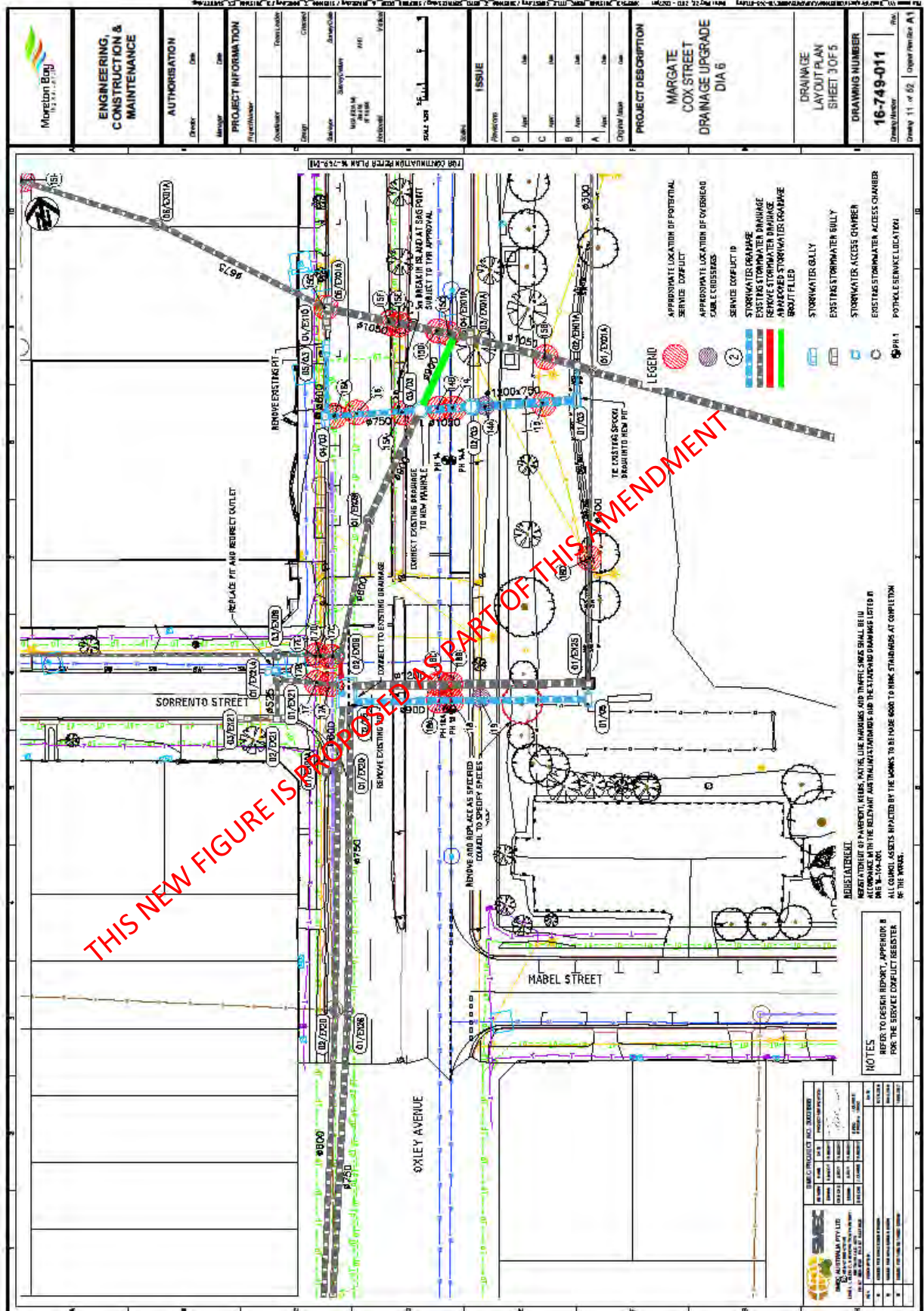
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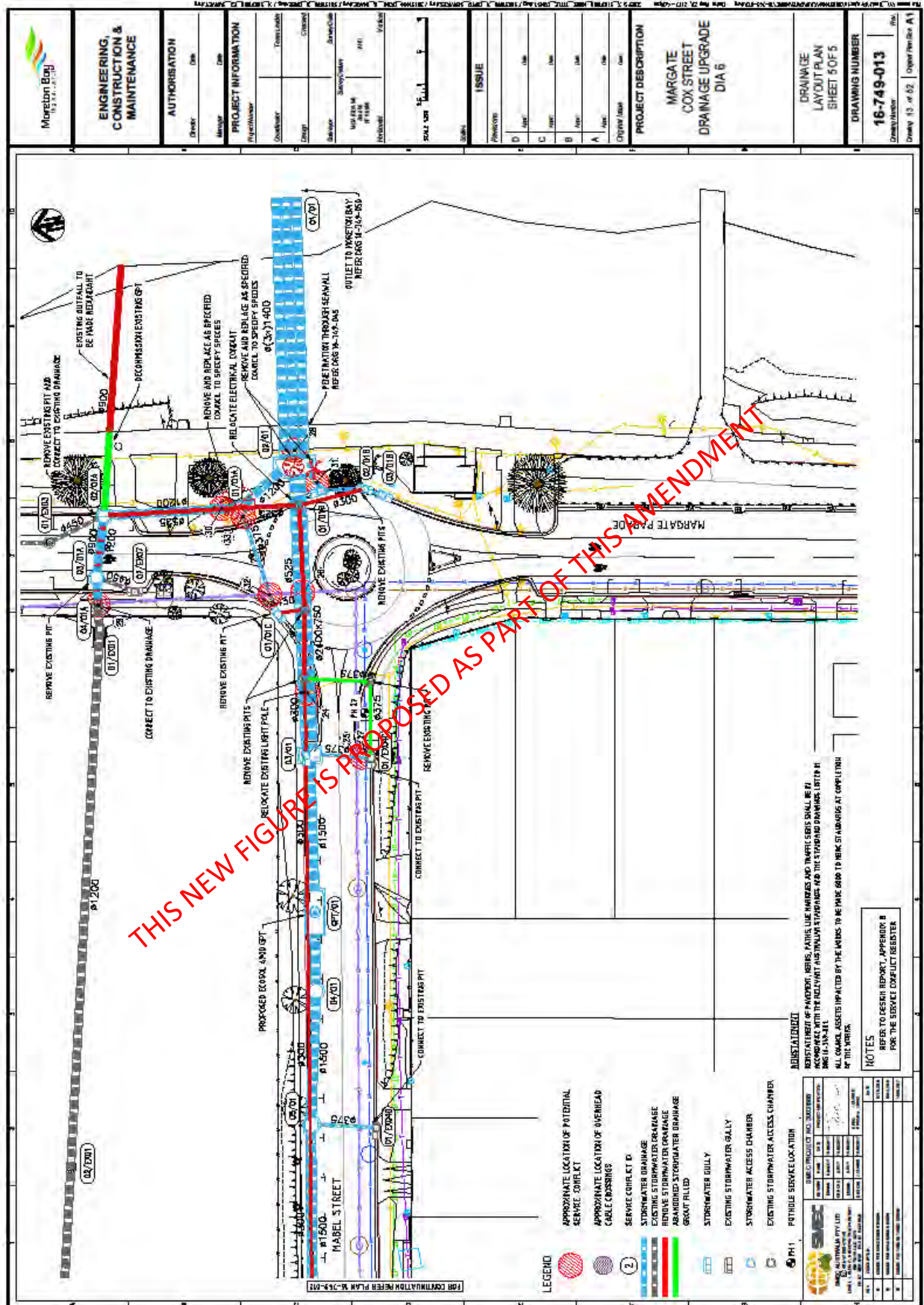


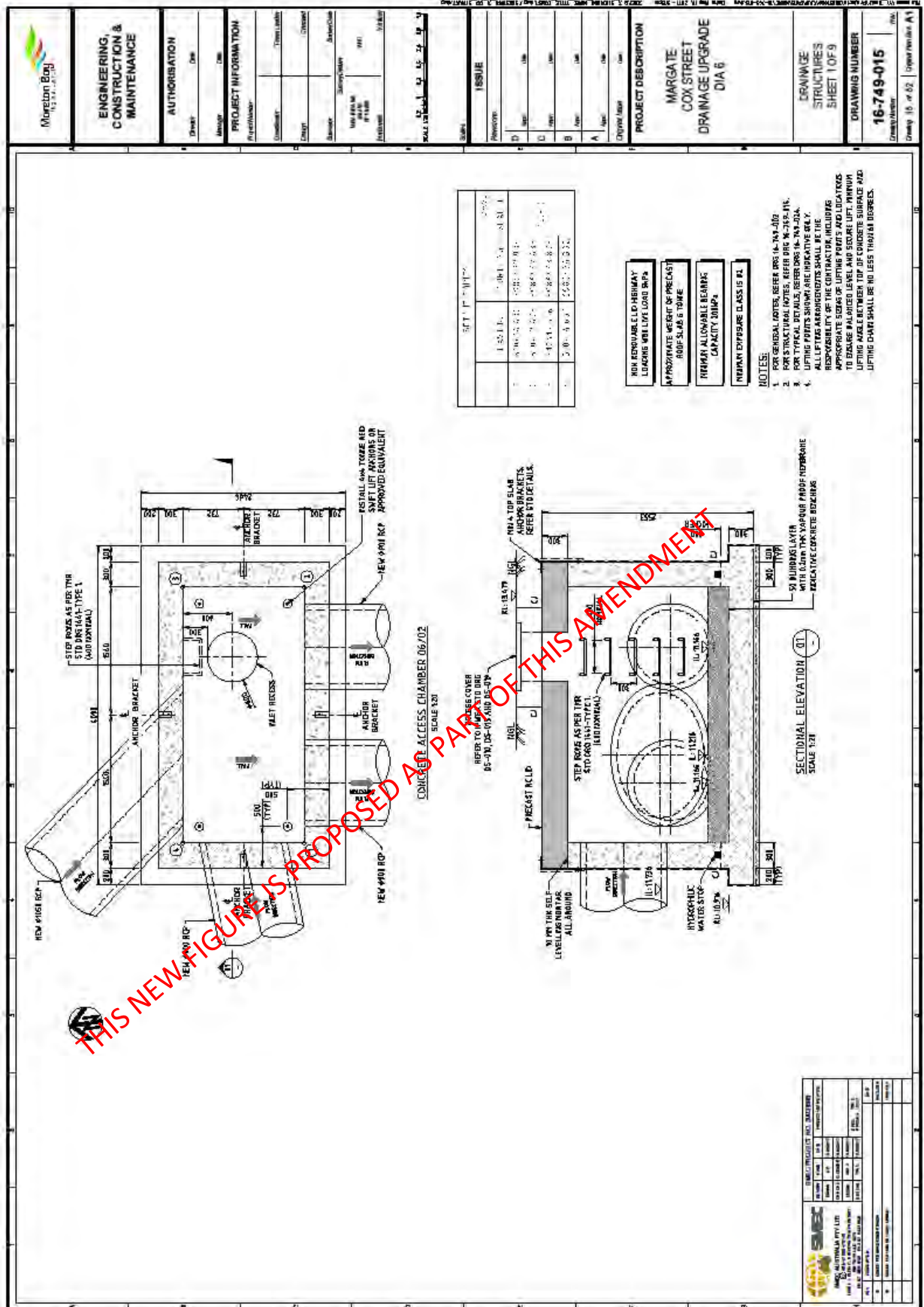


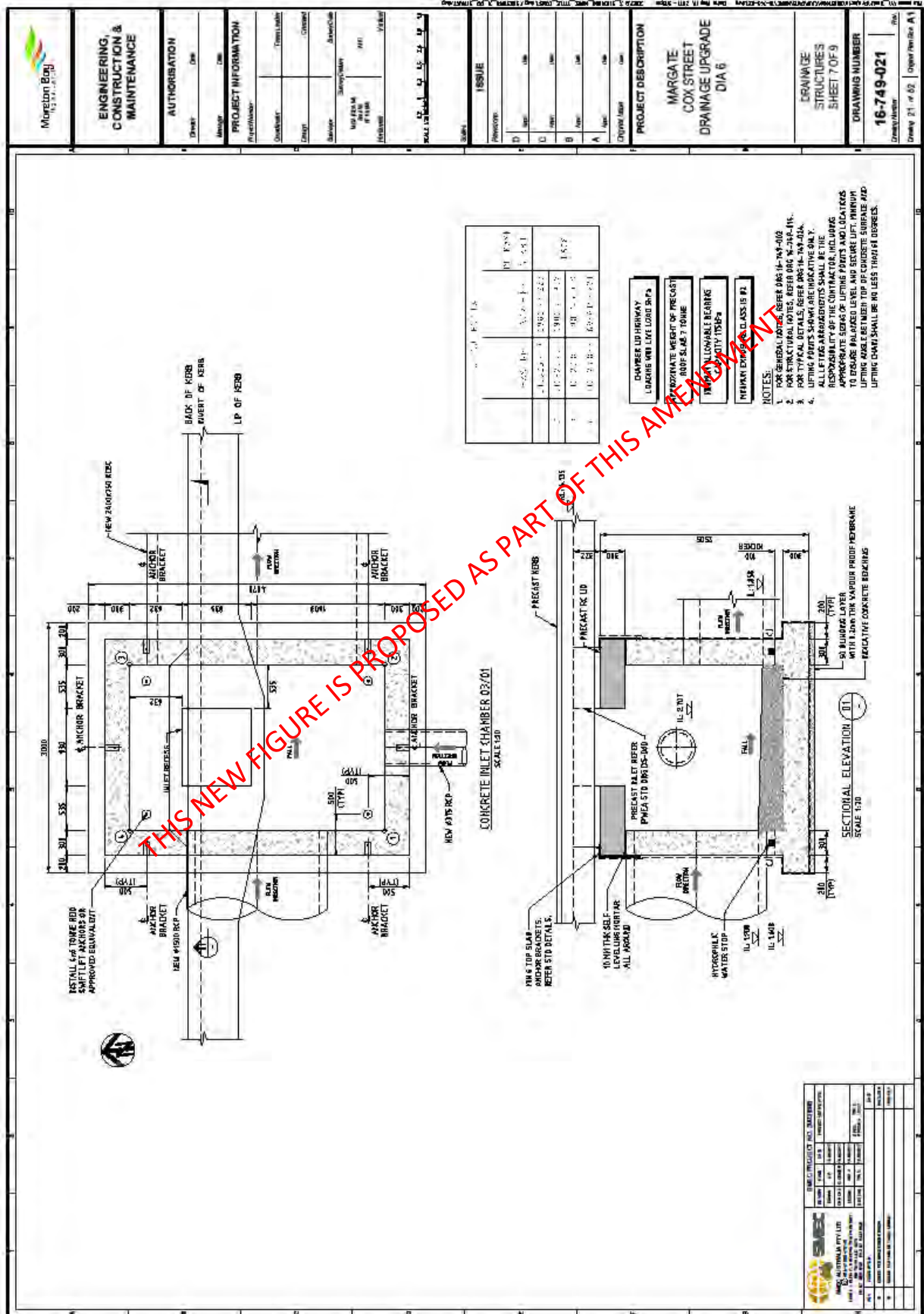


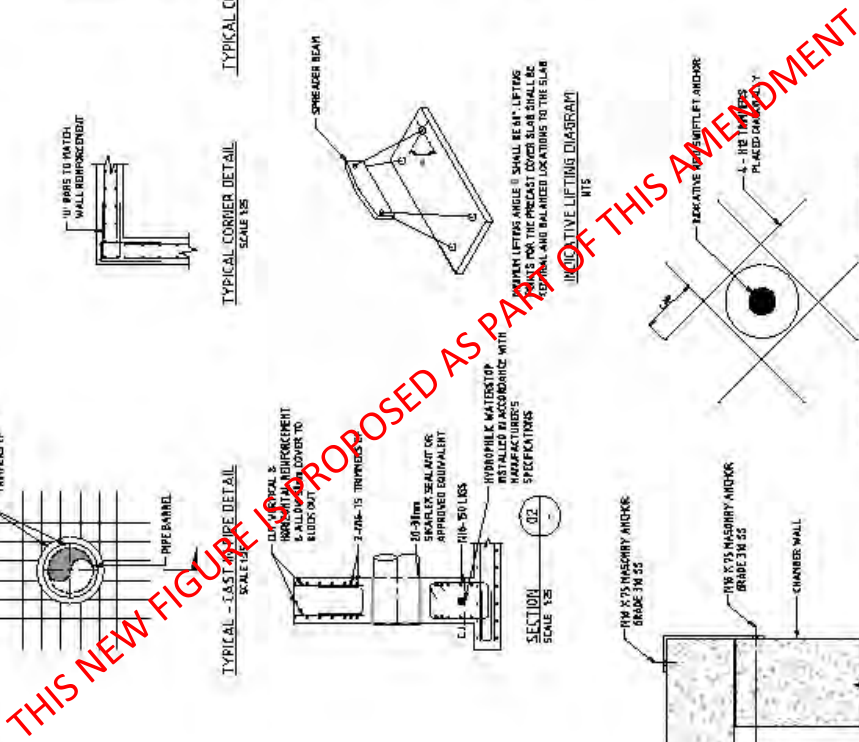


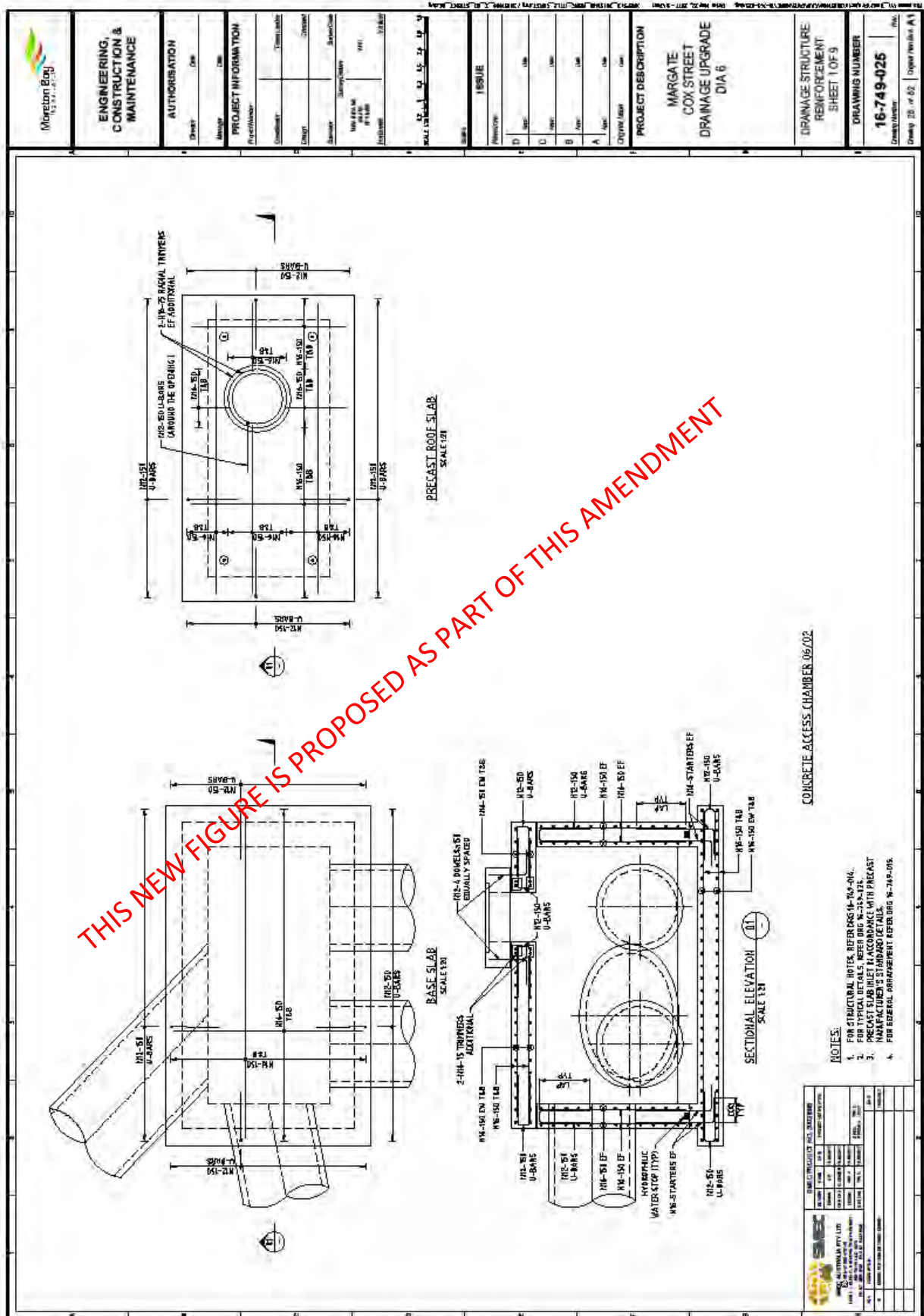


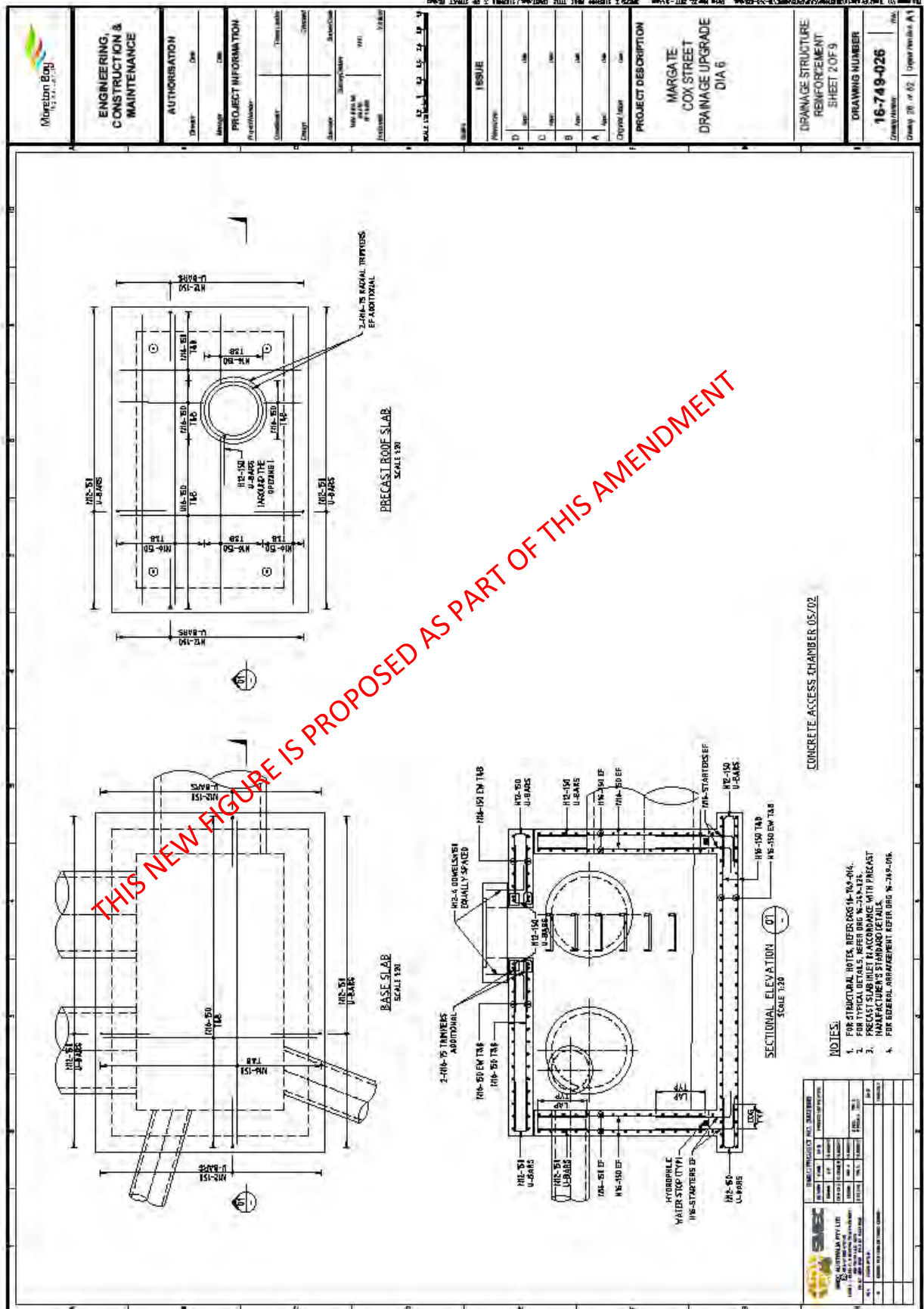


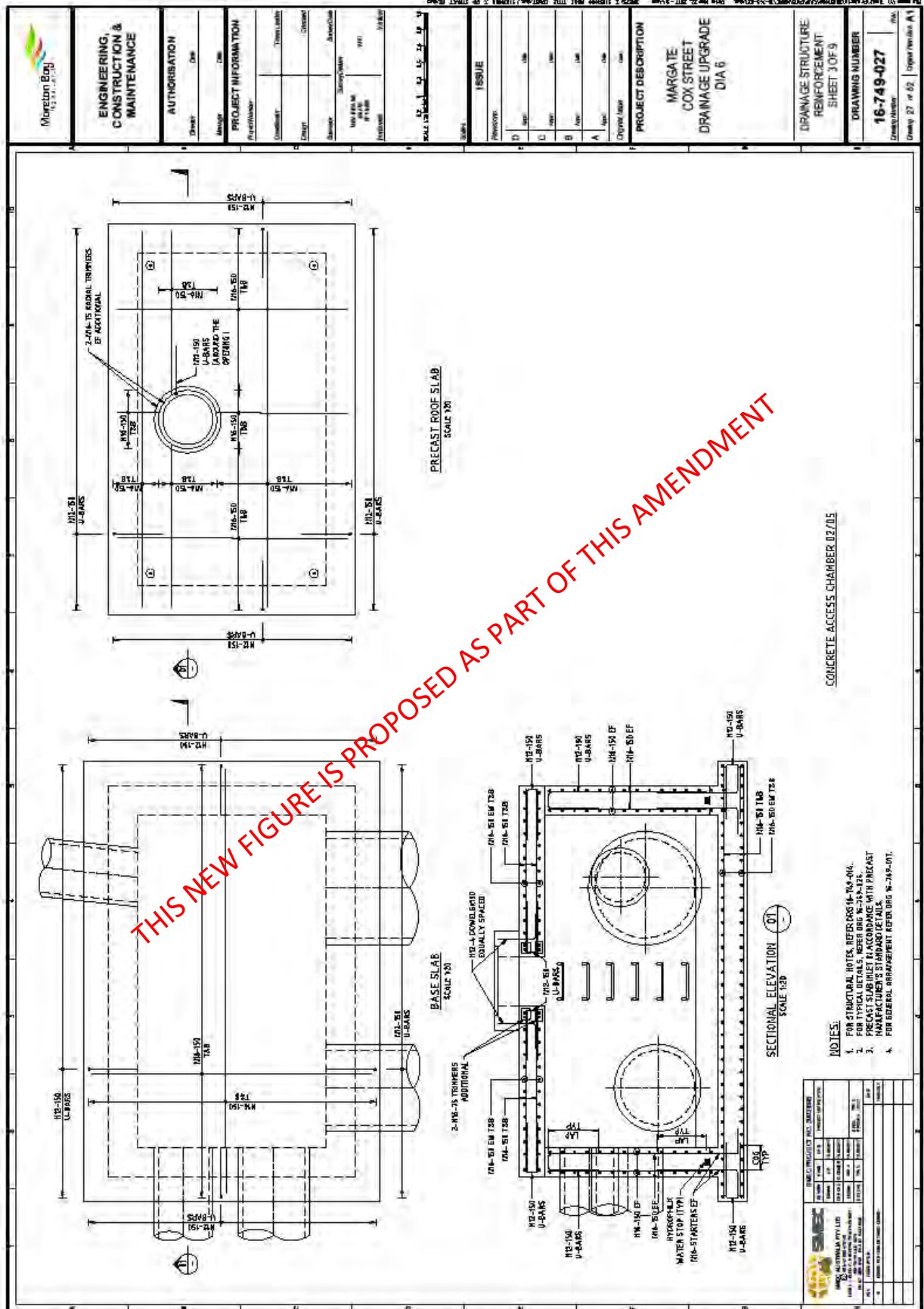


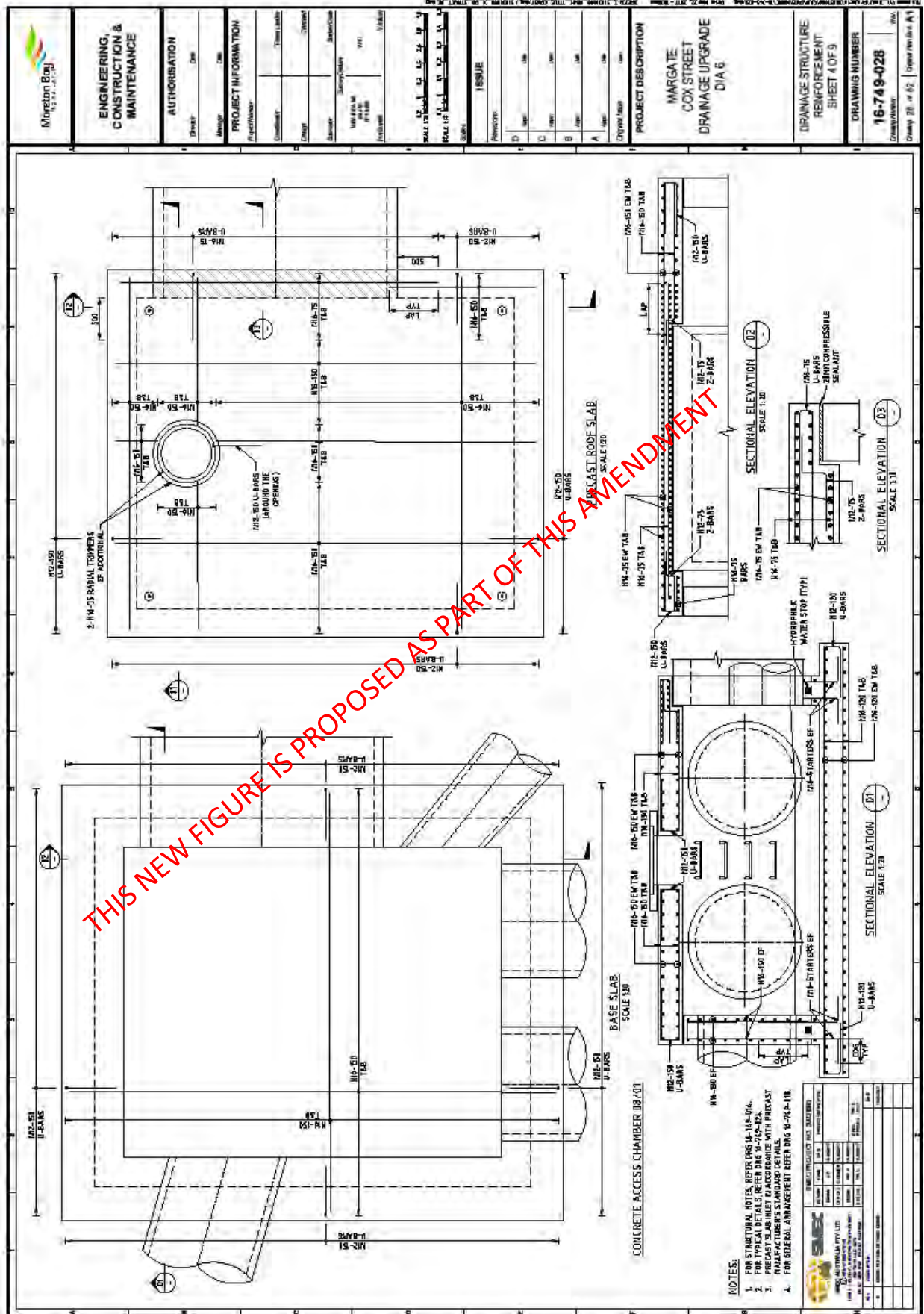


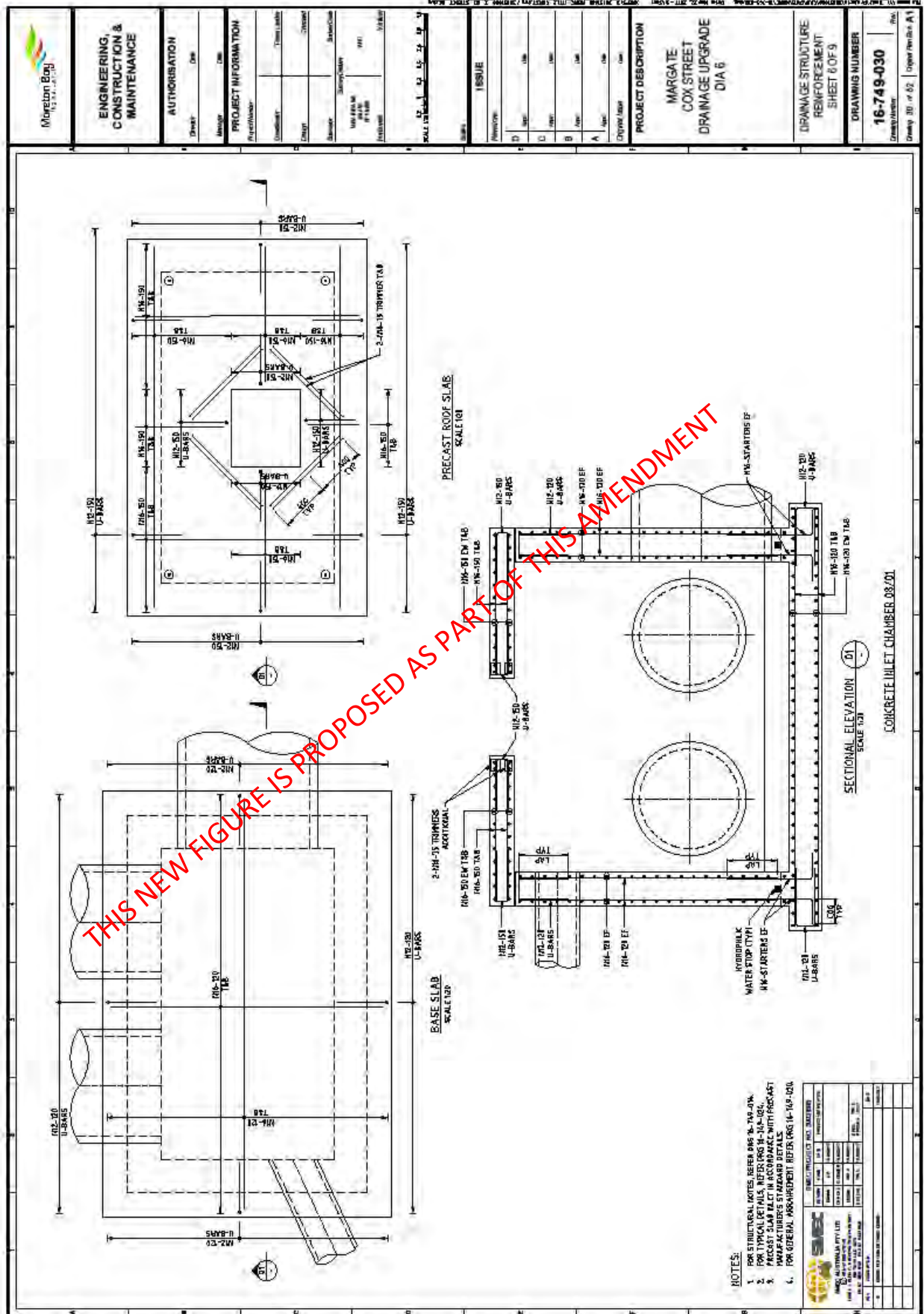


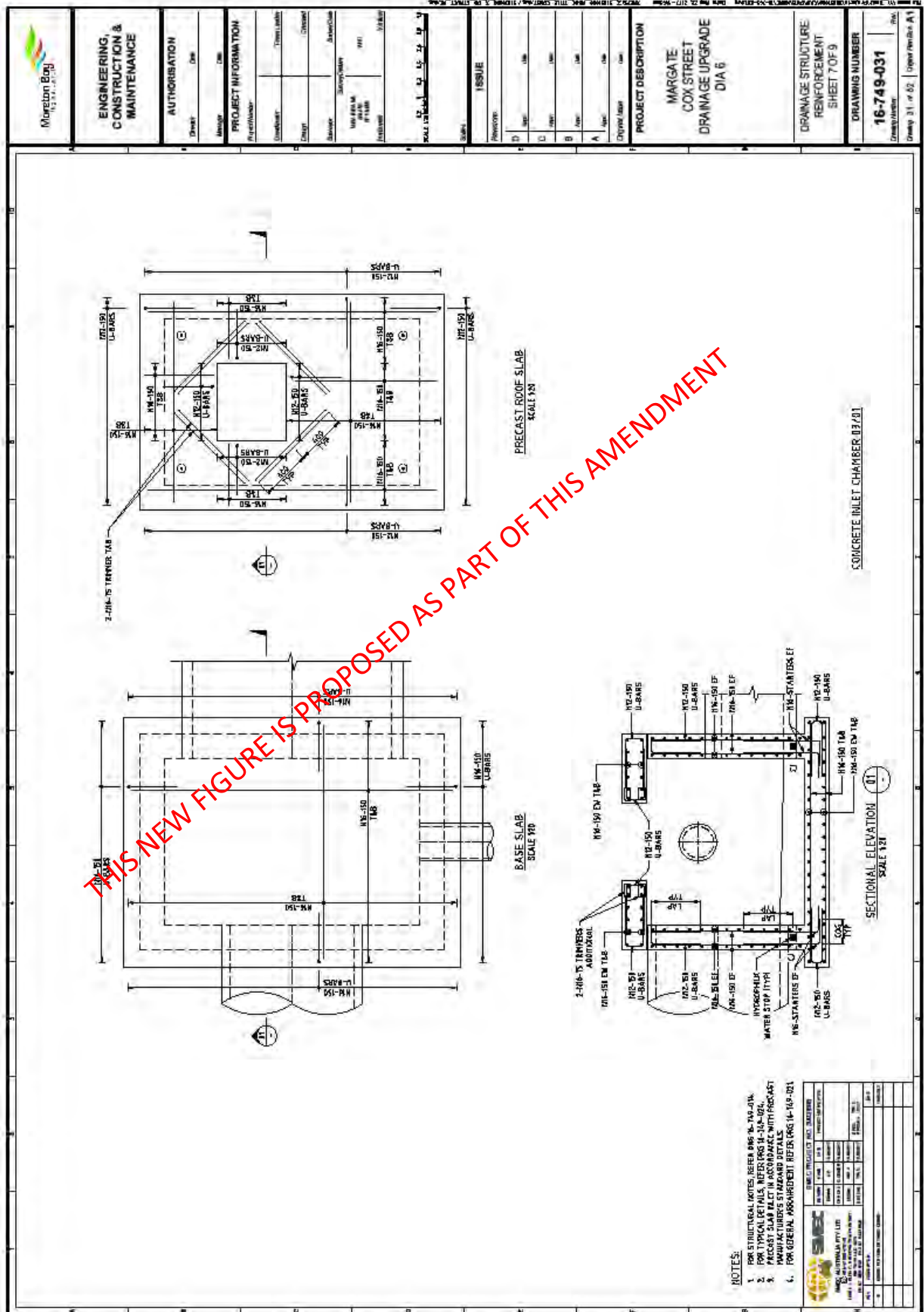


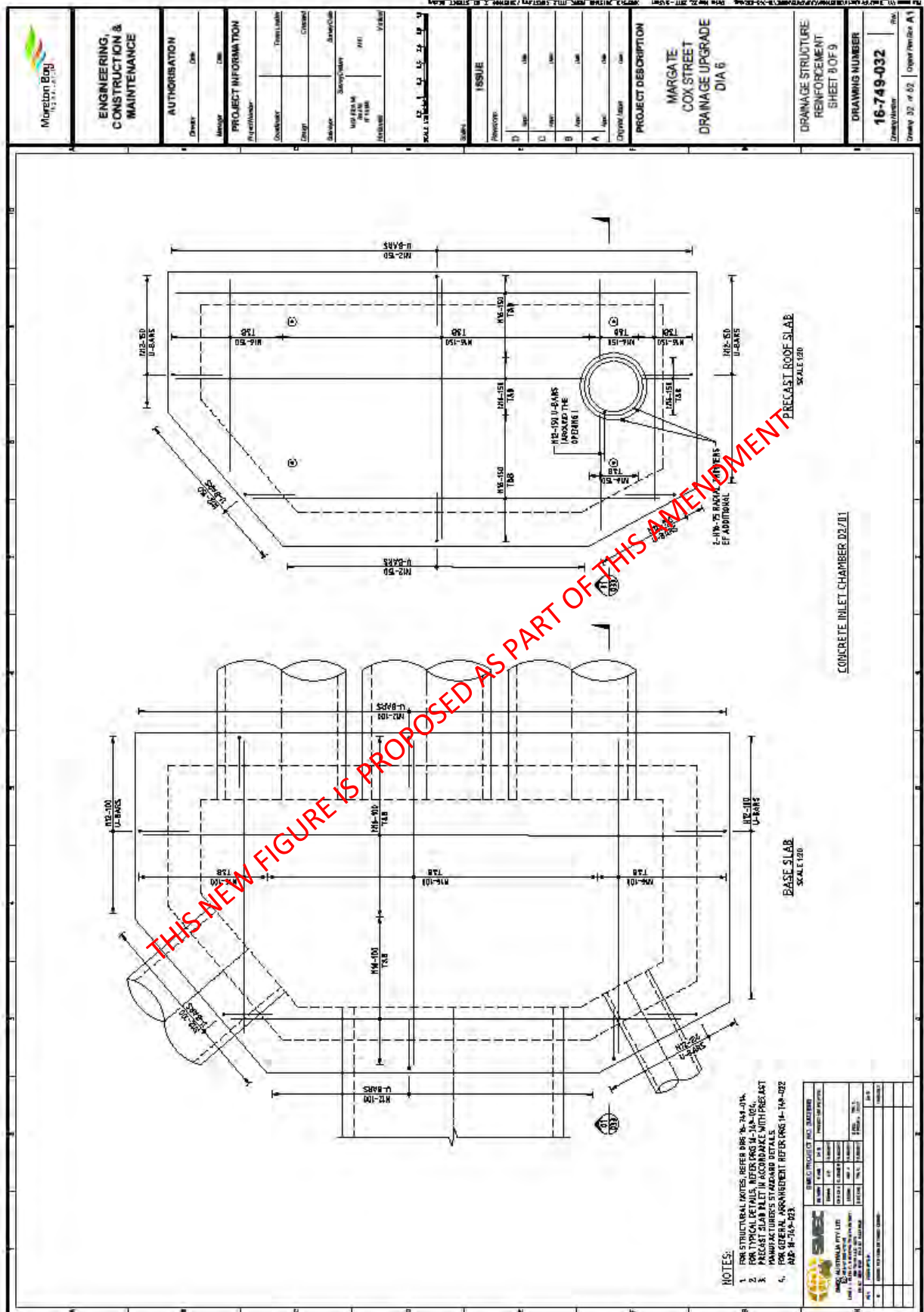


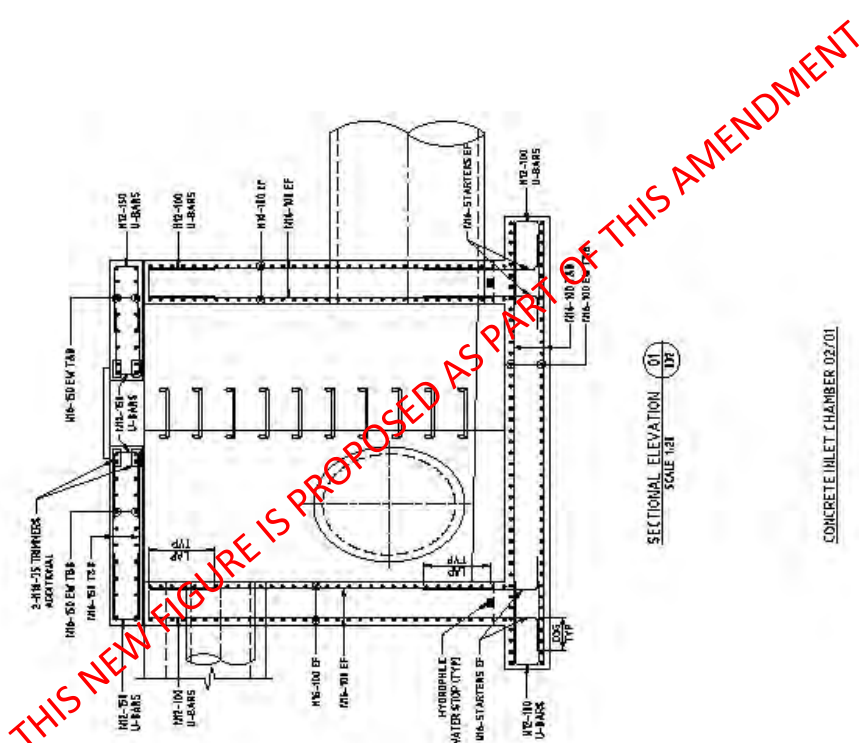


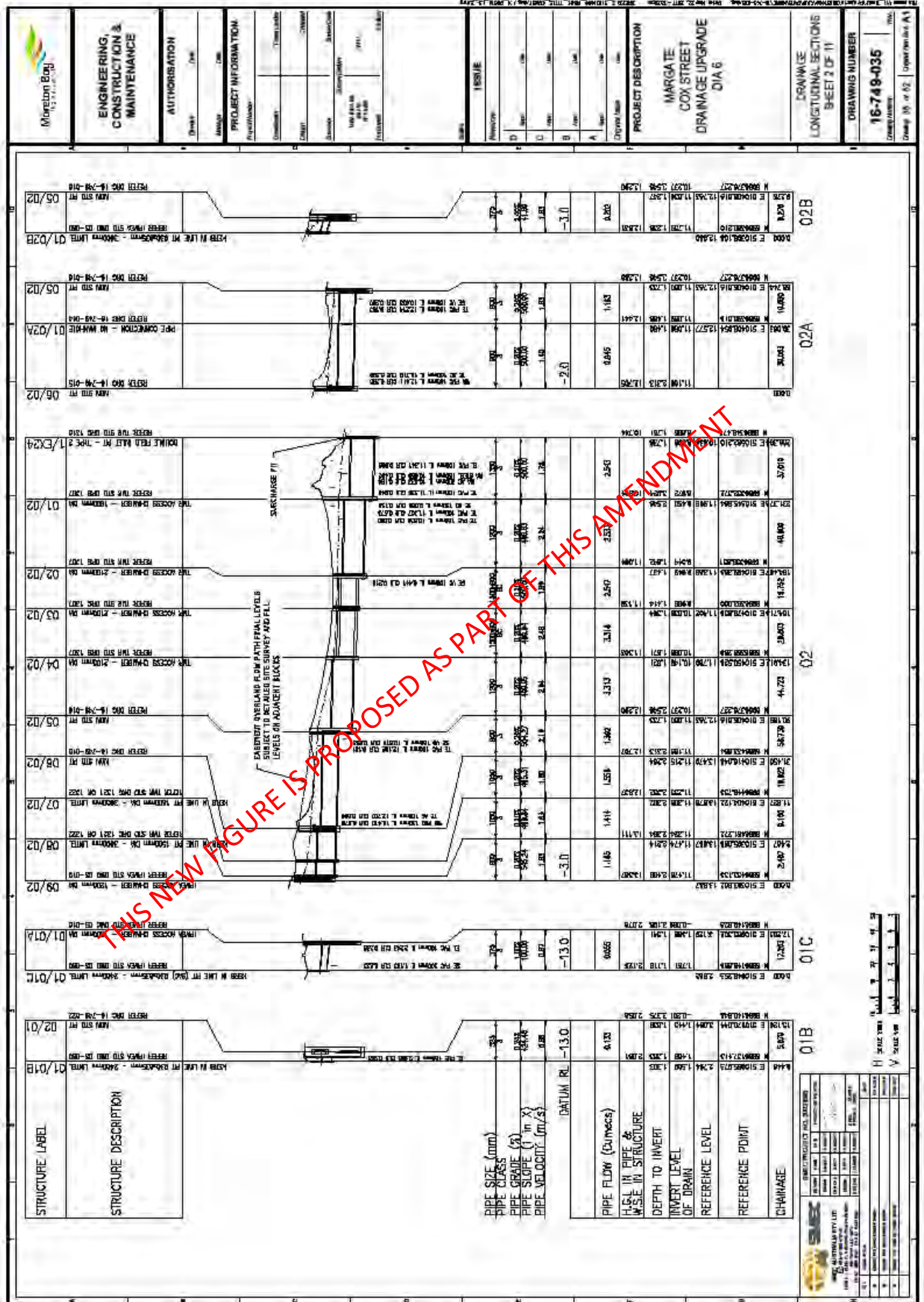


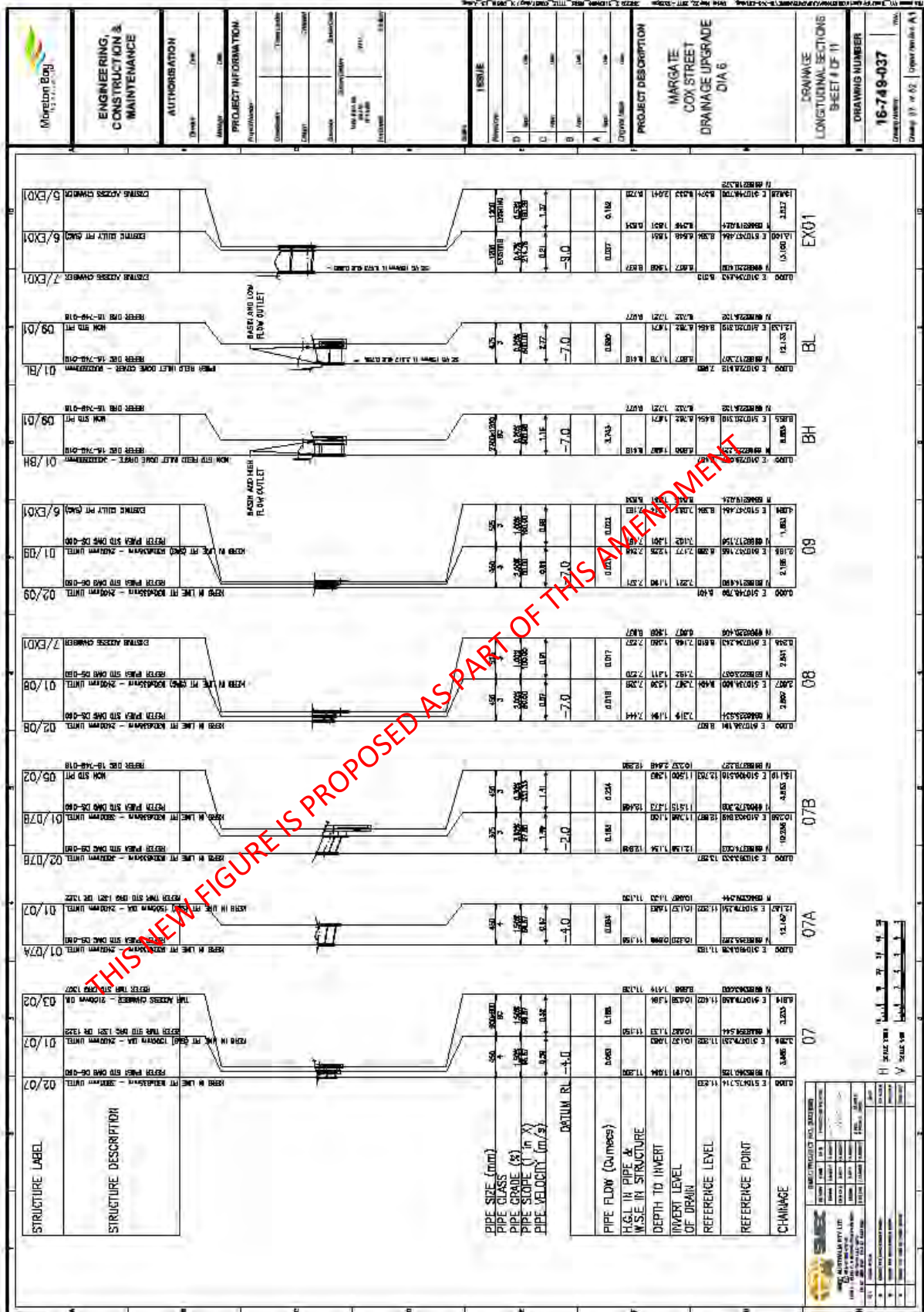


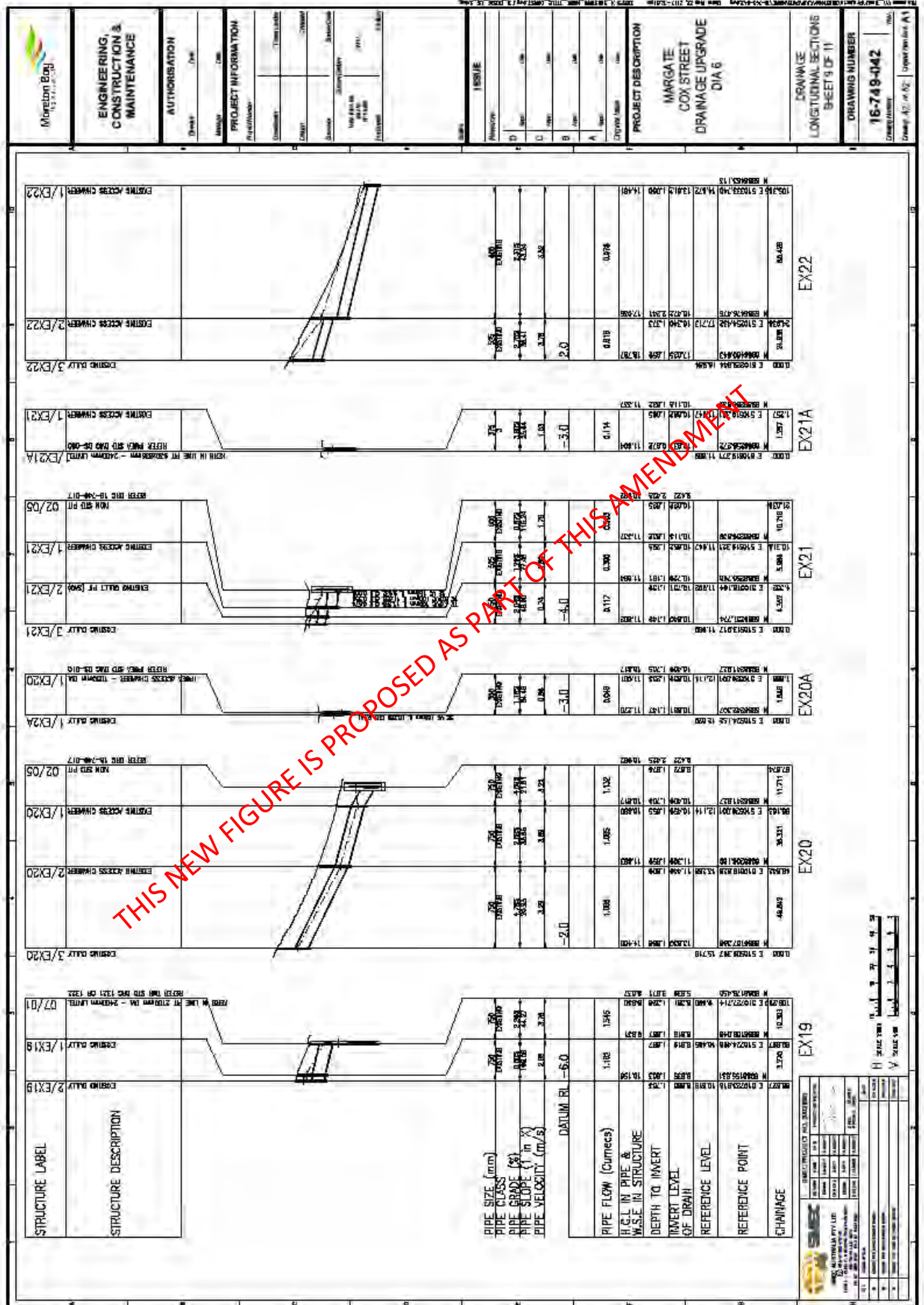


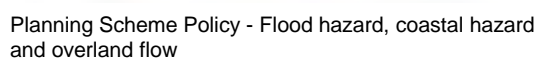


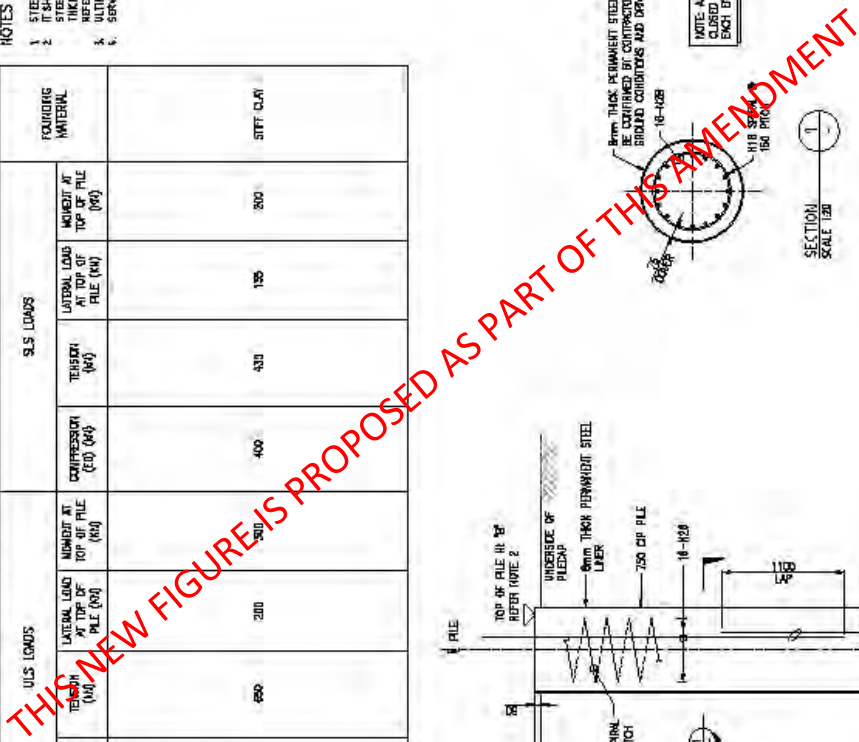


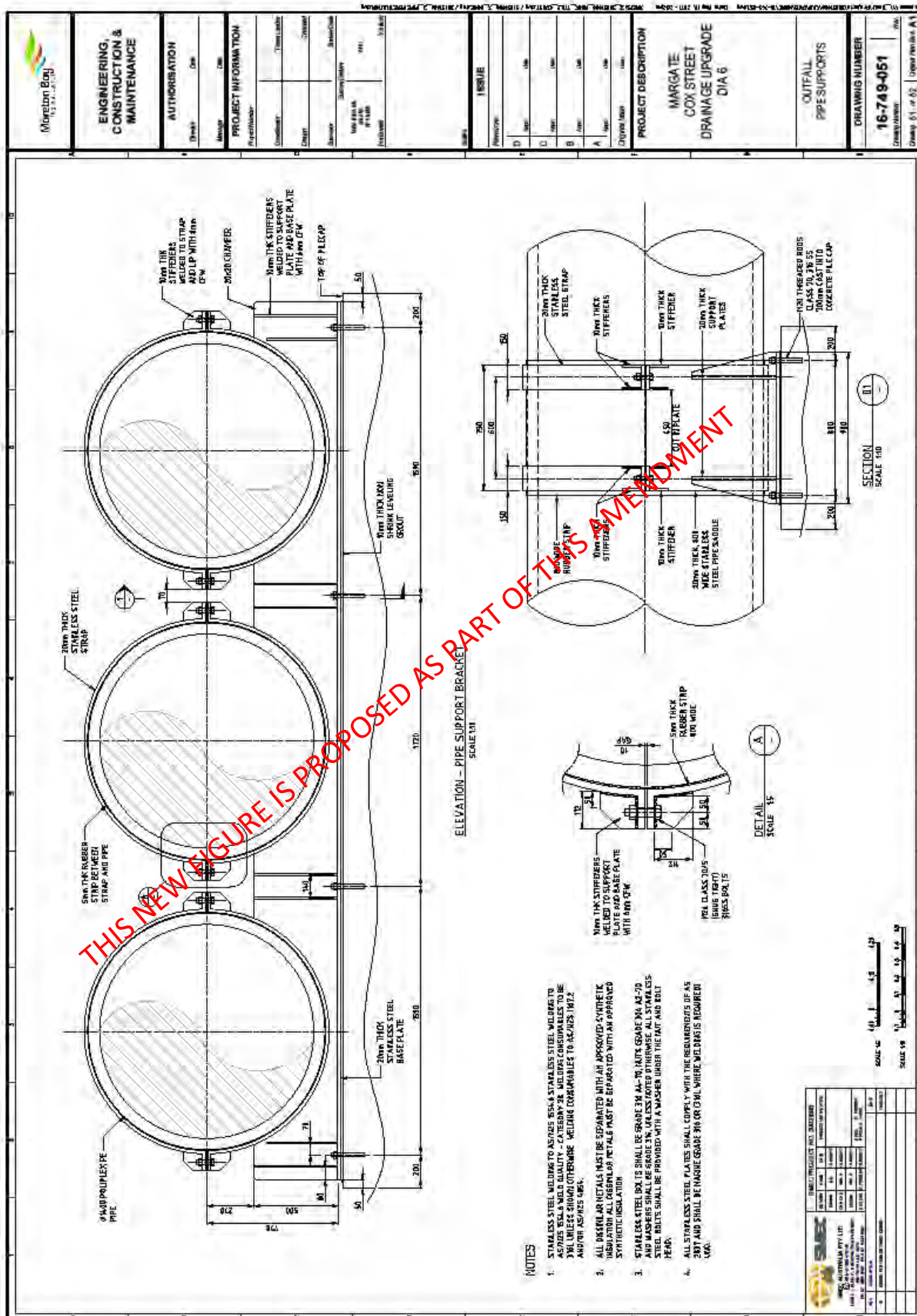


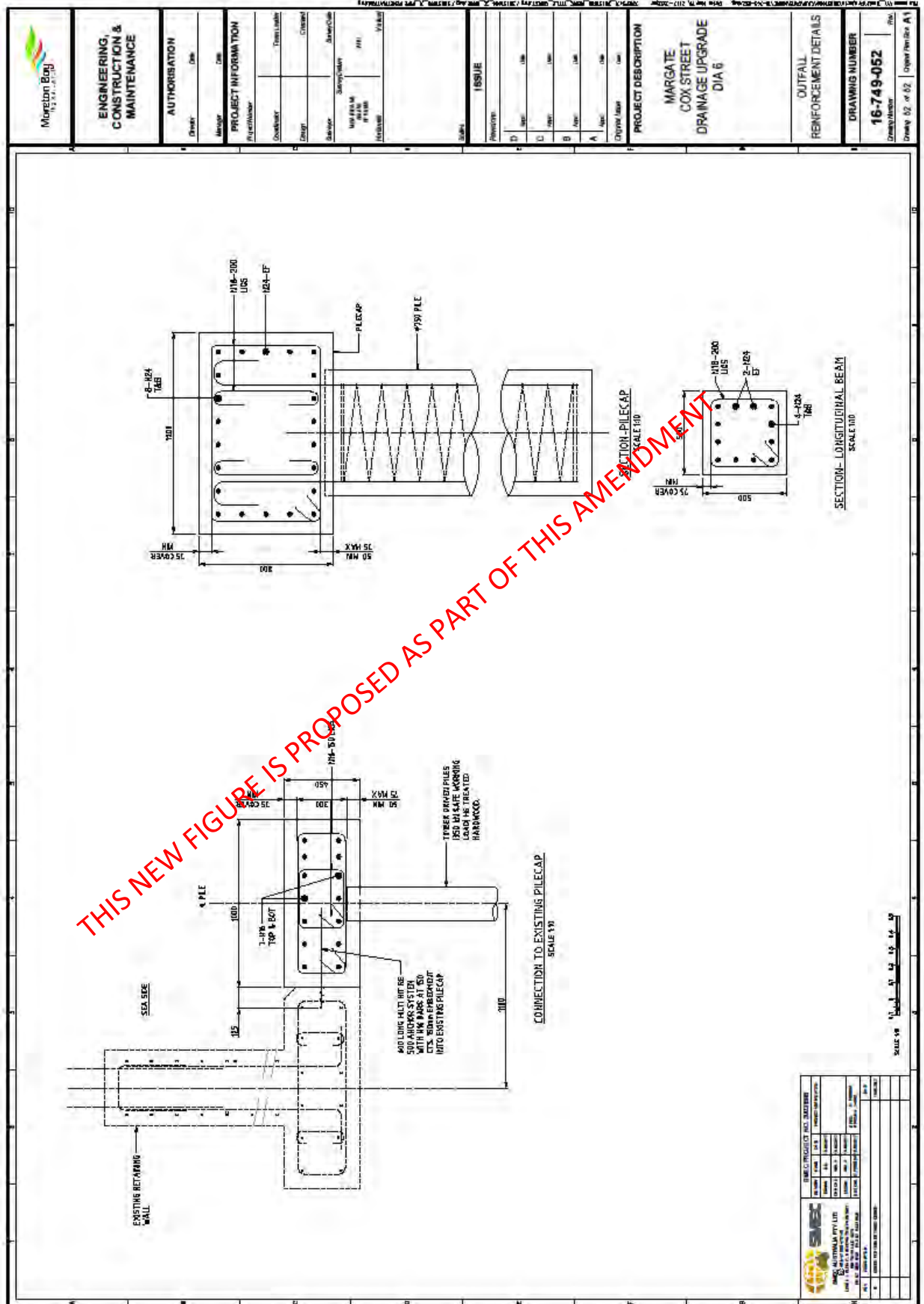












DRAINAGE MASTER PLAN

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.

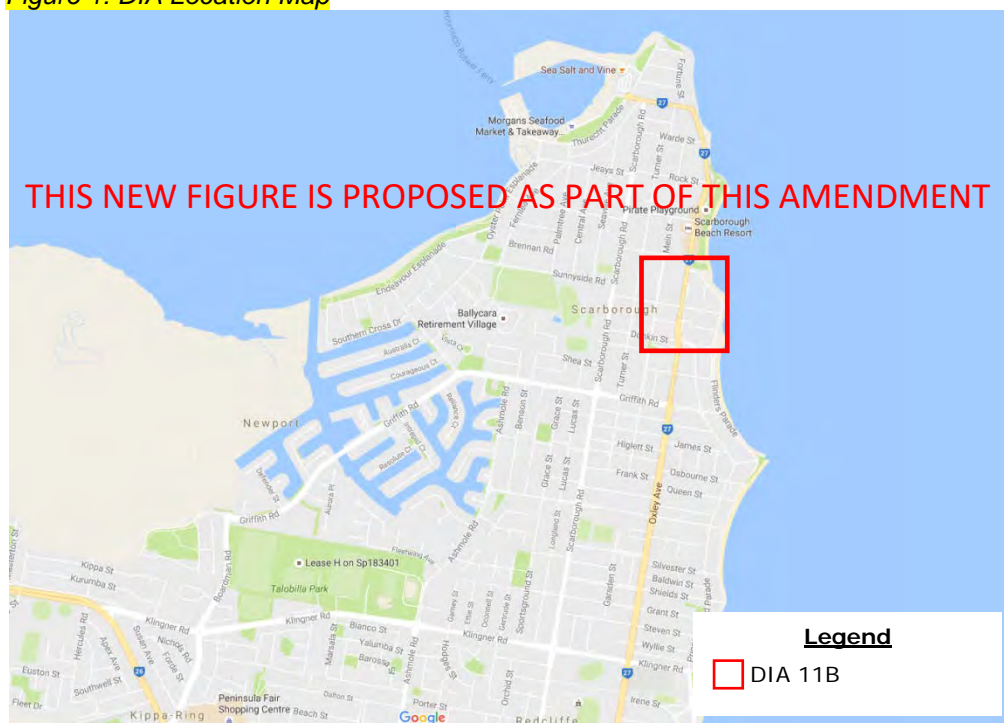
This DMP does not apply to development identified as exempt in Part 5.10.2 Categories of development and assessment - Flood hazard overlay.

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.

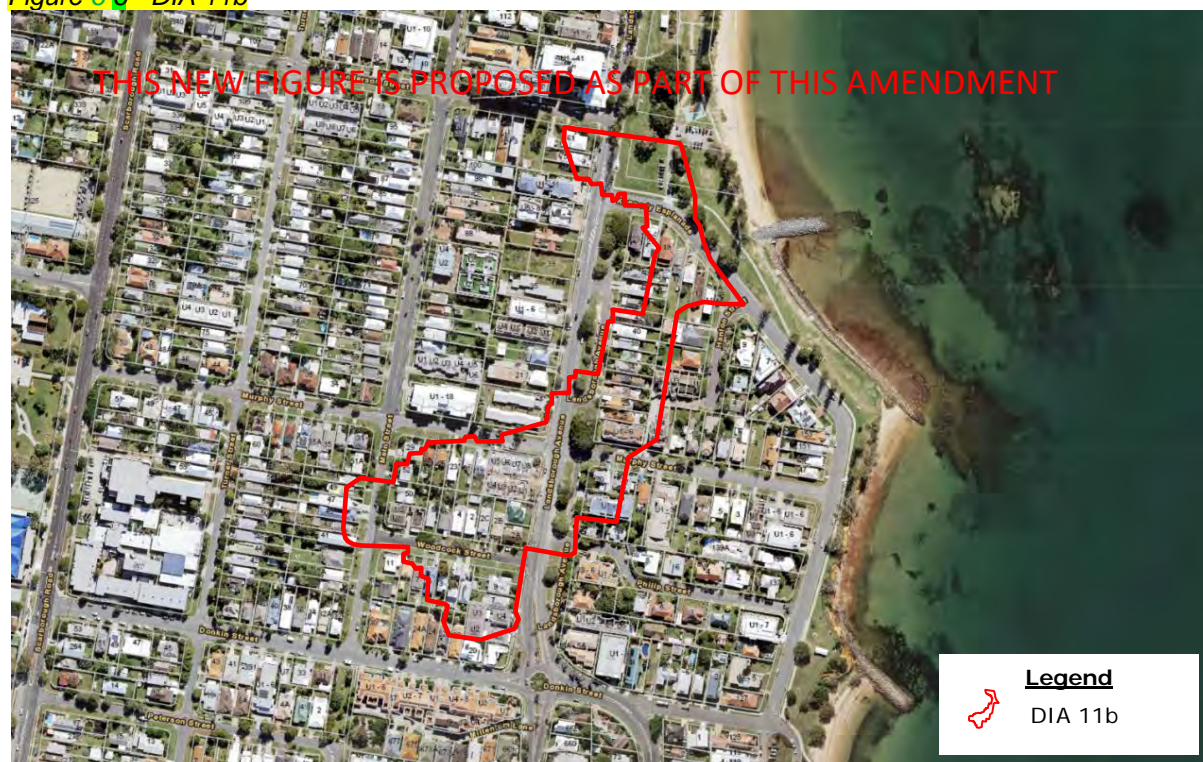
Figure 1: DIA Location Map



Source: MBRC Interactive Mapping, 2016

DIA 11b comprises an area of approximately 45,500m² 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

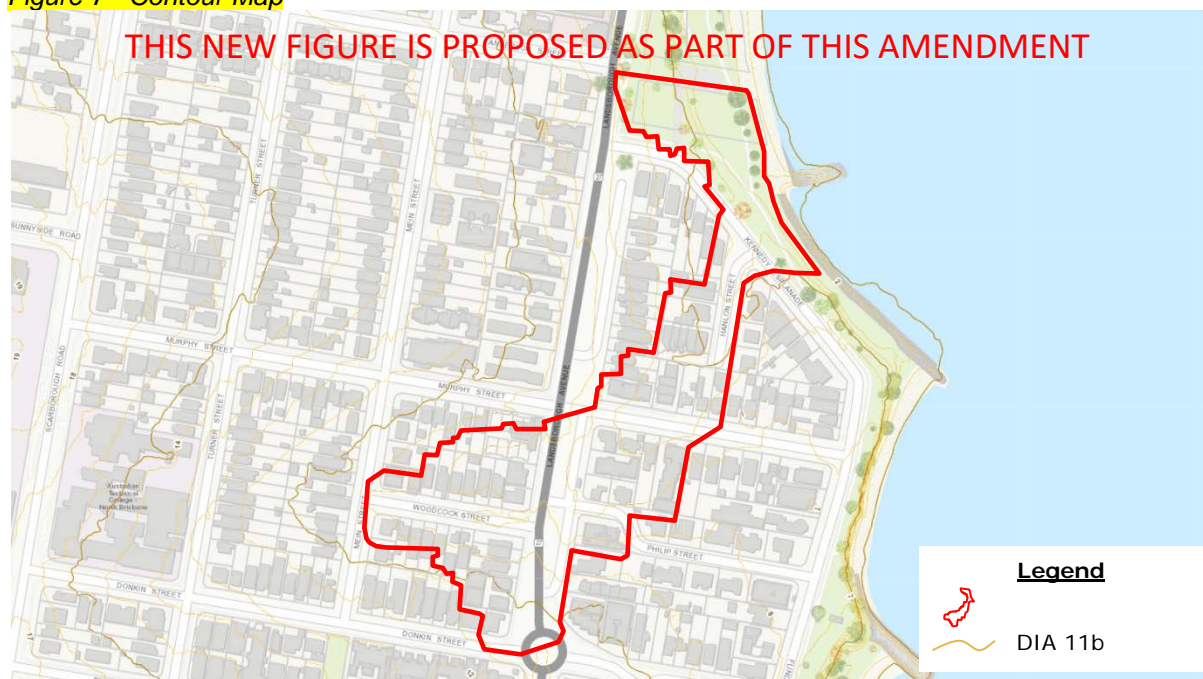


Source: MBRC Interactive Mapping, 2016.

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	<p>The entire allotment/development site area and meeting the following:</p> <p>(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);</p> <p>(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</p> <p>(c) ensure no worsening of flood impacts to other properties beyond known flood impacts at the date of adoption of the planning scheme.</p>	<p>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:</p> <ul style="list-style-type: none"> ▪ 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	<p>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.</p> <p>Where filling occurs, other applicable code requirements apply in the MBRC Planning Scheme. This may include consideration of, but not limited to:</p> <ul style="list-style-type: none"> ▪ 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.

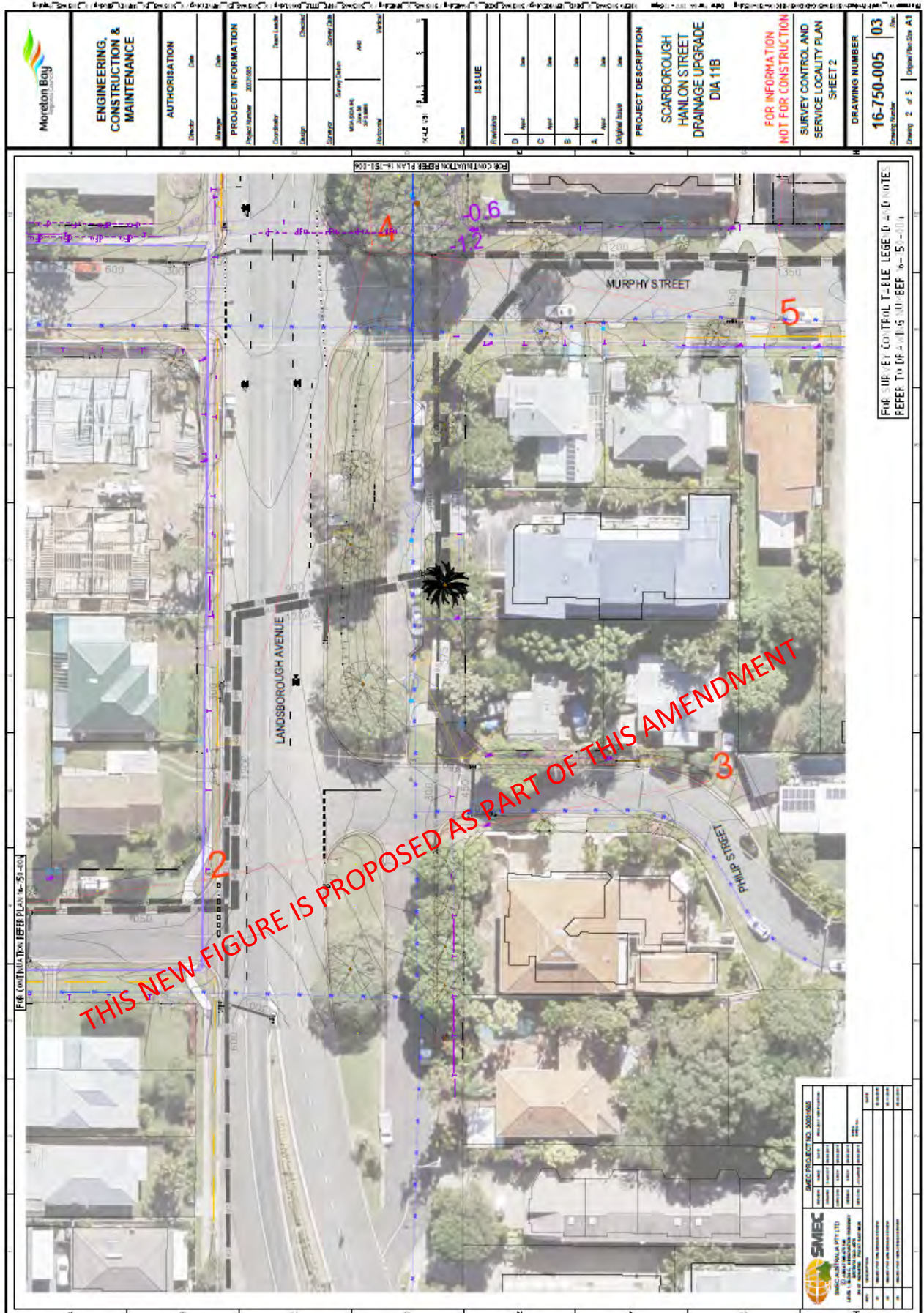
Aspect of Development	Filling Requirements	Minimum Fill Level	Minimum Extent of Filling	Notes
Operational work (filling or excavation only)	Filling is mandatory	Flood Planning Level	<p>The entire allotment/development site area and meeting the following:</p> <p>(a) provide a minimum 1:100 uniform cross fall shaped to contains flood waters to the street and drainage network with the exception of meeting (b) and (c);</p> <p>(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</p> <p>(c) ensure no worsening of flood impacts to other properties beyond known flood impacts at the date of adoption of the planning scheme.</p>	<p>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:</p> <ul style="list-style-type: none"> ▪ 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	<p>Filling is permitted and minimum fill levels are not regulated by the DMP for this aspect of development.</p> <p>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:</p> <ul style="list-style-type: none"> ▪ 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	<p>Filling is permitted and minimum fill levels are not regulated by the DMP for this aspect of development.</p> <p>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:</p> <ul style="list-style-type: none"> ▪ 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.

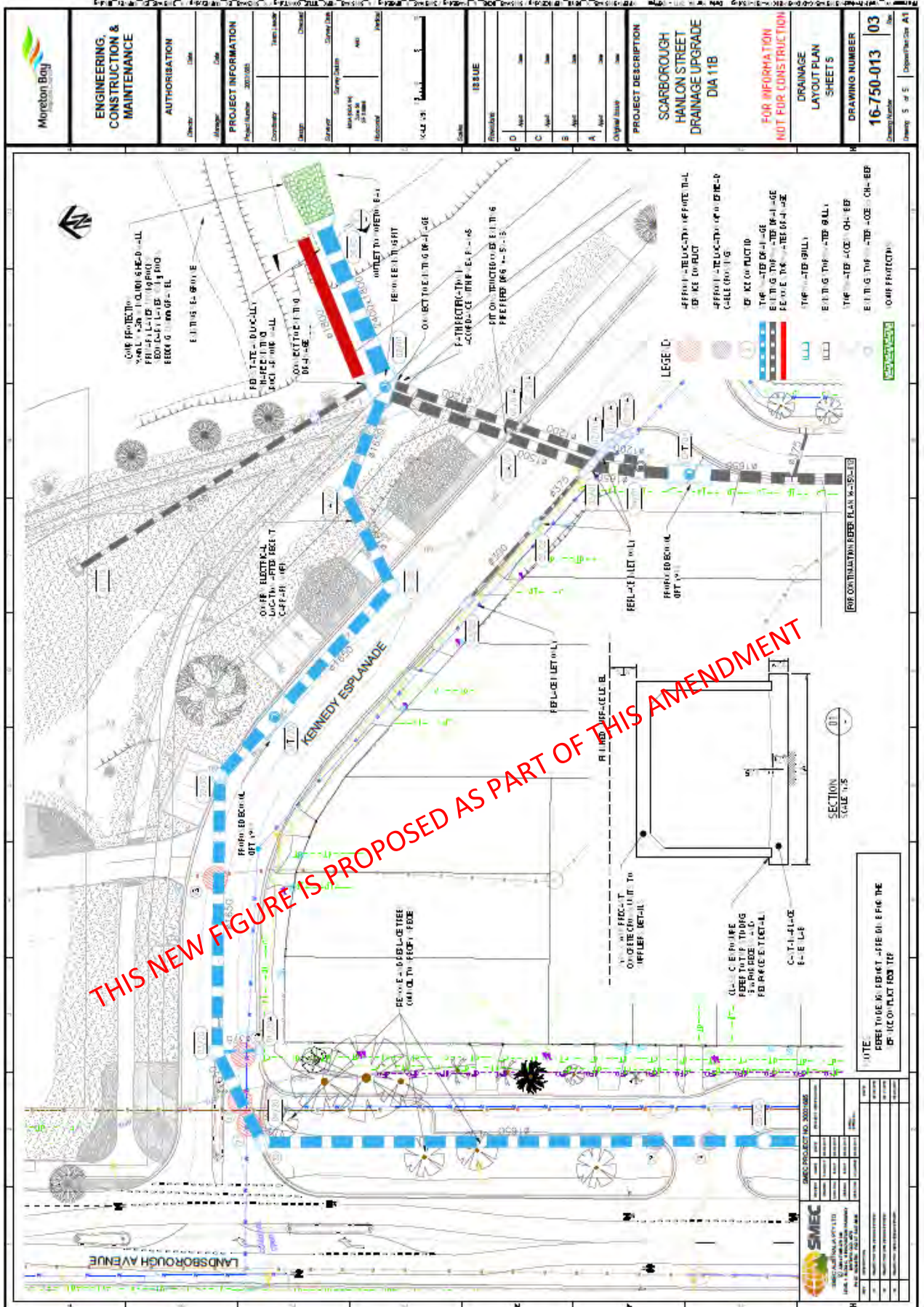
Appendix A - Flood Risk Mitigation to be undertaken by Council

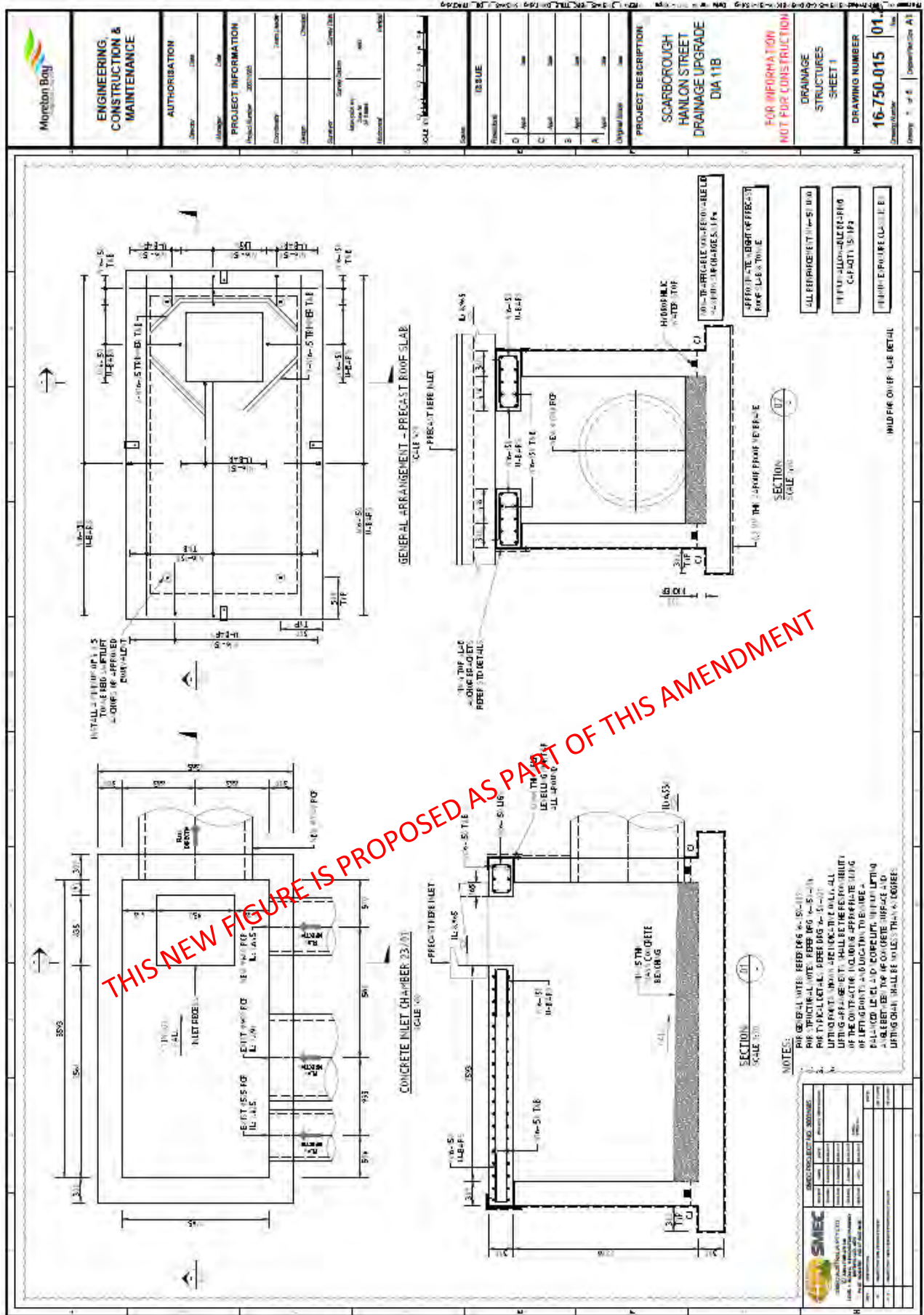
Detailed Design DIA11B

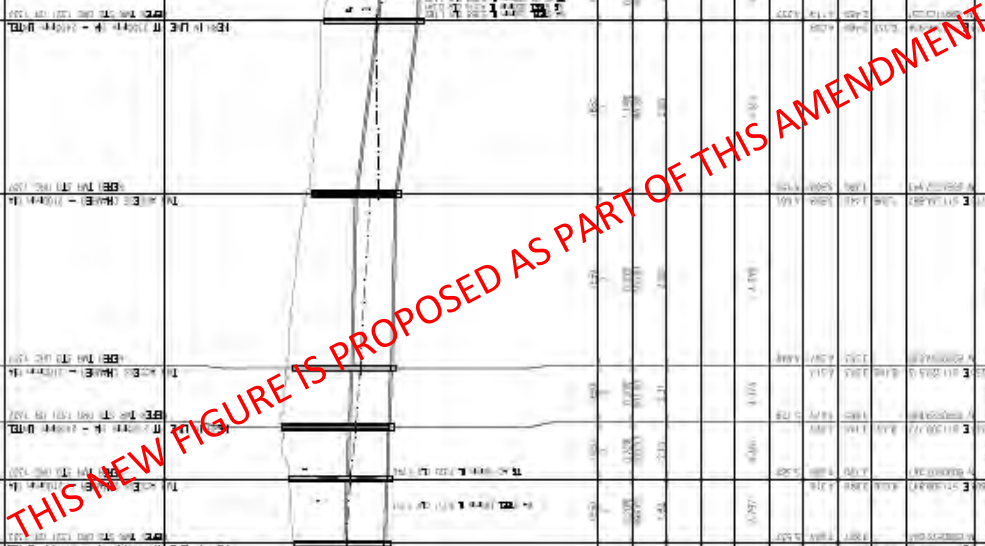
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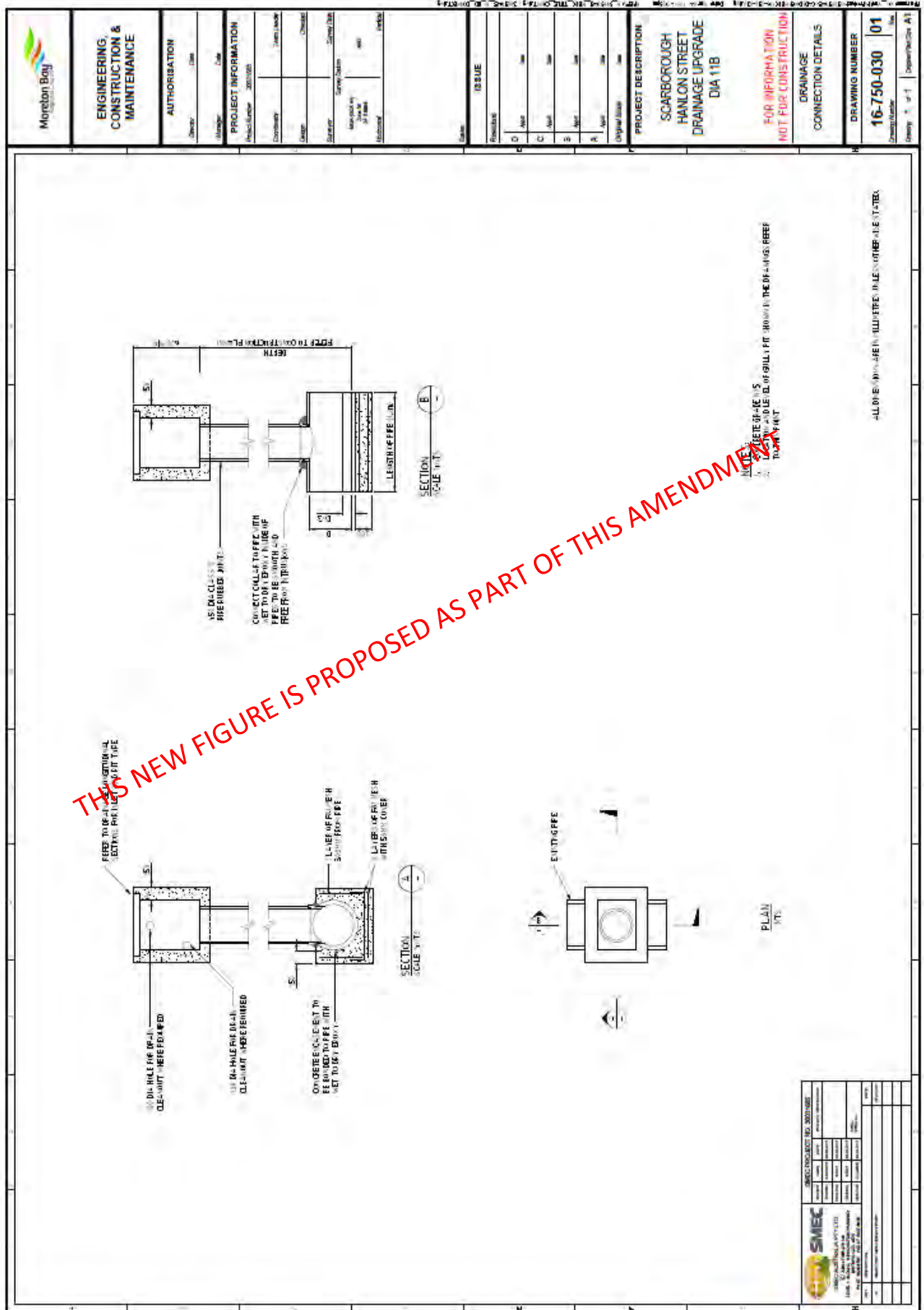












DRAINAGE MASTER PLAN

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 Categories of development and assessment - 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 25,000m² 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

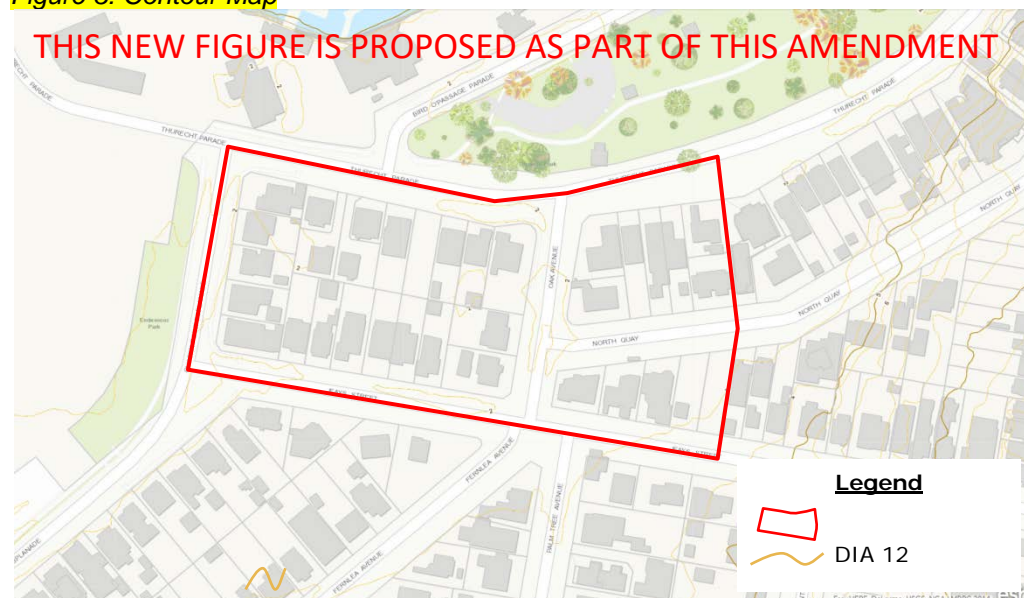


Source: MBRC Interactive Mapping, 2016.

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.

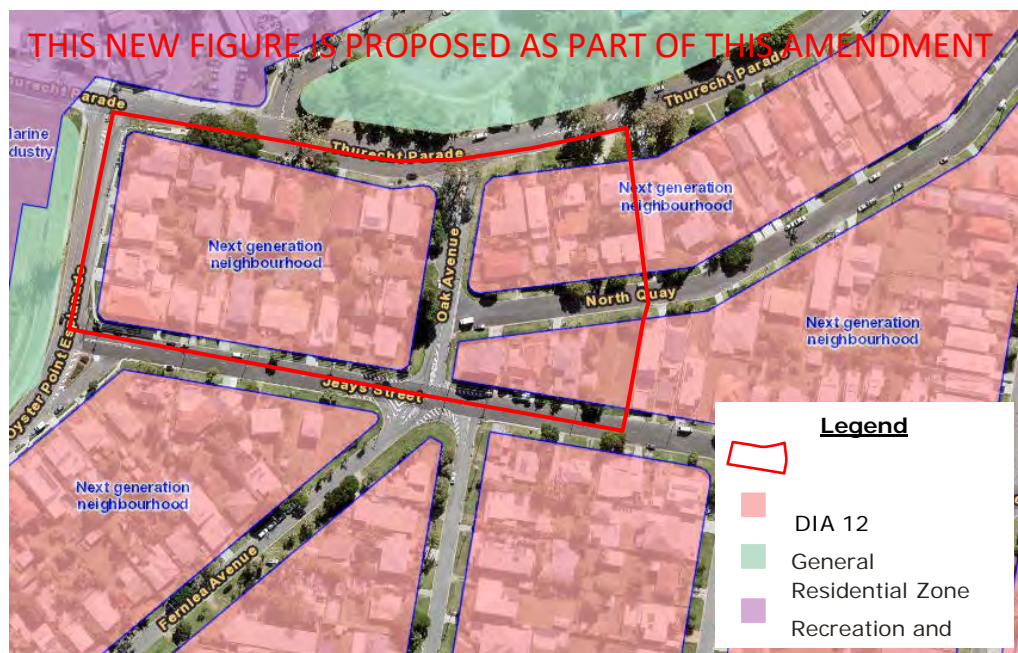
Outcomes for other aspects of development not addressed by the zone code (e.g. reconfiguring a lot, operational work etc) are expressed in the relevant planning scheme codes and continue to apply to development in the DIA.

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.

2 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.

3 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	<p>The entire allotment/development site area and meeting the following:</p> <p>(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);</p> <p>(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</p> <p>(c) ensure no worsening of flood impacts to other properties beyond known flood impacts at the date of adoption of the planning scheme.</p>	<p>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:</p> <ul style="list-style-type: none"> 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	<p>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.</p> <p>Where filling occurs, other applicable code requirements apply in the MBRC Planning Scheme. This may include consideration of, but not limited to:</p> <ul style="list-style-type: none"> ▪ 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	<p>The entire allotment/development site area and meeting the following:</p> <p>(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);</p> <p>(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</p> <p>(c) ensure no worsening of flood impacts to other properties beyond known flood impacts at the date of adoption of the planning scheme.</p>	<p>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:</p> <ul style="list-style-type: none"> 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	<p>Filling is permitted and minimum fill levels are not regulated by the DMP for this aspect of development.</p> <p>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:</p> <ul style="list-style-type: none"> ▪ 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	<p>Filling is permitted and minimum fill levels are not regulated by the DMP for this aspect of development.</p> <p>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:</p> <ul style="list-style-type: none"> ▪ 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



GENERAL NOTES

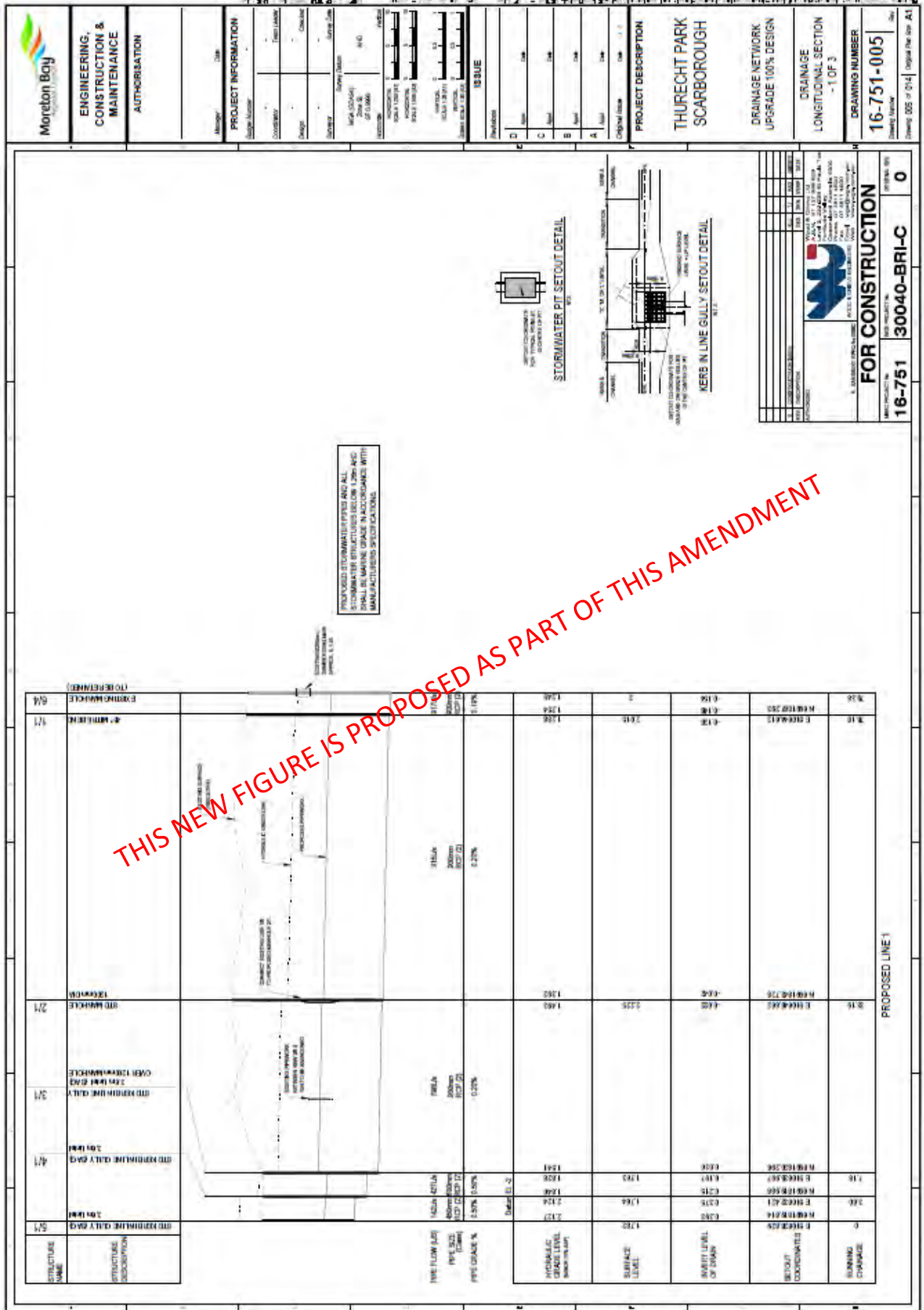
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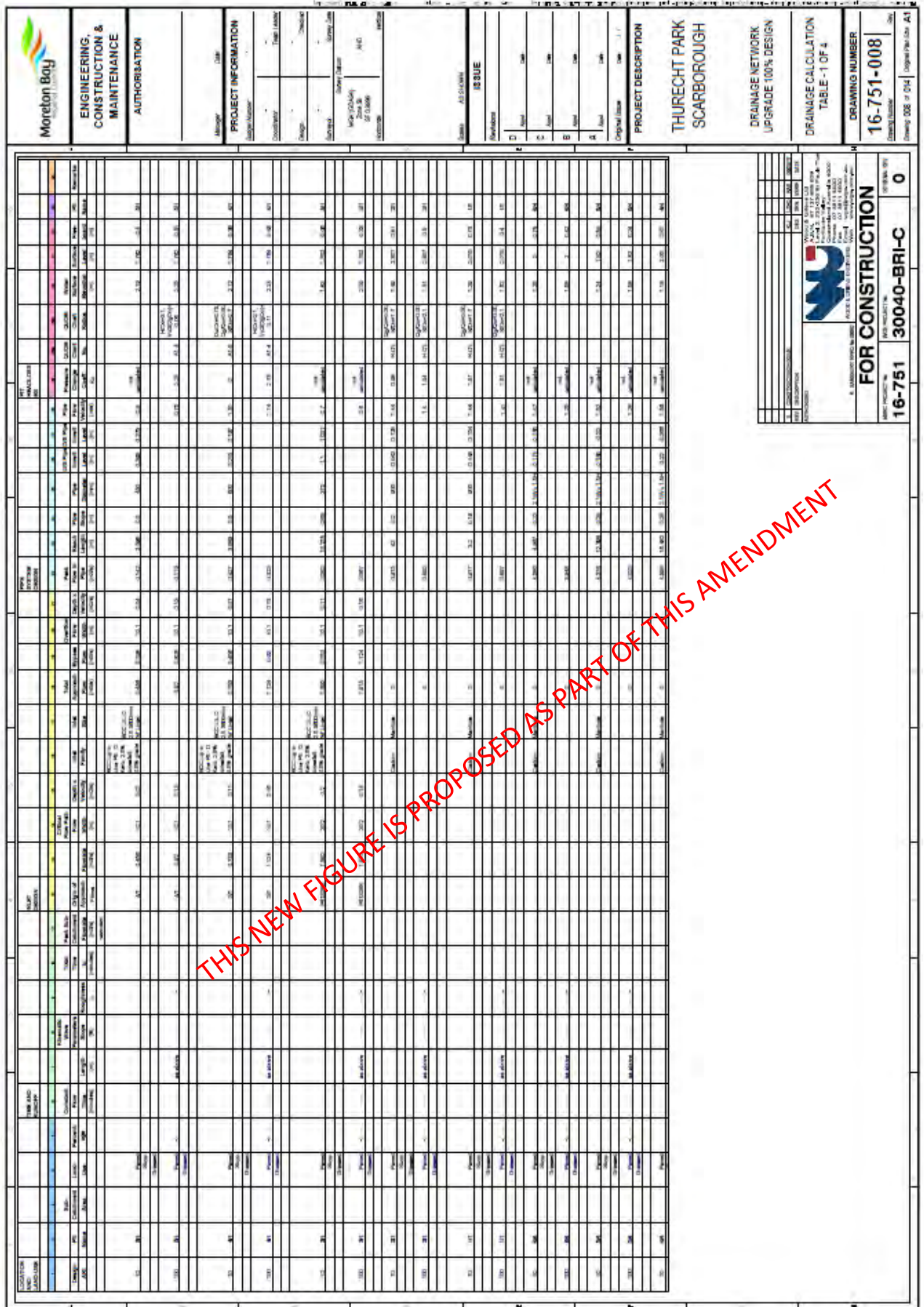
LOCALITY PLAN

DWG No.	REV	DESCRIPTION
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003	0	OVERALL DRAINAGE LAYOUT PLAN
004	0	DRAINAGE UPGRADE PLAN
005	0	DRAINAGE UPGRADE SECTION 1 OF 2
006	0	DRAINAGE UPGRADE SECTION 2 OF 2
007	0	DRAINAGE UPGRADE SECTION 3 OF 3
008	0	DRAINAGE UPGRADE SECTION 4 OF 4
009	0	DRAINAGE UPGRADE SECTION 5 OF 5
010	0	DRAINAGE UPGRADE SECTION 6 OF 6
011	0	DRAINAGE UPGRADE SECTION 7 OF 7
012	0	DRAINAGE UPGRADE SECTION 8 OF 8
013	0	DRAINAGE UPGRADE SECTION 9 OF 9
014	0	DRAINAGE UPGRADE SECTION 10 OF 10

MORETON BAY

REGIONAL COUNCIL

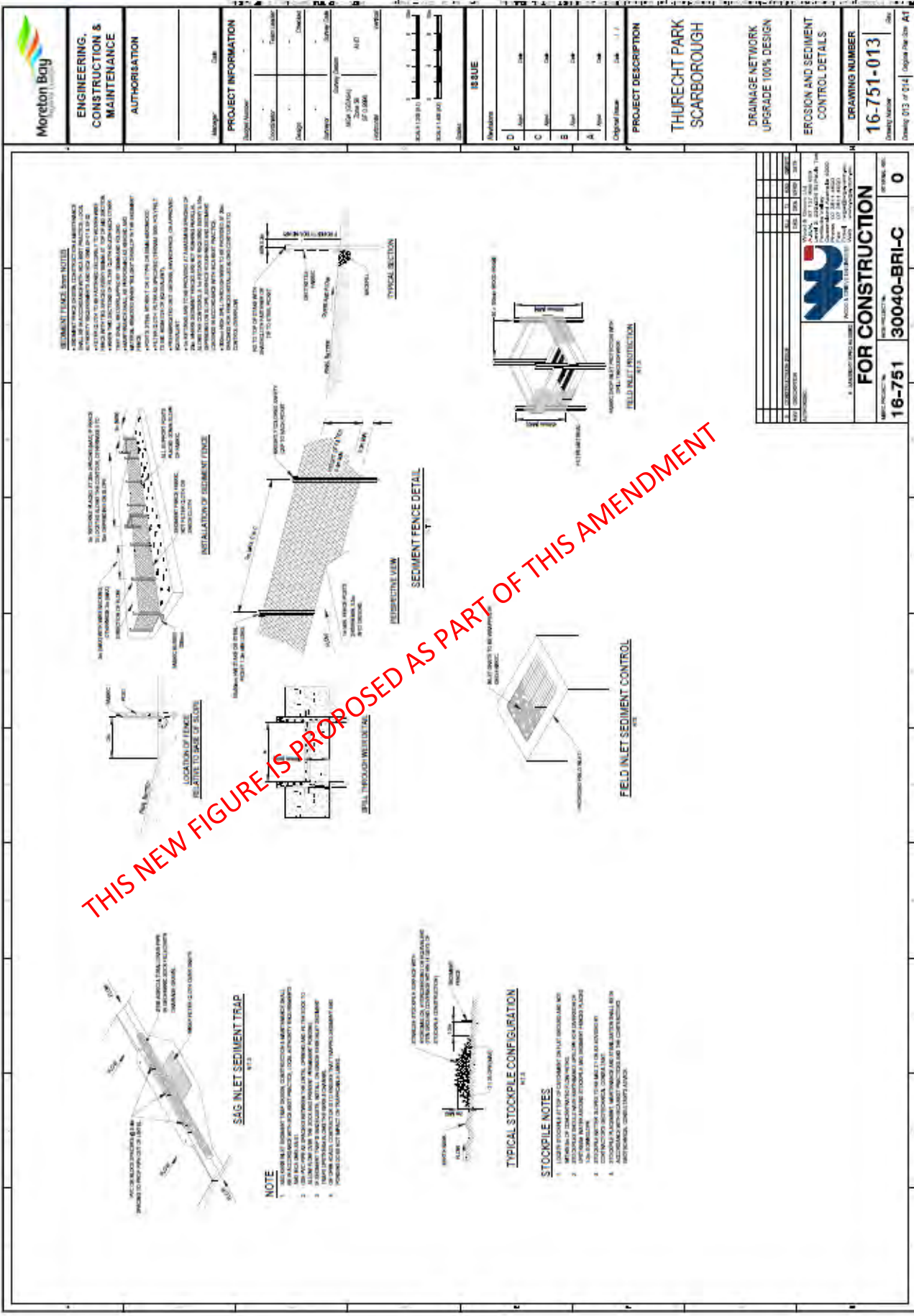




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DRAINAGE MASTER PLAN

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.

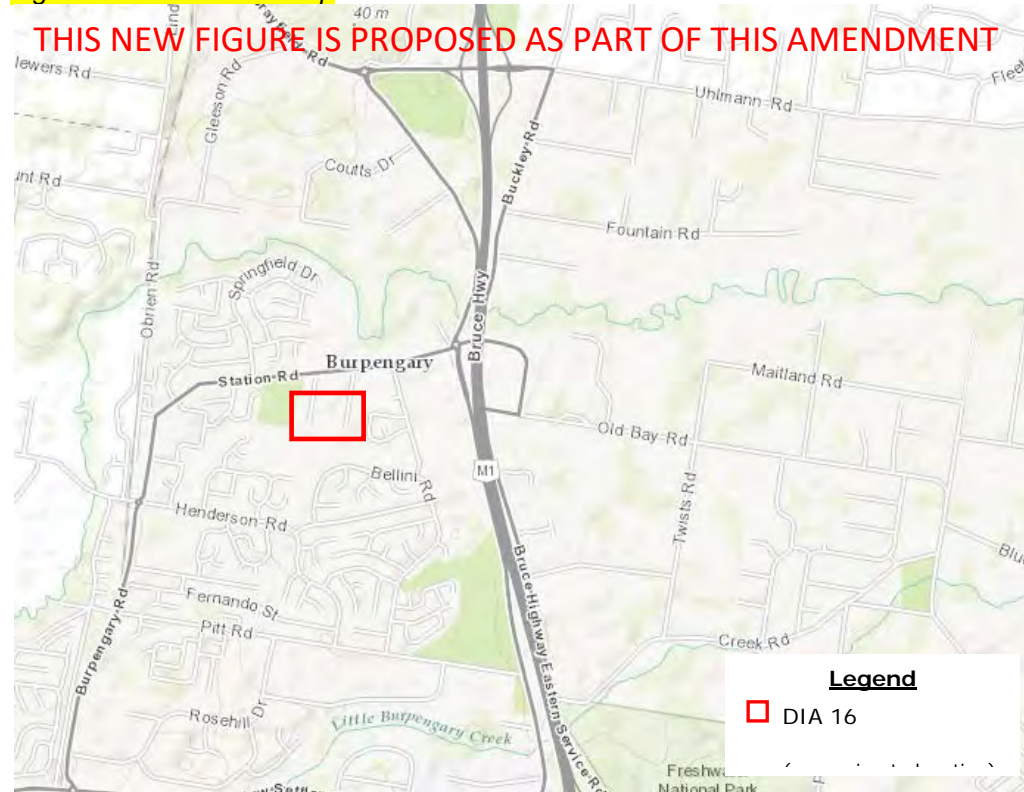
This DMP does not apply to development identified as exempt in Part 5.10.2 Categories of development and assessment - Flood hazard overlay

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 40,000m² 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

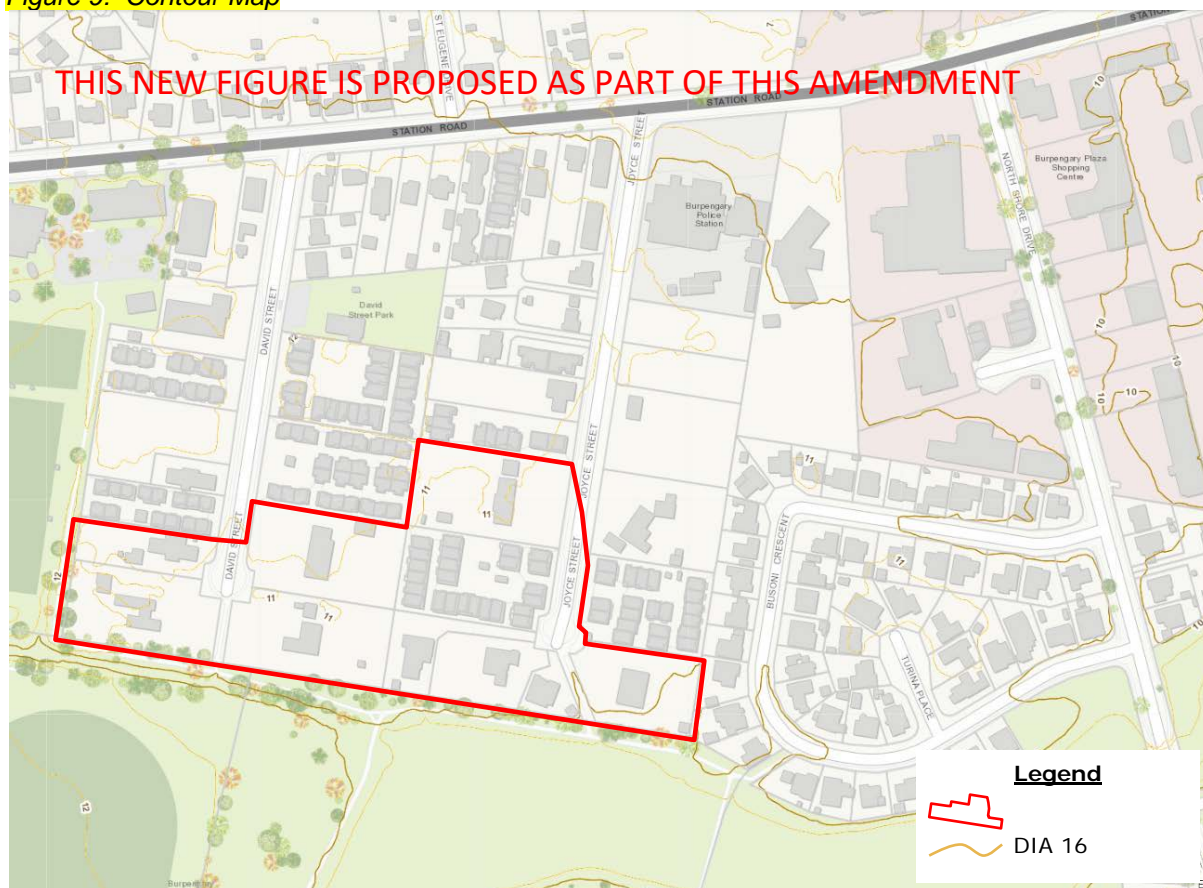


Source: MBRC Interactive Mapping, 2016

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)

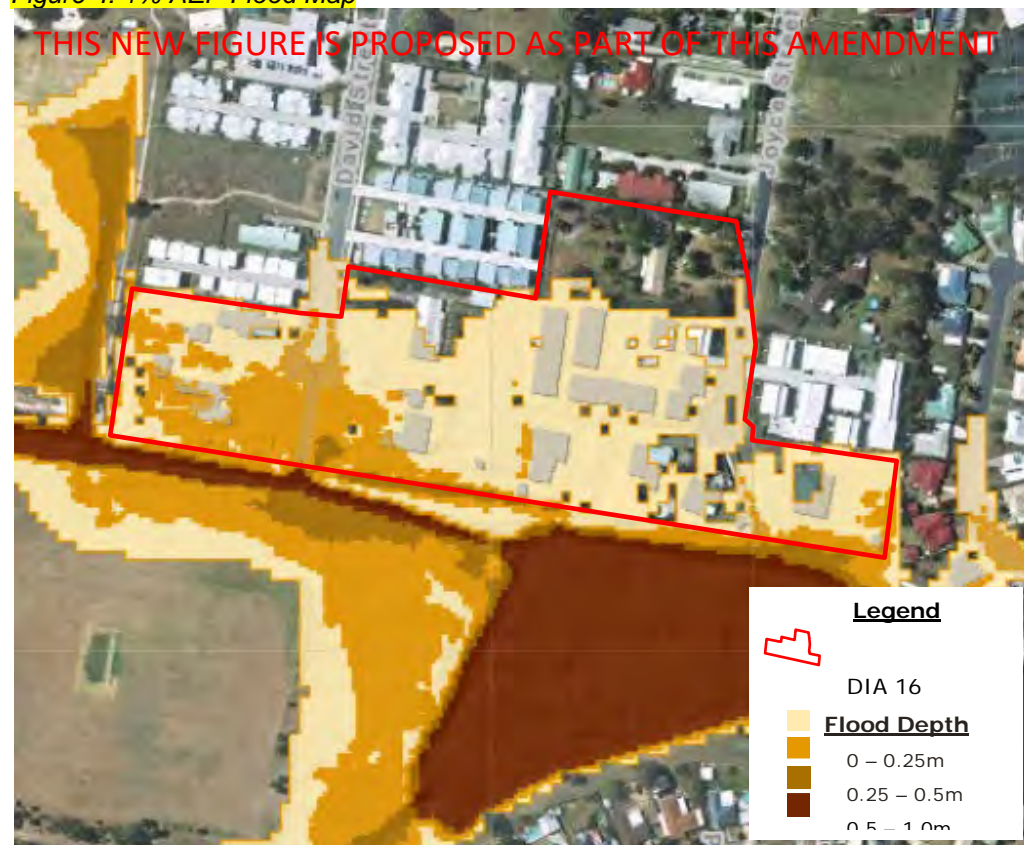
2.2 Summary of Flood Issues affecting the DIA

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

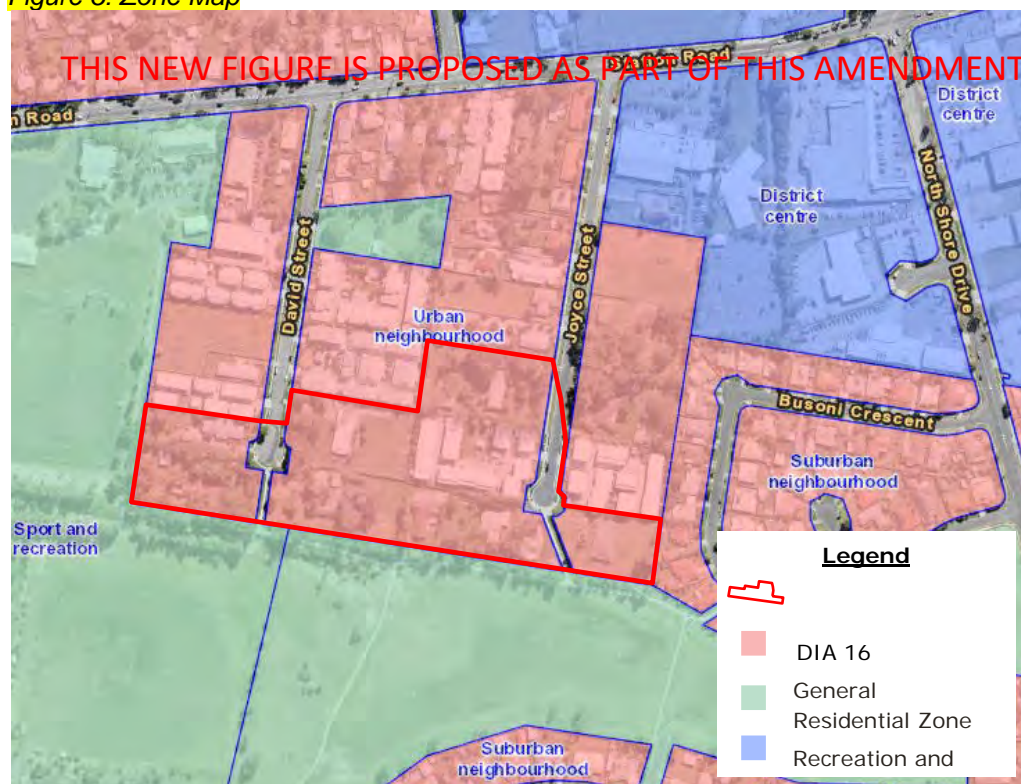
DIA 16 is entirely included in the Urban Neighbourhood Precinct of the General Residential Zone. Accordingly development outcomes expected by the DMP are those identified in the purpose and overall outcomes of the General Residential Zone Code. In summary this includes a diverse mix of residential uses 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	<p>The entire allotment/development site area and meeting the following:</p> <p>(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);</p> <p>(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</p> <p>(c) ensure no worsening of flood impacts to other properties beyond known flood impacts at the date of adoption of the planning scheme.</p>	<p>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:</p> <ul style="list-style-type: none"> 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	<p>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.</p> <p>Where filling occurs, other applicable code requirements apply in the MBRC Planning Scheme. This may include consideration of, but not limited to:</p> <ul style="list-style-type: none"> ▪ 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	<p>The entire allotment/development site area and meeting the following:</p> <p>(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);</p> <p>(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</p> <p>(c) ensure no worsening of flood impacts to other properties beyond known flood impacts at the date of adoption of the planning scheme.</p>	<p>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:</p> <ul style="list-style-type: none"> 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	<p>Filling is permitted and minimum fill levels are not regulated by the DMP for this aspect of development.</p> <p>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:</p> <ul style="list-style-type: none"> ▪ 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	<p>Filling is permitted and minimum fill levels are not regulated by the DMP for this aspect of development.</p> <p>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:</p> <ul style="list-style-type: none"> ▪ 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

THIS NEW FIGURE IS PROPOSED AS PART OF THIS AMENDMENT



DATE	DESCRIPTION	REVISION
001	CAD SHEET	D
002	STREET CLOSING PLAN	D
003	IMPROVED AND TREATMENT CONTROL (IMCUT PLAN)	B
004	SEWAGE AND WASTEWATER CONTROL DETAILS	B
005	EXISTING LAYOUT PLAN	C
006	SEWAGE LAYOUT PLAN	D
007	GENERAL LAYOUT PLAN	D
008	IMPROVED TREATMENT PLAN	C
009	DRAINAGE CHANNEL CONNECTION	D
010	DRAINAGE CHANNEL CROSS SECTION (1:10)	D
011	TREATMENT DRAINAGE (1:1000) SECTION (1:10)	D
012	DRAINAGE LAYOUT PLAN	D
013	DRAINAGE TREATMENT PLAN	D
014	LANDSCAPE PLAN	A

1. The first step in the process of developing a business plan is to conduct a thorough market research. This involves identifying the target market, understanding their needs and preferences, and analyzing the competitive landscape. Market research can be conducted through various methods, including surveys, interviews, and focus groups. The goal is to gather valuable insights that will inform the business strategy and help identify potential opportunities and challenges.

2. Once the market research is complete, the next step is to define the business goals and objectives. These should be specific, measurable, achievable, relevant, and time-bound (SMART). For example, a goal might be to increase sales by 10% within the next six months. Objectives should be derived from these goals and provide a clear path to achieving them. This step is crucial as it sets the direction for the entire business plan and provides a benchmark for measuring success.

3. The third step is to develop a marketing strategy. This involves determining the most effective ways to reach the target market and promote the business. Key elements of a marketing strategy include identifying the marketing mix (product, price, place, and promotion), selecting the appropriate marketing channels, and allocating resources effectively. A well-defined marketing strategy is essential for attracting customers and driving sales growth.

4. The fourth step is to create a financial plan. This involves estimating the costs of starting and operating the business, as well as projecting the revenue and profits. Key components of a financial plan include a detailed budget, a cash flow statement, and a break-even analysis. The financial plan provides a clear picture of the business's financial health and helps to identify potential funding requirements. It is a critical tool for securing investment and managing the business's finances effectively.

5. The final step in the process is to write the business plan itself. This is a comprehensive document that outlines all the information gathered in the previous steps. It typically includes an executive summary, a description of the business, a market analysis, a marketing strategy, a financial plan, and a conclusion. The business plan serves as a roadmap for the business and is a key document for communicating the business's vision and strategy to stakeholders. It is a living document that should be reviewed and updated regularly as the business evolves.

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**MORETON BAY
REGIONAL COUNCIL**

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