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Civil Engineering and Flood Impact Assessment Report

Uniting Edinglassie Village ILU

Prepared for Uniting / 19 February 2024

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Contents

1.0 Introduction

TTW has been engaged by Uniting to provide the associated civil engineering design and documentation for the proposed Development Application of the Uniting Edinglassie Independent Living Units development.

This report aims to outline the existing stormwater management and infrastructure present within the development site and detail any augmentation to these assets required for the proposed development.

1.1 Background

Uniting is responsible for the Uniting Church's ministry for older people, particularly those who are disadvantaged, vulnerable and isolated.

Uniting operates more than 200 aged care services, with more than 14,000 clients in residential and community care programs and employs over 3,500 full time equivalent staff across NSW/ACT. Uniting is the single largest provider of aged care services in NSW and the ACT.

The Edinglassie Village site has been identified by Uniting as in need of redevelopment.

A 73-bed nursing home and a 53-bed hostel have made way for the recently constructed 100 bed residential aged care facility and carparking, whilst existing 45 independent living units (ILUs) remain.

A local heritage listed sandstone chapel is located mid-way along the Emerald Street boundary.

Number 6 and 8 Troy Street are single storey residences located on the Western side of the site, to be incorporated into the redevelopment.

The site is relatively flat but does fall gently towards the south and west and is listed as flood affected on Council's maps, effected mainly by flood waters from the north and east.

There are several substantial and highly valued trees scattered across the site, primarily along the highway frontage.

1.2 Development Site

The proposed development site is located within Edinglassie Village, located at 1-3 Emerald Street, 6 Troy Street, and 8 Troy Street, Emu Plains within Penrith City Council's Local Government Area. The location of the site is shown in Figure 1.1.

Figure 1.1:Site Location

1.3 Key Issues

This civil stormwater report and accompanying documentation will investigate several key issues as listed below:

- Maintain the overland flow paths through the site without imposing any risk of flooding to adjacent properties during the 1% Annual Exceedance Probability (AEP) storm event.
- Ensuring flood planning levels are met for the 1% AEP flood level within the site.
- Outline any proposed modifications to the existing stormwater pipe and pit structures and review effects to the hydraulic performance, if any.
- A stormwater management plan to suit the proposed arrangement.

1.4 Relevant Documents

Below is a list of relevant design and planning guidelines used to prepare this report:

- Penrith Development Control Plan 2014
- Penrith Local Environmental Plan 2010
- Penrith City Council - Engineering Construction Specification for Civil Works
- Penrith City Council - Stormwater Drainage Specification for Building Developments
- Australian Rainfall and Runoff 2016
- NSW Department of Housing Managing Urban Stormwater

2.0 Proposed Development

The existing 45 ILUs are in the southeastern and northwestern portions of the site and were constructed in the 1970s as villa style developments. Their design and features are out of step with contemporary demand and requiring increasing levels of maintenance to keep them to a serviceable condition. For these reasons, the proposal is to demolish and replace them with a more contemporary design and greater product mix that make greater use of the valuable site and provides Uniting an opportunity to accommodate and assist more residents in the Emu Plains area.

The proposed redevelopment will provide 147 ILUs with a unique identity and character that not only underpins all aspects of design and reflects the Uniting values, but also reflects upon Emu Plains as an established suburb in the west of Sydney.

The civil works involved include the installation of a new in-ground pit and pipe system, the provision of flood storage and stormwater quality measures. Refer to the civil engineering drawings in Appendix A for the schematic civil engineering plans.

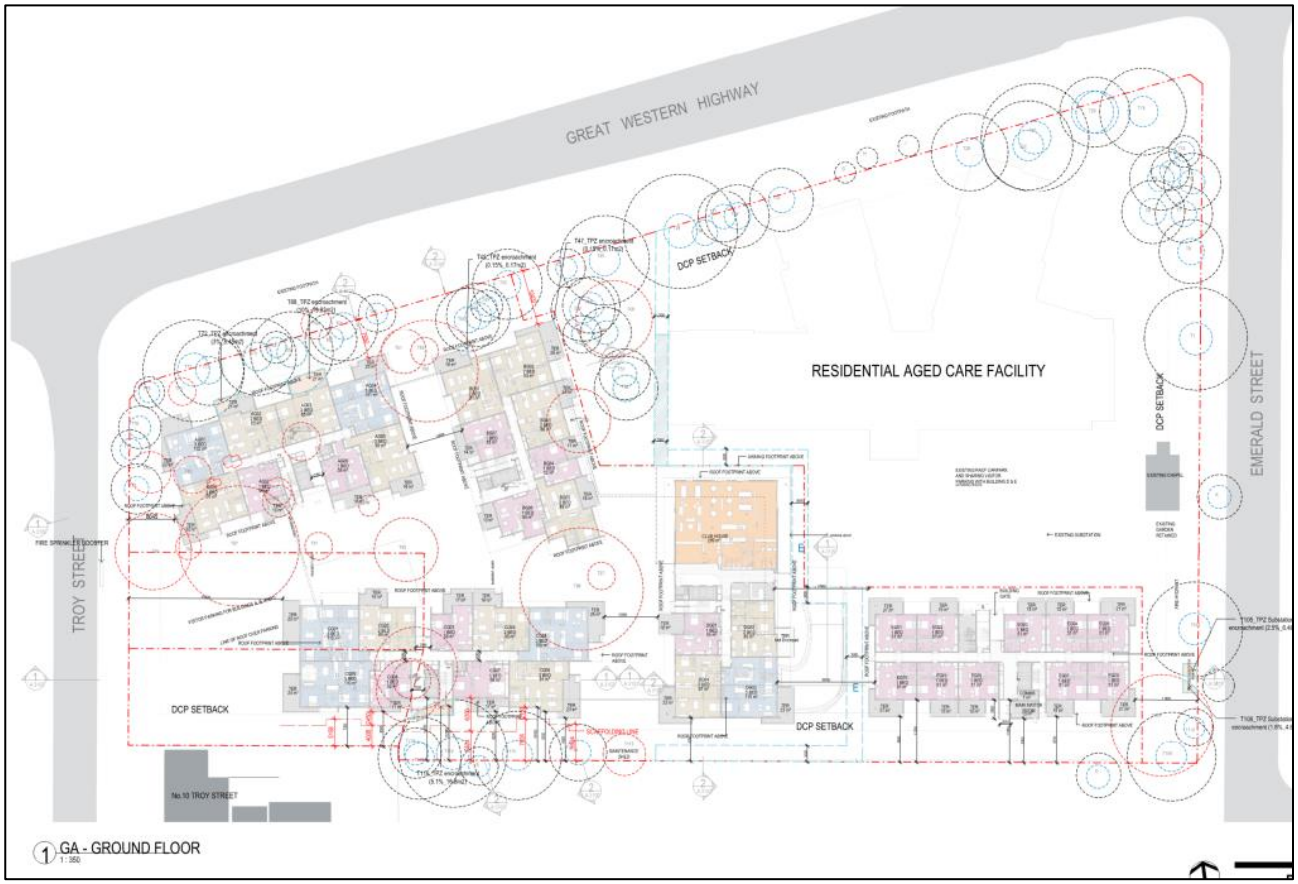


Figure 2.1: Architectural Ground Floor Plan (Source: Drawing A 2001 Rev H prepared by Group GSA dated 25/09/22)

3.0 Stormwater Design

3.1 On-Site Stormwater Detention

Penrith City Council requires that development within the mandatory on-site stormwater detention (OSD) catchments maintain existing site discharge rates for all events up to and including the 1 in 100-year ARI storm event. If the post development flow exceeds the existing site discharge rates, then that site will need to have an OSD to alleviate flowrates.

The site is not identified as being located within a mandatory on-site stormwater detention, however pre lodgement advice from Penrith City Council has identified that OSD may be required should the stormwater flows post development exceed the capacity of the existing system.

The site area is equal to approximately 1.3 hectares with impervious areas comprising 78% of the existing site. Post development this decreases to 57% of the total site representing a reduction in impervious area of 21%. As a result of the reduced impervious area, stormwater flow from the site is expected to decrease post development (refer to Table 3.1).

Table 3.1: Pre and Post Development Flowrates

Rainfall Event (AEP %)	Pre-Development Flow (L/s)	Post-Development Flow (L/s)
1%	848	847
5%	606	584
10%	516	493
20%	410	375

This reduced stormwater flow has been modelled in DRAINS to determine the downstream stormwater network has sufficient capacity. The site proposes to maintain existing drainage catchments and therefore will not exceed the downstream capacity of the system and does not require OSD.

3.2 DRAINS Modelling

The inground site stormwater network has been modelled using DRAINS modelling software applying Australian Rainfall and Runoff 2019 procedures with blockage factors applied as outlined in the Penrith City Council Stormwater Drainage Specification for Building Developments.

Table 1 Theoretical Capacity of Pit

Pit Condition	Pit Inlet type	Percentage of Theoretical Capacity Allowed
Sag	Side entry	80%
Sag	Grated	50%
Sag	Combination	Side inlet capacity only. Assume grate is completely blocked.
Sag	Letterbox	50%
Continuous Grade	Side entry	80%
Continuous Grade	Grated	50%
Continuous Grade	Combination	90%

Figure 3.1 - Blockage factors from Penrith City Council - Stormwater Drainage Specification for Building Developments

The detailed pit and pipe network is subject to future confirmation from the hydraulic engineer regarding downpipe locations. This will be further developed during detailed design. The current network is based on flood modelling requirements and indicative low points.

Capacity of the Council stormwater system has been modelled at the request of Council to ensure stormwater discharge flows from site do not inundate the downstream stormwater network. Information regarding the Council system has been obtained using the survey of site and surrounding road network performed as part of the proposed development design as well as the schematic utilised in the flood mapping prepared for Council. Inflow from the existing Council drainage pipe on Great Western Highway has been incorporated from the detailed flood model (further details in Section 4.0). During major storm events the surrounding road networks of Troy Street, Great Western Highway, and Emerald Street are inundated by floodwaters.

A DRAINS model incorporating the surrounding Council network and demonstrating capacity is maintained for the 20%AEP minor design storm has been submitted to Council for review.

3.3 Water Quality

Penrith City Council Development Control Plan requires all new developments to install permanent stormwater pollution controls. Penrith City Council DCP provides specific pollutant reduction targets for new developments. The targets are listed in Figure 3.2.

a) Pollution load reductions:
   i) 90% reduction in the post development mean annual load total gross pollutant (greater than 5mm);
   ii) 85% reduction in the post development mean annual load of Total Suspended Solids (TSS);
   iii) 60% reduction in the post development mean annual load of Total Phosphorus (TP);
   iv) 45% reduction in the post development mean annual load of Total Nitrogen (TN);
   v) 90% Free Oils and Grease with no visible discharge.

Figure 3.2 - Pollutant reduction targets for new developments (Penrith City Council)

The site has been modelled in MUSIC-6 (Model for Urban Stormwater Improvement Conceptualisation) using the Penrith City Council MUSIC-Link.

To meet the reduction targets, it is recommended that the following water quality devices are installed into the development:

- 9 x Pit filter baskets such as the Ocean Protect OceanGuard or equivalent to capture gross pollutants, suspended solids and attached pollutants; the filter basket would be located within surface inlet pits on site.
- Vegetated swales for water quality and stormwater conveyance provided within the soft landscaping areas of the development site.
- 18 x 690mm PSorb StormFilter media filtration cartridges by Ocean Protect or approved equivalent. Eighteen (18x) filters are proposed and will be treat silt-sized particles and a high percentage of phosphorus, nitrogen and hydrocarbons.

Provision of the 18x 690mm PSorb Stormfilter cartridges will be split between two separate StormFilter unit chambers. StormFilter chamber 1 will be located to the west of the site and house 8x cartridge units in an offline configuration as detailed in the Civil Engineering Drawings. StormFilter chamber 2 will be located to the north of the site and will consist of a prefabricated 3.25m Diameter manhole housing 10x cartridge units in an online configuration. Chamber plans, sections, and design levels has been provided in Civil Drawings C104, C120, and C121 located in Appendix A of this report. There is minor bypass of the two water quality chambers primarily associated with tree protection zones, existing grading at site boundaries, and the proposed easement on site as outlined in Section 3.4 of site.

The site will have two outlets, on the north boundary and the west boundary. The outlets will collect stormwater via OceanGuard baskets in stormwater pits, as well as through downpipes from the roof of buildings. Each storm filter chamber will require 8 x 690mm StormFilter cartridges for stormwater quality measures.

Refer to Figure 3.3 and Figure 3.4 for the relevant MUSIC results and model schematic demonstrating site compliance with Council water quality design parameters.

	Sources	Residual Load	% Reduction
Flow (ML/yr)	4.79	4.79	0
Total Suspended Solids (kg/yr)	437	52.7	88
Total Phosphorus (kg/yr)	1.01	0.323	68.1
Total Nitrogen (kg/yr)	10.4	5.71	45.1
Gross Pollutants (kg/yr)	140	0	100

Figure 3.3: MUSIC Results

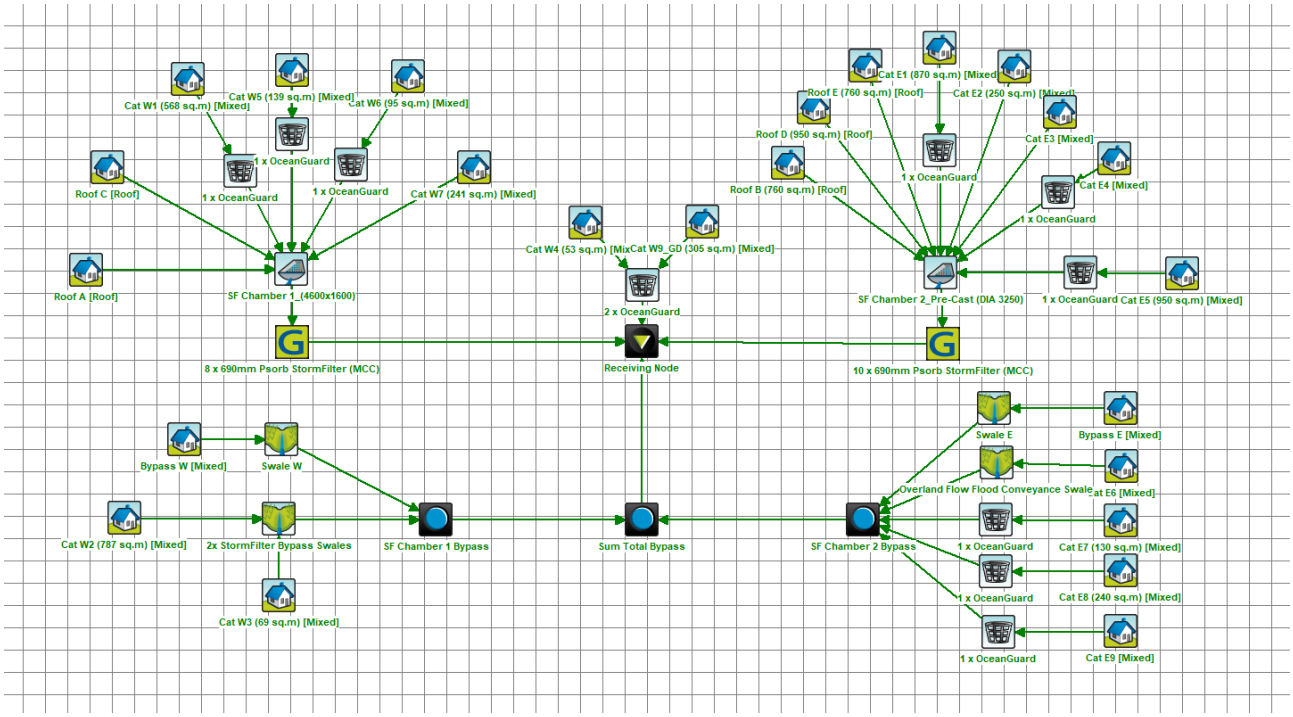


Figure 3.4: MUSIC Model

A MUSIC-link summary report has been prepared and included as Appendix B of this report.

3.4 Relocation of Existing Easement

The existing easement conveys water from the upstream school to the south to Great Western Highway to the north. As a result of the design modification to consolidate the basement, the existing easement which flows through the site from south to north is to be relocated. The new easement alignment (shown in blue) is to replace the existing easement alignment (shown in red) as seen in Figure 3.5. This easement requires one 600mm pipe and one culvert (1m wide x 450mm tall) in order to maintain stormwater flows from the neighbouring site to the south through to the Great Western Highway. Refer to the civil engineering drawings in Appendix A for more detail on easement realignment.

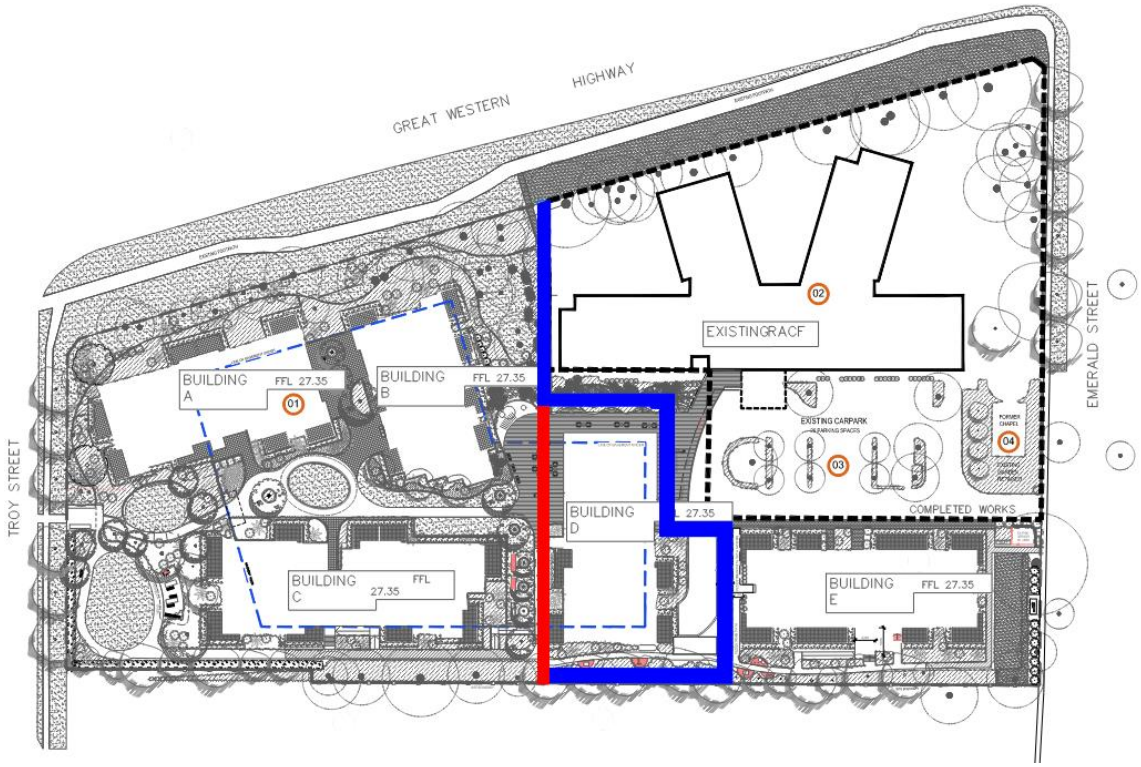


Figure 3.5: Existing vs. Proposed Easement

3.5 Stormwater During Construction

During the construction phase of the project, an erosion and sediment control plan will be implemented to prevent sediment laden stormwater from flowing into adjoining properties, bushland, roadways or receiving water bodies. Stormwater controls onsite are detailed in an Erosion and Sediment Control Plan and Landcom NSW's Managing Urban Stormwater, Soils and Construction ("Blue Book"). Refer to the civil engineering drawings in Appendix A.

4.0 Flood Impact Assessment

The following provides an assessment on flood conditions of the site and summarises the flood modelling results for both existing and proposed site conditions in the 1% Annual Exceedance Probability (AEP) event. A flood impact assessment was also carried out to investigate the potential flood impacts on neighbouring properties due to the proposed redevelopment.

4.1 Objectives and Methodology

The objective is to define the local flooding in accordance with the Floodplain Development Manual (NSW DIPNR 2005) and address the flood planning requirements of City of Penrith Development Control Plan (DCP), 2014 – C3 Water Management, with regards to the proposed redevelopment. It involved the following methodology:

- Obtain the latest hydraulic (TUFLOW) model from Council and refine the model within the site proximity using additional data and survey in order to determine the site existing flood characteristics for the 1% AEP event.
- Incorporate the site survey and proposed design and assess the site flood characteristics in proposed site conditions for the 1% AEP event.
- Prepare relevant flood maps including flood extents, depths, levels, velocities, hazards and impacts.
- Comment on flood characteristics and model outcomes in existing and proposed conditions.
- Carry out a compliance assessment to ensure compliance with the

4.2 Available Data

4.2.1 Previous Flood Studies

As part of the Residential Aged Care Facility development, TTW completed a flood assessment of the site in 2018. Since this previous study was completed, Penrith City Council has commissioned BMT to carry out an overland flow study for the region including Emu Plains, Emu Heights and Leonay suburbs and summarised the outcomes in Emu Plains Overland Flow Flood Study Report, 2020 (referred to as Council flood study, hereafter).

As part of the study, BMT has prepared a hydraulic flood model for the catchment which TTW obtained from Council (referred to as Council flood model, hereafter) and used as a basis to assess the flood conditions of the site in both predevelopment and post development conditions.

4.2.2 Survey Data

Survey information adopted for this study has been collated from the following sources:

- One metre resolution Digital Elevation Model (DEM), ALS.
- Site survey data completed by Vince Morgan Surveyors dated 26/05/23.
- Site civil design completed by TTW.

4.3 Hydraulic Model Structure

The Council's TUFLOW hydraulic model was used to determine flood extents, levels, depths, velocities and hydraulic hazard during the critical 1% AEP event for the site in the existing and proposed conditions.

The procedure completed to create the site flood model is described in the below steps:

- Refine the TUFLOW model by updating the model data and incorporating additional site-specific data.
- Determine flood extents, levels, depths, velocities and hydraulic hazard during the critical 1% AEP event for the site in existing conditions.
- Update the TUFLOW model to allow simulation of the proposed site conditions.
- Determine flood extents, levels, depths, velocities and hydraulic hazard during the critical 1% AEP event for the site in proposed conditions.
- Carry out an offsite impact assessment and prepare a flood impact map for the 1% AEP event.
- Comment on flood characteristics and model outcomes in existing and proposed conditions.
- Undertake a compliance assessment based on the flood planning requirements of Penrith City Council.

4.3.1 2D Model Domain

The model domain received from Council covers a large area of 13.7km^2 including the suburbs of Emu Plains, Emu Heights and Leonay. Hence, for the purpose of current flood assessment, the original 2D model domain was modified to an area of 39.4 ha including the site and is bounded to Russel Street to the west, Emerald Street to the east, Lucas Street to the south and Water Street to the north. TTW model domain is shown in Figure 4.1.

The received model from Council uses a 2m^2 grid cell size. The grid cell size of 2m squared is considered to be acceptable to appropriately represent the variations in topography and land use within the study area. It should be noted that TUFLOW samples elevation points at the cell centres, mid-sides and corners, therefore this cell size results in surface elevations being sampled every 1m.

4.3.2 Topography

The existing TUFLOW model surface was merged with the available site survey DTM triangles data to increase the accuracy of the existing model surface at the site proximity. The topographical surface from the survey includes the recently completed Residential Aged Care Facility as well as the latest development works near the eastern site boundary.

4.3.3 Building Footprints

The footprints of buildings within the model domain were defined with raised elevation cells to act as blockage and prevent the water to flow through. However, buildings onsite and nearby the site were defined by inactive cells. Building outlines of the existing buildings onsite as well as the nearby buildings were refined based on the site survey and aerial photographs.

4.3.4 1D Model Domain

The existing 1D network was retained inside the model, consistent with the Council's model. Pit blockages were also retained consistent with the Council's model.

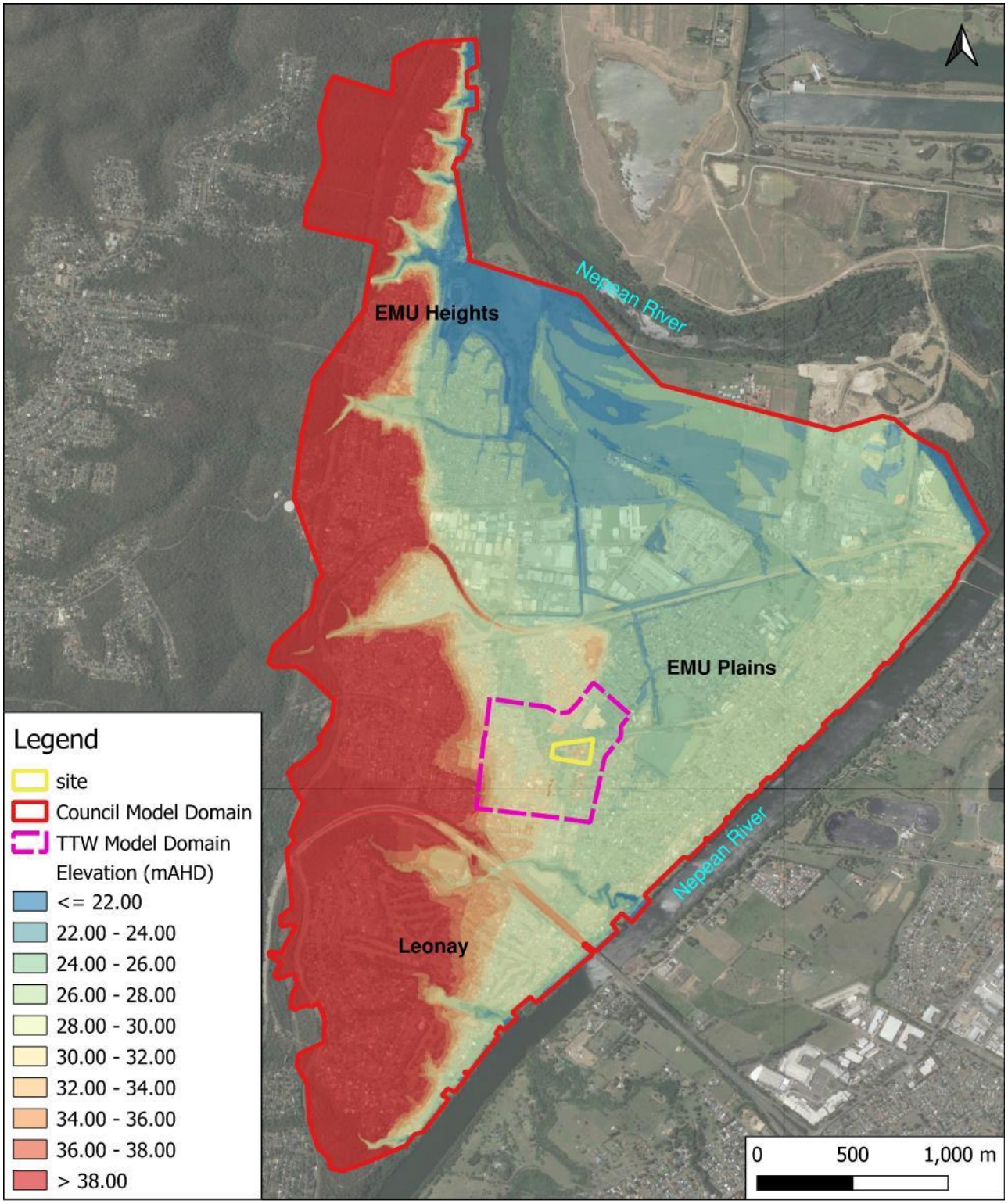


Figure 4.1: Comparison of TTW TUFLOW Model Domain with Council's Model Domain

4.3.5 Boundary Conditions

Inflow Boundaries:

The Council flood model defines catchment inflows through several Source – Area (SA) boundary conditions scattered across the 2D model domain. The application of SA boundary method is an effective and approved method to determine extents and gravity of flood affection across the flood affected areas of a catchment. However, the use of SA method might not be suitable for assessing the flood impacts of a proposed development. The reasons being:

- The subject site is not affected by riverine flood flows in the 1% AEP event. Rather, the flood affection of the site is predominantly due to local overland flows through the eastern and southern site boundaries.
- SA boundaries apply the flow directly onto the cells within the polygon as a source. Therefore, the model would not simulate the run-off routing of the local overland flows throughout the model domain.
- As per SA boundary definition, the flow is directed to the lowest model cells based on the model surface elevations. If more cells become wet, the total flow is redistributed over the wet cells in the following model step. Therefore, distribution of the model inflow is dependent on the surface elevations.
- The later means that any changes to the existing model surface (i.e., applying the proposed site surface elevations in order to simulate the proposed site conditions) would result in redistribution of inflows within the model. Therefore, flood results for the existing & proposed site conditions are incomparable.

To address this concern, the model was reconstructed using direct rainfall methodology which allows runoff to be generated over the entire model domain, rather than the more traditional approach of calculating an inflow hydrograph and lumping it in at an assumed location.

By implementing the direct rainfall method, the rainfall inflow is directly applied to the 2D terrain, and the hydraulic model automatically routes the flow as determined by the elevation and roughness grids and any included hydraulic structures.

Additionally, upstream model inflows were extracted from Council's model (using PO lines) and applied to the upstream of TTW model domain as inflow hydrographs.

Outflow Boundaries:

Stage-discharge (water level versus flowrate) curves were adopted as the downstream boundary conditions for all locations where floodwaters leave the 2D domain. The stage-discharge relationships were generated by TUFLOW though specifying downstream boundary slopes.

TTW model boundaries are shown in Figure 4.2 overleaf.

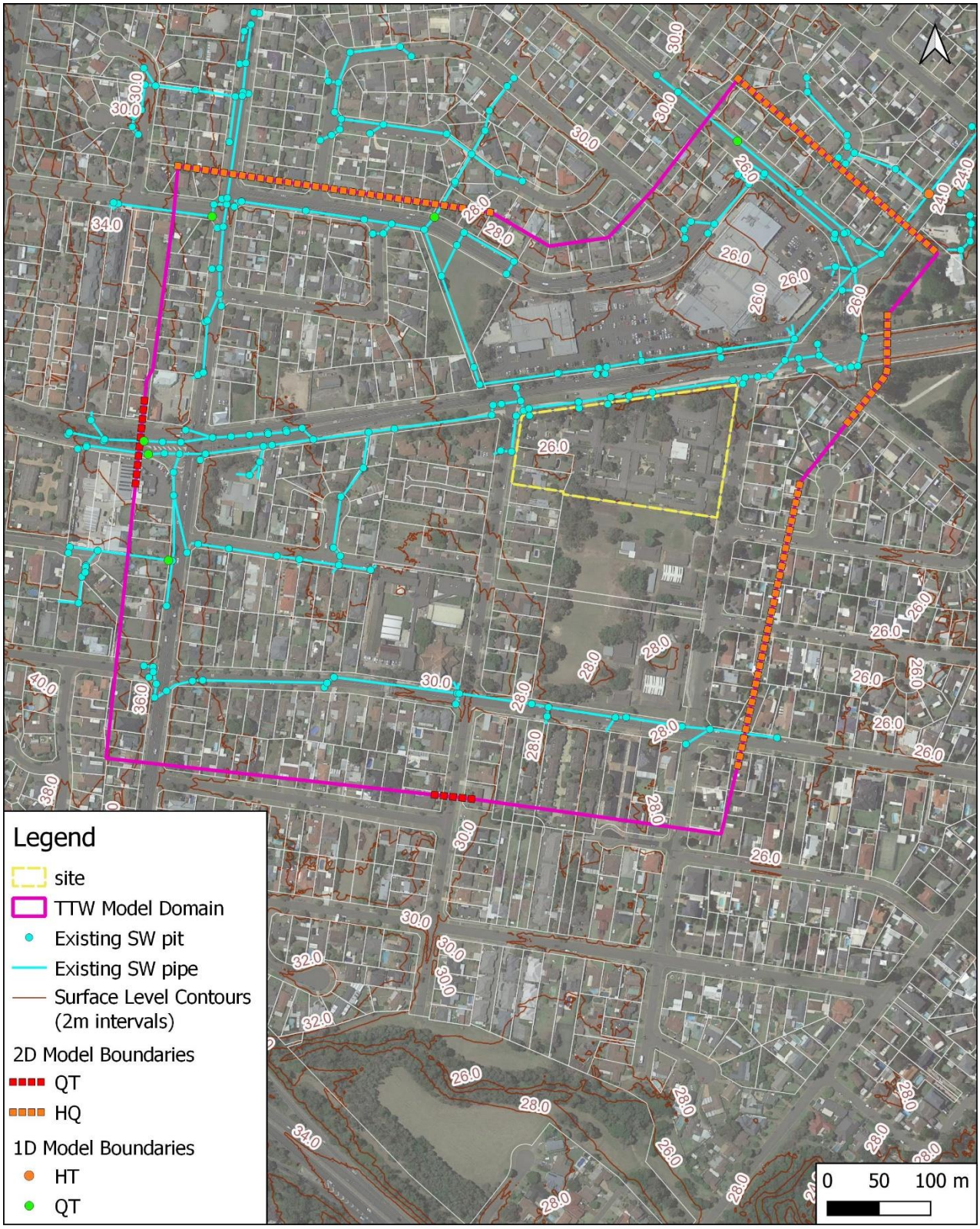


Figure 4.2: TTW TUFLOW Model Boundaries

Impact of Nepean River Flooding on the site:

According to Nepean River Flood Study (Advisian, 2018) the site location is situated within the Flood Planning Area (FPA) of the 1%AEP Nepean River floodwater + 500mm freeboard as shown in Figure 4.3 below. However, the flood planning area is heavily associated with the site boundary with the surrounding road networks, particularly it's frontage with the Great Western Highway and therefore the majority of the internal site area falls outside of the flood planning area as demonstrated in the figure below. Regardless, compliance with Council's minimum FFL of the 1%AEP + 500mm freeboard has been adopted for all habitable structures in accordance with the DCP.

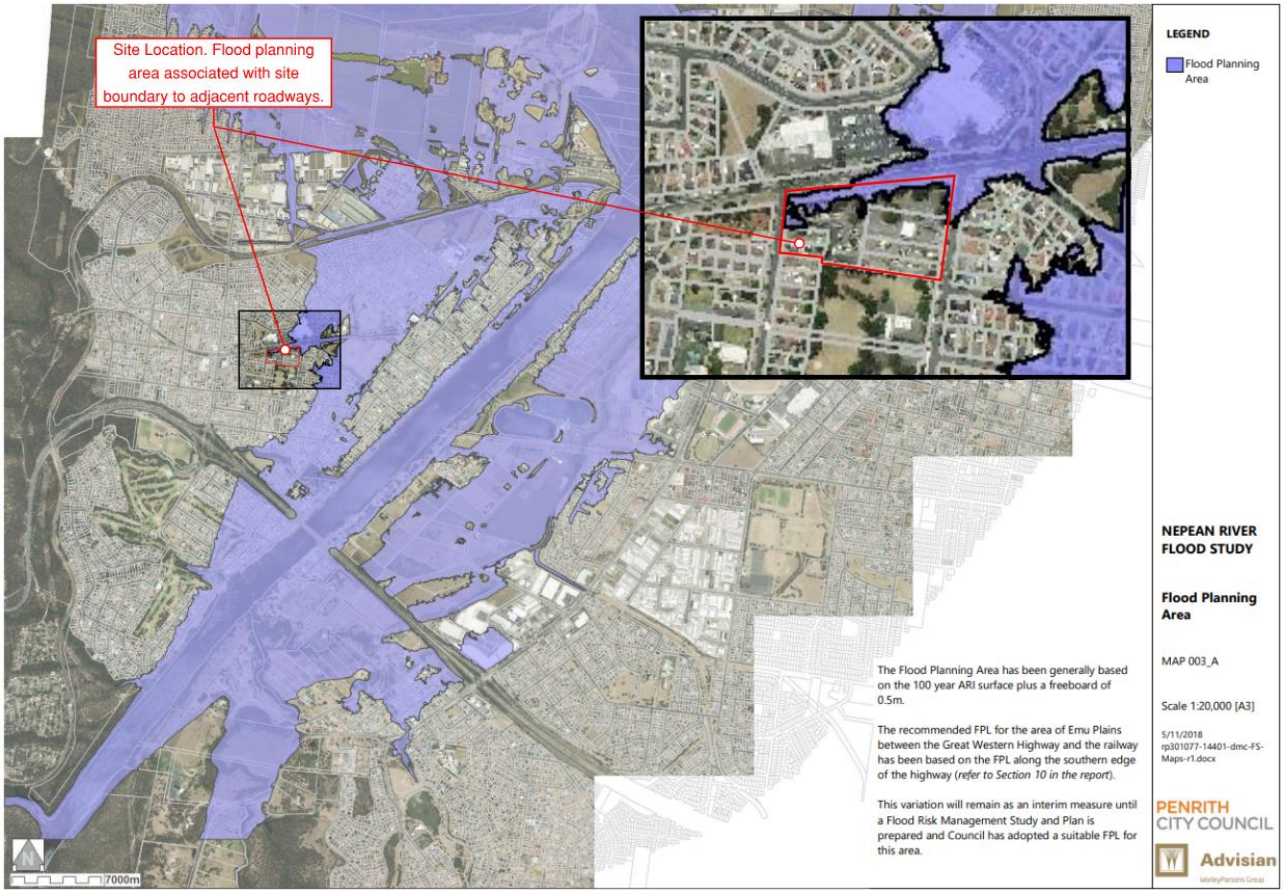


Figure 4.3: Flood Planning Area – Extract from Nepean River Flood Study (Advisian, 2018)

BMT has also conducted a series of sensitivity assessments to determine the impact of Nepean River mainstream on the local catchment flood conditions. The results of the sensitivity assessment demonstrate that the site is not impacted by tailwater levels of Nepean River during the 1% AEP flood event when 1% AEP flood event of the local catchment coincides with the 1% AEP riverine flood event as shown in Figure 4.4.

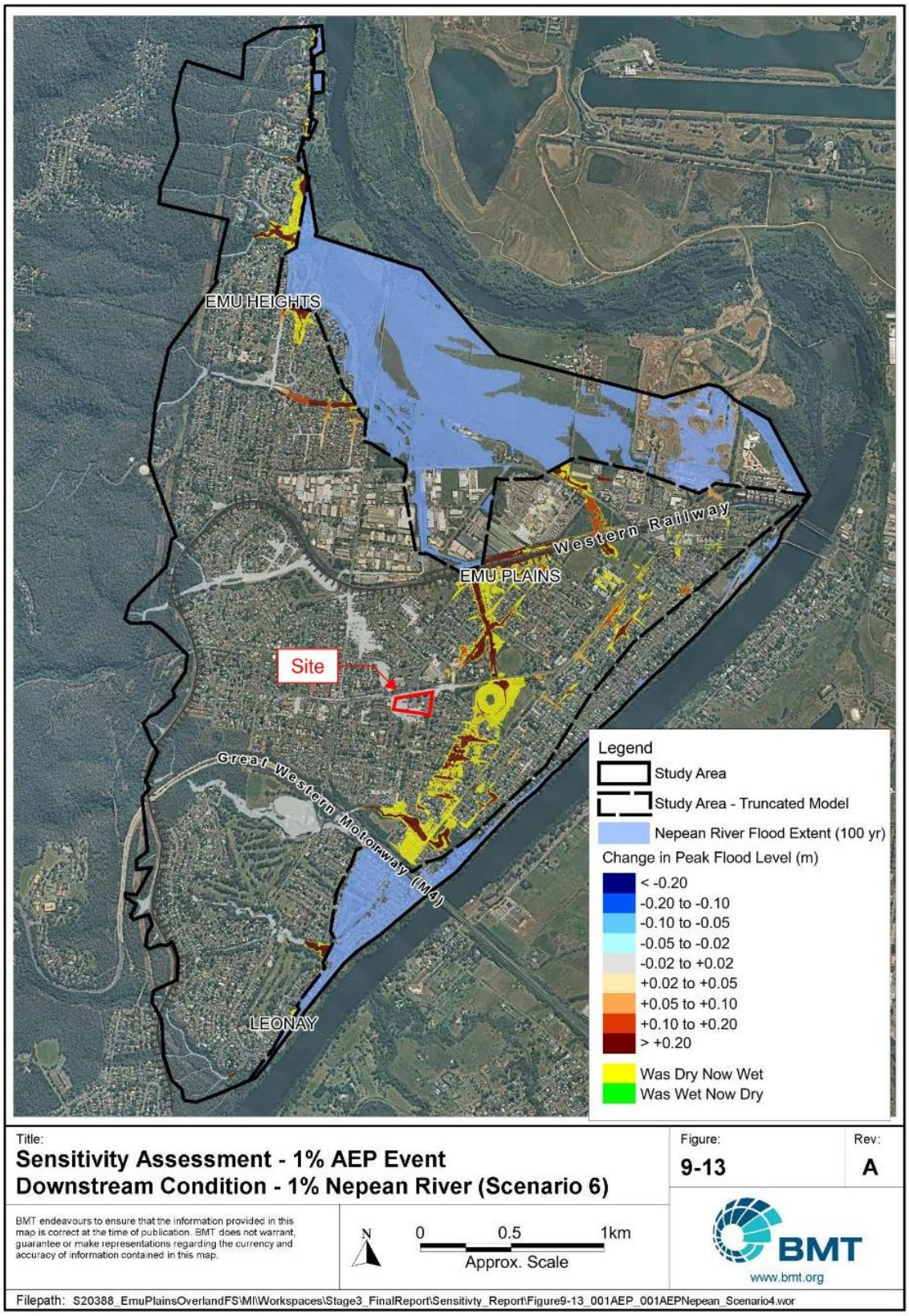


Figure 4.4: Impact of Nepean River 1% AEP flood on the site

4.3.6 Hydraulic Roughness and Rainfall Losses

The hydraulic roughness of a material is an estimate of the resistance to flow and energy loss due to friction between a surface and the flowing water. A higher hydraulic roughness indicates more resistance to the flow. Roughness in TUFLOW is modelled using the Manning's (n) roughness co-efficient.

Land use regions and Manning's coefficients were retained consistent with the Council's model data. However, Manning's coefficient for buildings was updated to suite the direct rainfall methodology. Adopted Manning's coefficients for each land use category are summarised in Table 4.1 below.

Table 4.1: Roughness (Manning's) Coefficients

Land use category	Manning's (n)	IL (mm)	CL (mm/hr)
Open Areas	0.035	10.0	0.0
Car Parks	0.020	1.0	0.0
Roads & paved areas	0.020	1.0	0.0
Residential Lots	0.040	5.0	2.5
Buildings	If depth ≤ 0.3m then n = 0.020 If depth ≥ 0.1m then n = 3.000 Otherwise interpolate for n	1.0	0.0

4.3.7 Critical 1% AEP Storm Duration

As part of the EMU Plains Overland Study (2020), BMT has investigated the catchment peak flood levels under various flood durations and determined the associated critical flood durations across the catchment. Based on the provided critical duration map (shown in Figure 4.5), the critical storm duration that produces highest flood levels at the site location during the 1% AEP event is 60 minutes.

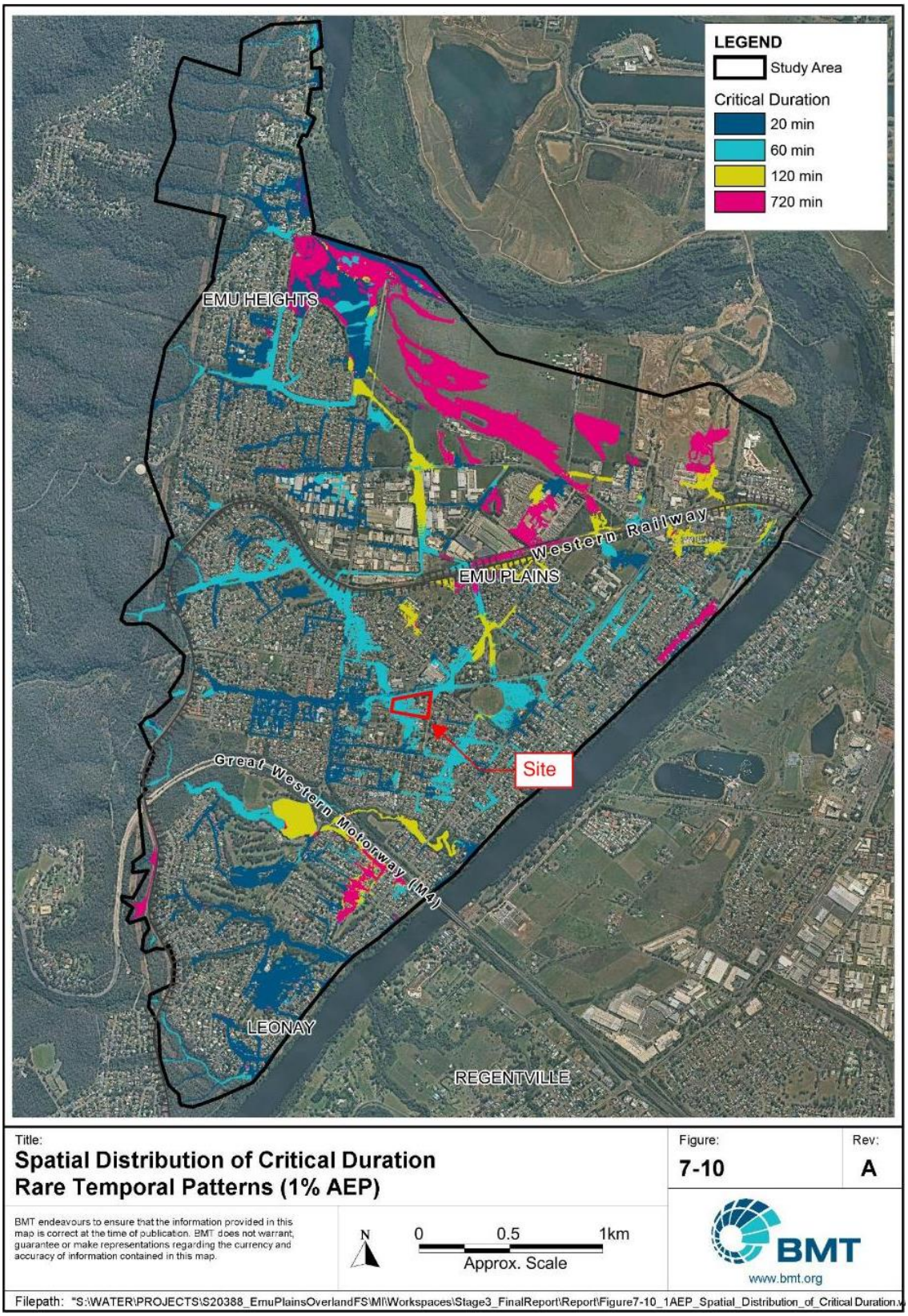


Figure 4.5: Spatial Distribution of Critical 1% AEP Storm Duration (BMT,2020)

4.3.8 Model Validation

The TTW model (as explained in Section 4.3.1 to Section 4.3.5) was run for the 1% AEP (60 minutes) event under the existing site conditions and then results were compared to those of Council's model.

Comparison of the flood model results confirm that the TTW flood model results are generally consistent with Council model results and minor differences are typically due to implementation of direct rainfall methodology (as opposed to SA inflows) and incorporation of site survey data. Flood level comparison for the 1% AEP (60 minutes) event is depicted in Figure 4.6.

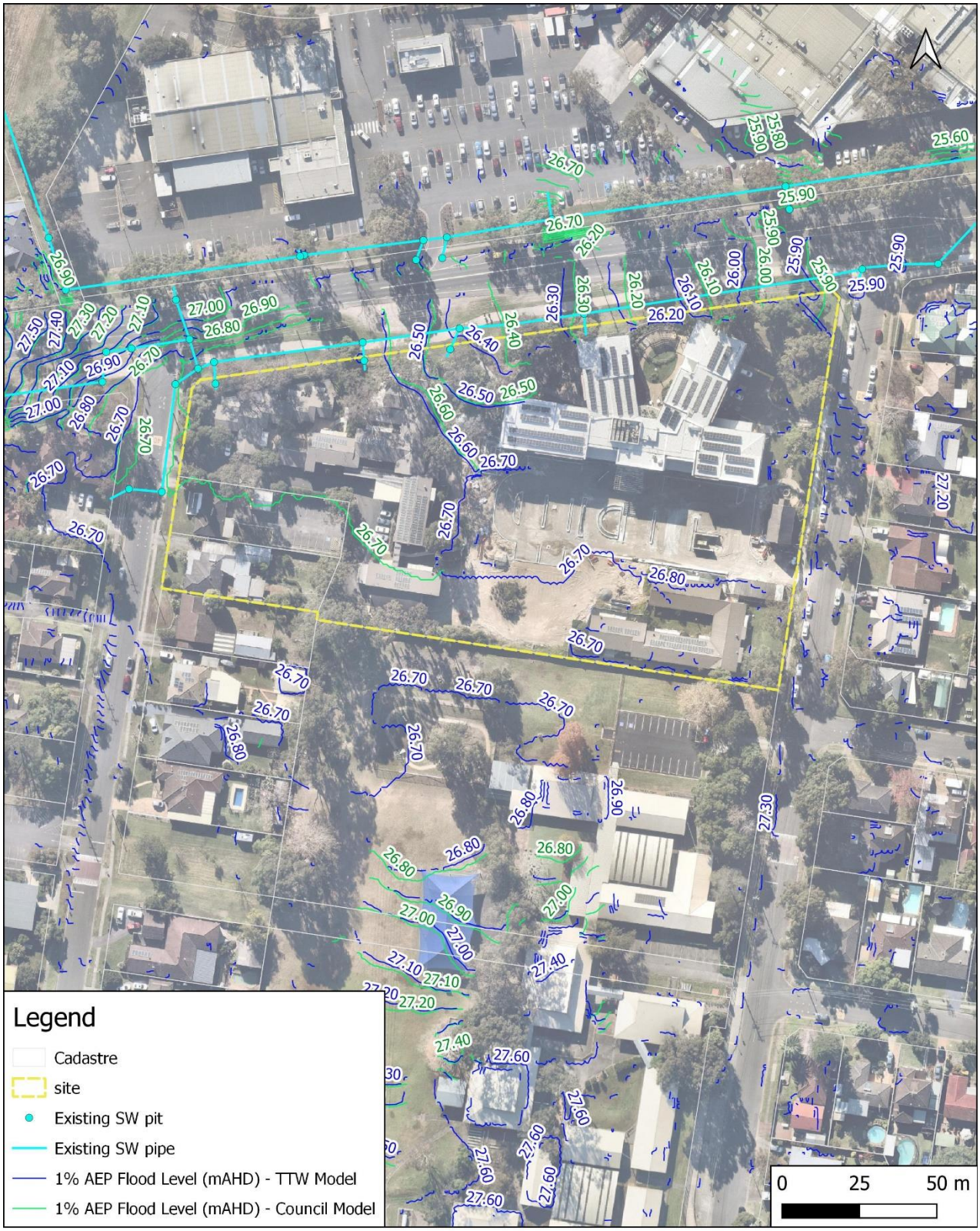


Figure 4.6: Flood Level Comparison for 1% AEP Event (TTW Tuflow model versus Council Model)

4.4 Flood Model Results

The behaviour of the overland floodwaters across the site and in the vicinity of the site during the critical 1% AEP event for the existing and proposed site conditions are described in general terms, and offsite flood impacts due to the proposed development are investigated.

4.4.1 Flood Mechanism

The site is considered a local flood storage and predominantly affected by overland flows of the Great Western Highway as well as overland flows of Forbes Street.

Overland Flows from Great Western Highway:

- Overland flows of the walker Street catchment accumulate at a low point in Brougham Street and overtop onto Great western Highway.
- Overflows continue running east over Great western Highway up to the intersection of Great Western Highway and Russell Street where partially flow north through Russel Street as well as continue to flow east through Great Western Highway toward the site.
- The portion of overland flows that run east over Great Western Highway then merge with flows from MacKay Street at a point to the west of intersection of Great Western Highway and Troy Street before running towards a sag point in Troy Street near the western site boundary.
- Floodwaters over the Troy Street sag point reach up to a level of 26.82m AHD during the 1% AEP flood event and overtop onto the site.

Overland Flows from Forbes Street:

- Overland flows of Forbes Street accumulate over an existing sag point up a level of 27.60m AHD before overtopping onto the EMU Plains Public School and run toward the site.

4.4.2 Existing Conditions

The peak flood levels depths, velocities and hazards in the critical duration 1%AEP event for existing site conditions are shown in Figure 4.7 , Figure 4.8 and Figure 4.9 respectively. Flood results indicate that:

- Site is partially flood affected during the 1% AEP event by overland flows arriving to the site through its western and southern boundaries.
- Floodwaters accumulate across a trapped - low area at southwestern site boundary where flood depths become as deep as 0.95m.
- Flow velocities are typically low across the site (<0.2 m/s) except for designated areas near the western and northern site boundaries as well as across the existing easement traversing the site from southern boundary to northern boundary.
- Flood hazards are generally low across the site except for the trapped - low area at southwestern site boundary with intermediate flood hazards.

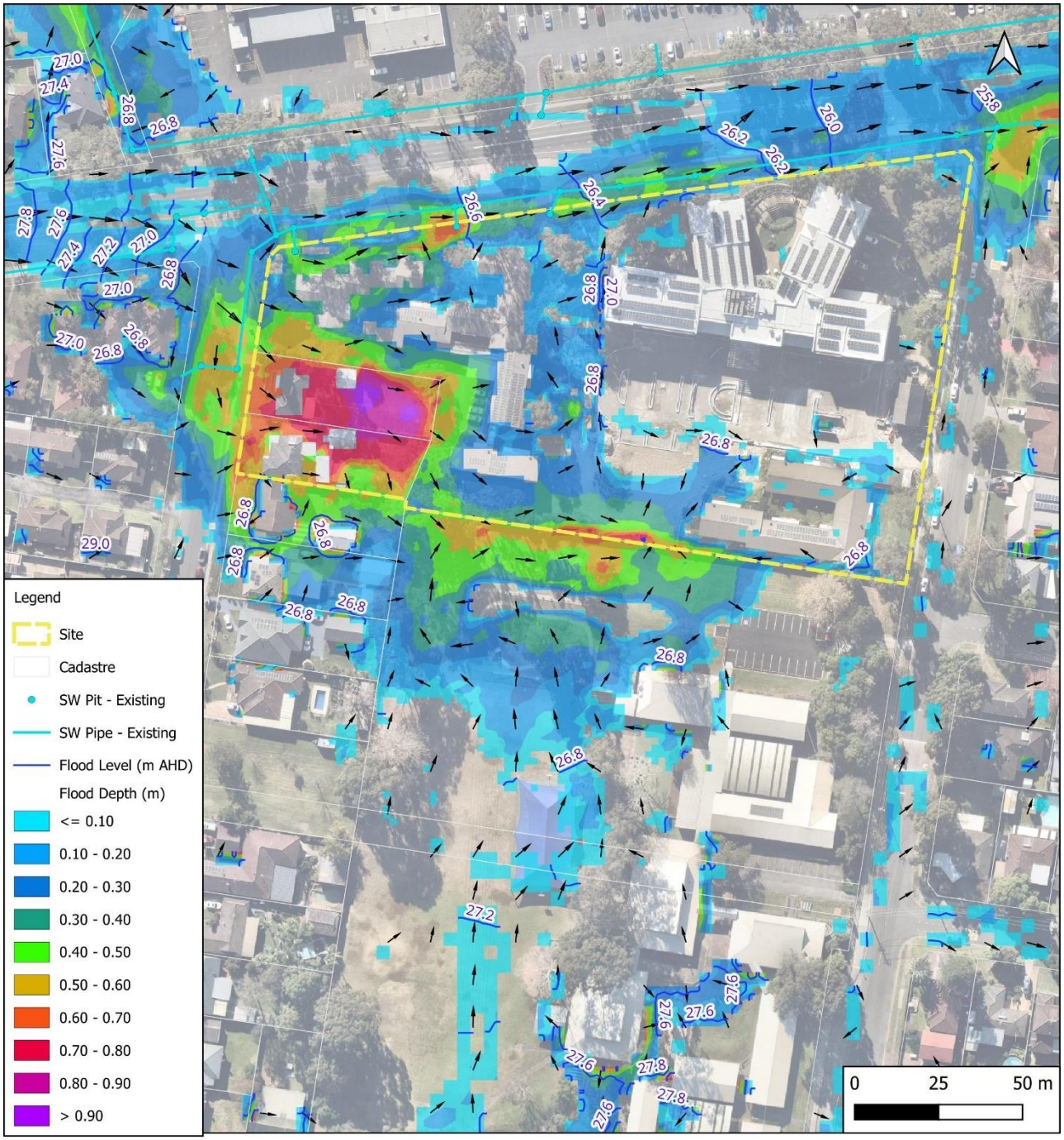


Figure 4.7: Flood Depths & Levels - 1% AEP Flood Event- Existing Conditions

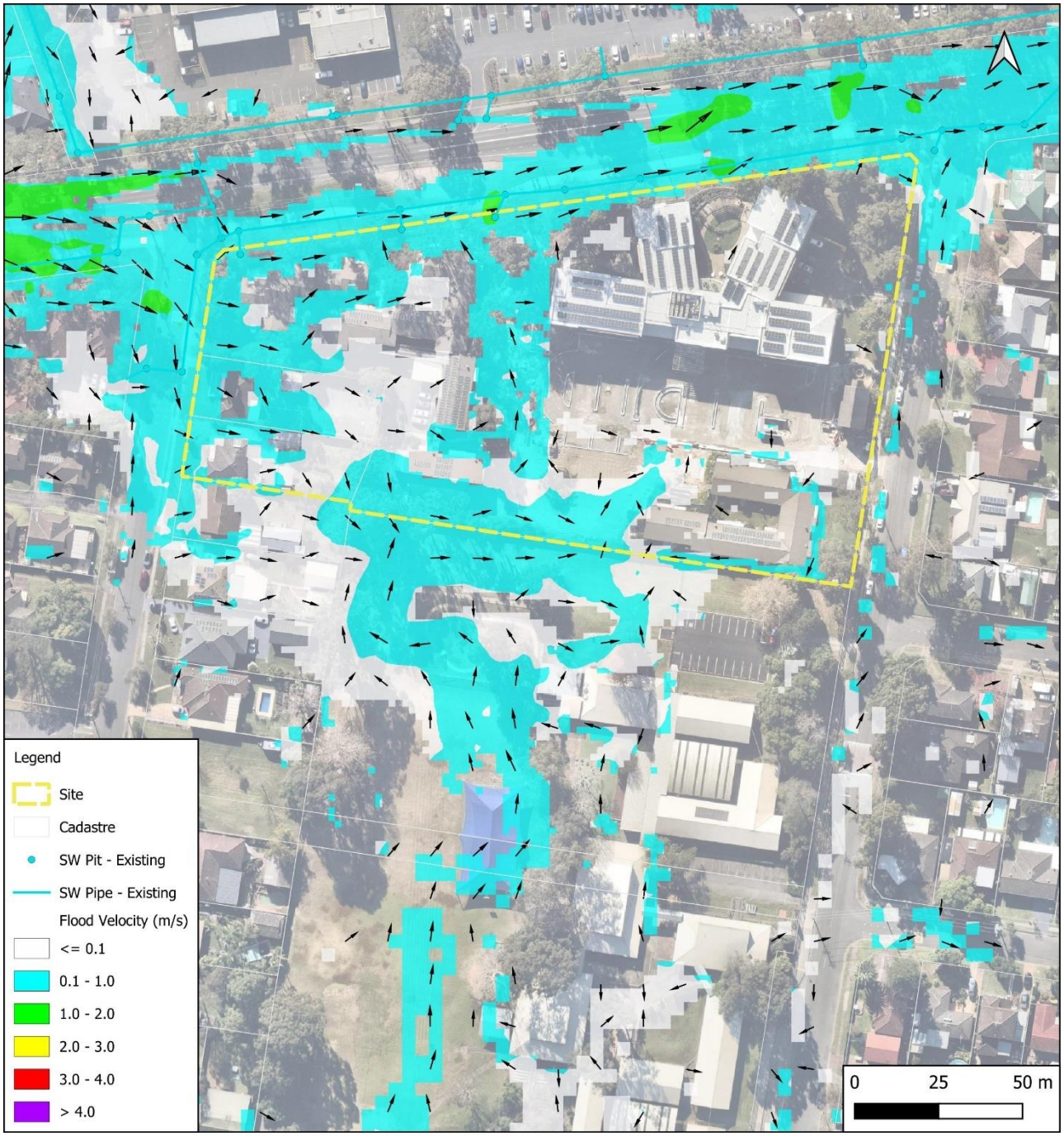


Figure 4.8: Flood Velocities - 1% AEP Flood Event- Existing Conditions

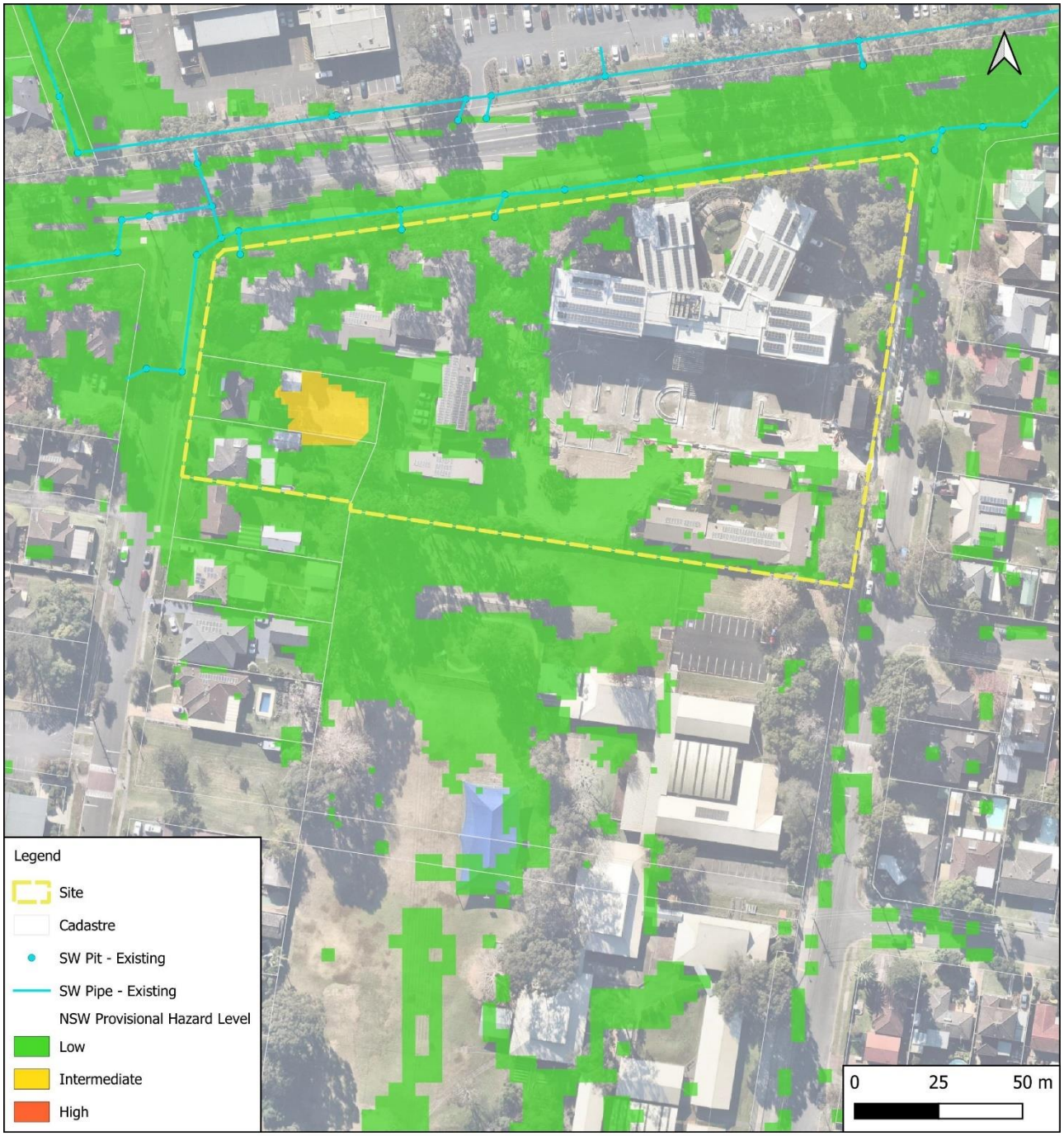


Figure 4.9: NSW Provisional Hazard Categories - 1% AEP Flood Event- Existing Conditions

4.4.3 Proposed Conditions

Easement Relocation

An existing easement on-site contains a 600mm diameter stormwater pipe and is orientated in a north-south direction benefitting Emu Plains Public School. The drainage network through this easement provides capture of overland flow within Emu Plains Public School and conveyance of this flow to the Great Western Highway to the north of Uniting Edinglassie.

A previous development application was submitted to Penrith City Council with two separated basements within the site to avoid impacting this easement. Uniting is looking to redesign this proposal to reduce the footprints of the buildings previously proposed and redesign the basement car park proposed for this development; from two separate, single level basements to one consolidated, single level basement. To achieve this, a repositioning of the stormwater pipe and the associated easement is required.

Flood modelling has been conducted to ensure that the proposed redevelopment including changes to the existing drainage easement onsite would not cause any negative flood impacts on the neighbouring properties including Emu Plains Public School.

Proposed Model

The model geometry was updated by defining the proposed building footprints as a flow blockage in the model via the incorporation of a 3D surface model (TIN). Manning's values for the site were modified to represent the site in proposed conditions. The existing drainage easement serving the Emu Plains Public School site was replaced with the proposed easement and in-ground drainage network as shown in Figure 4.10. The width of the proposed easement is to be defined based on council requirements. It contains one existing 600mm pipe, one new 600mm pipe, two new 450mm pipes and one new box culvert (1.00m x 0.45m).

In addition, suspension of a portion of Building A as well as terraces fronting the north boundary of site was incorporated into proposed site condition modelling to bypass overflows of Troy Street to Great Western Highway during large flood events as shown in Figure 4.10.

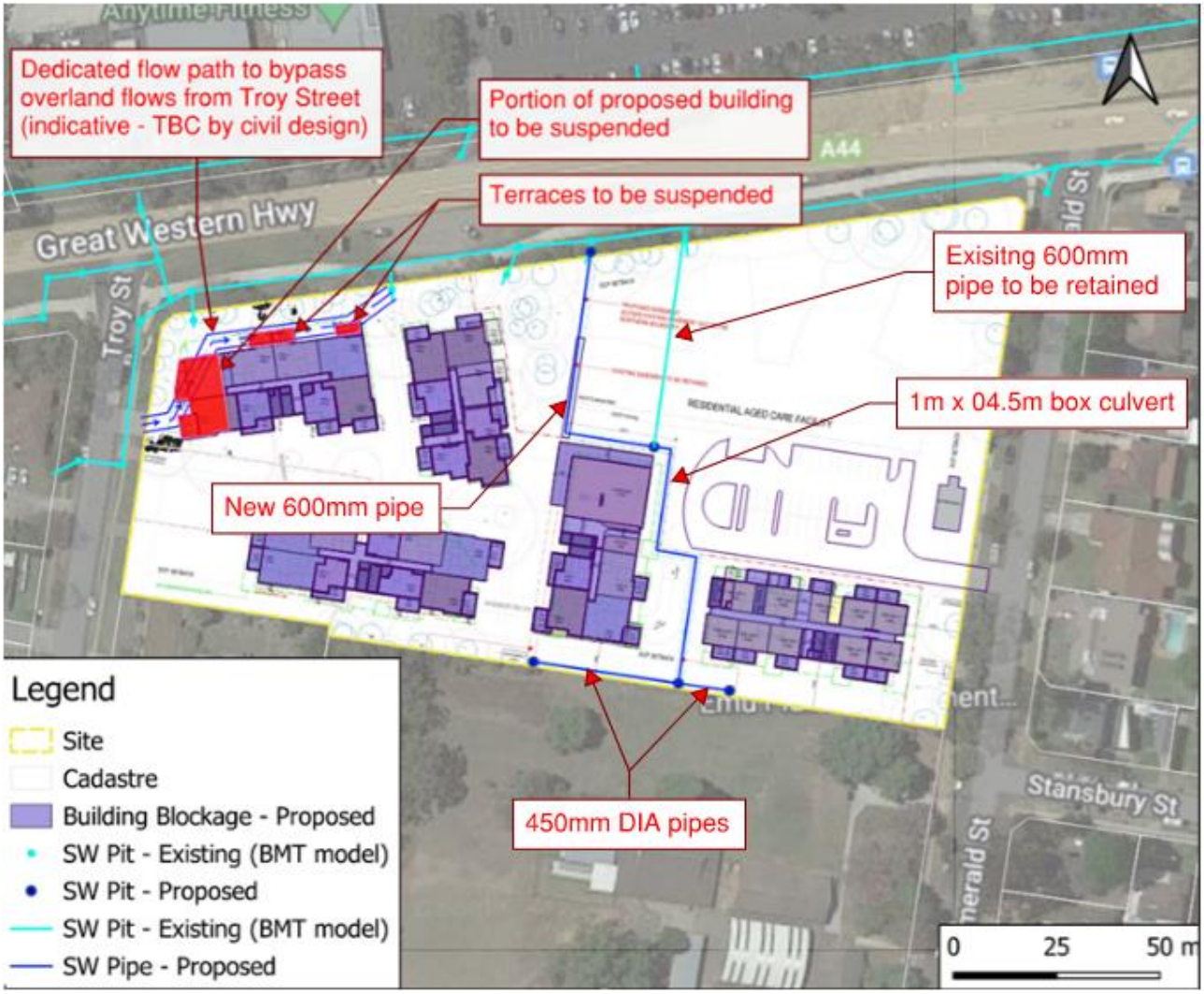


Figure 4.10: Changes applied to the model to simulate proposed site conditions.

Peak flood levels & depths, velocities and hazards for proposed site conditions in the critical duration 1% AEP event are presented in Figure 4.11, Figure 4.12 and Figure 4.13 respectively. Flood results confirm that:

- Flood levels reach up to 26.8m across the site as well as over the Troy Street's sag point.
- Proposed high flow network effectively bypasses the overland flows entering the site from western and southern boundaries to downstream and renders the proposed buildings and basement car park entrances flood free in the 1% AEP flood event and minor local overland flows on the site are generally shallow and of low hazard.
- Flood hazards remain typically low across the site except for an area near the southwestern site boundary where the flood flows become hazardous in the 1% AEP event.

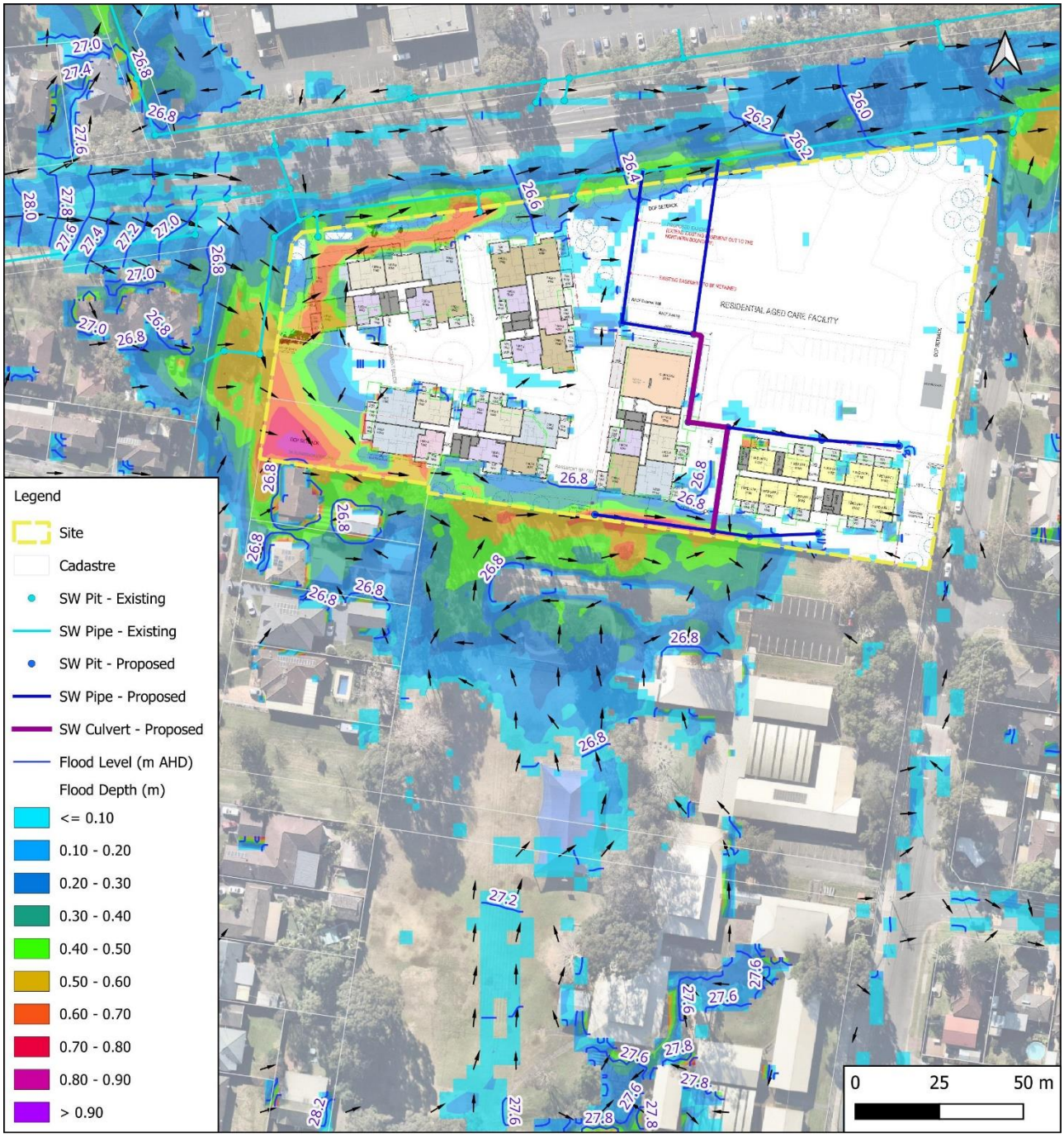


Figure 4.11: Flood Depths & Levels - 1% AEP Flood Event- Proposed Conditions

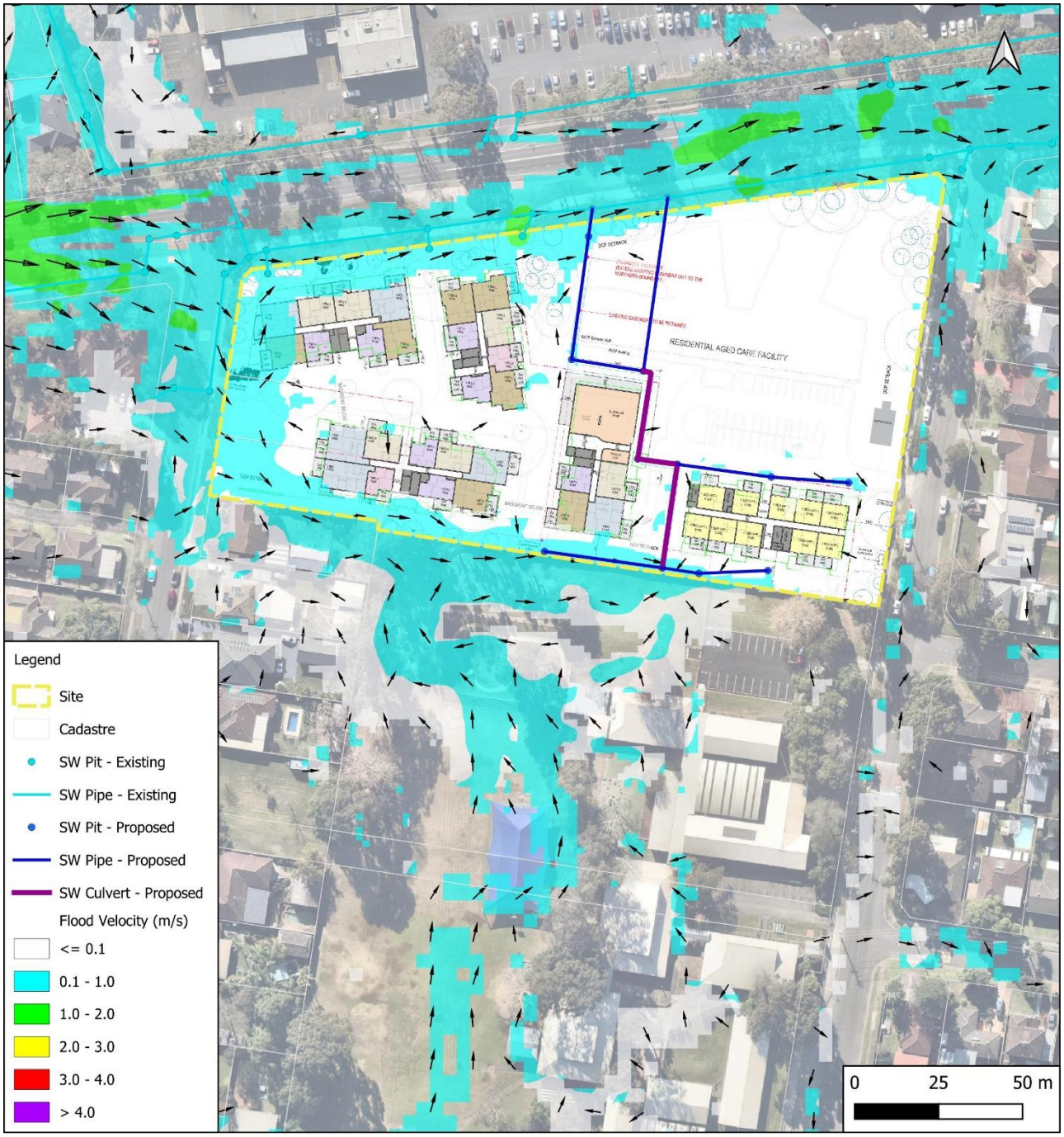


Figure 4.12: Flood Velocities - 1% AEP Flood Event- Proposed Conditions

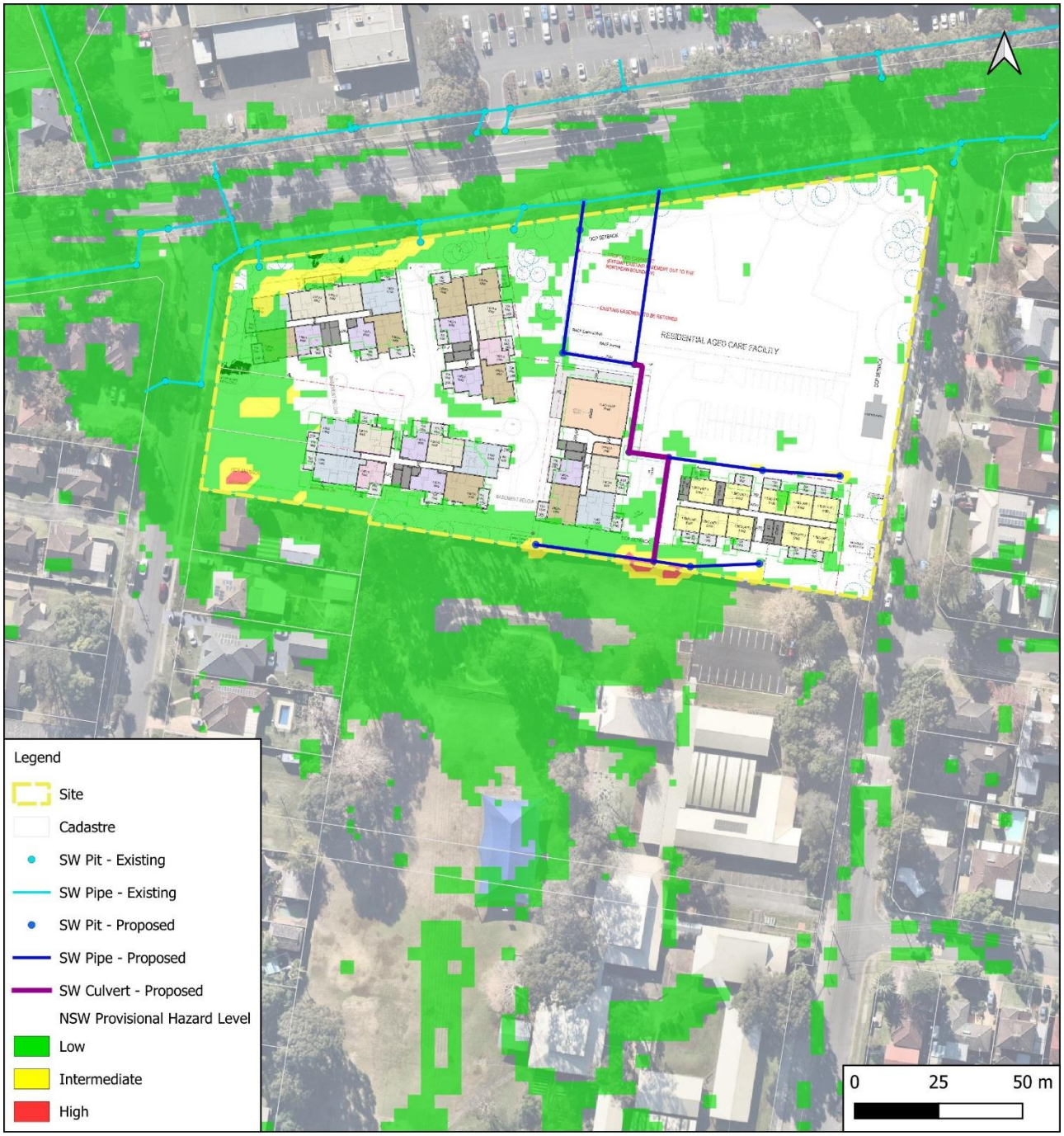


Figure 4.13: NSW Provisional Hazard Categories - 1% AEP Flood Event- Proposed Conditions

4.5 Flood Planning Requirements

Flood planning requirements are to comply with requirements outlined in the NSW State Government Floodplain Development Manual 2005, the Penrith Development Control Plan (DCP) 2014, and the Penrith Local Environmental Plan (LEP) 2010. Flood Planning Levels are to be at or above the 1% AEP flood level plus 0.5m freeboard.

4.5.1 Penrith Development Control Plan (DCP) 2014

Based on the Penrith Development Control Plan (2014), Section C3 - Water Management, the following requirements apply to the proposed development:

- The Finished Floor Level (FFL) for the proposed buildings are to be at or above the 1% AEP flood level of 26.80m AHD plus 0.5m of freeboard (FFLs ≥ 27.30m AHD).
- The crest of the driveway to proposed lower ground car park needs to be no lower than 27.10m AHD (1% AEP flood level of 26.80m AHD plus 0.3m of freeboard).
- Any other openings to the basement, including ventilation grills and the crest to any stairway, shall be a minimum of 300mm above the top water level of the 1% AEP flood event.

The proposed buildings are to comply with Construction of Buildings in Flood Hazard Area and the accompanying handbook developed by the Australian Building Codes Board (2012).

4.6 Offsite Impacts

Figure 4.14 presents the impact of the proposed development on flood level. The surrounding area is generally unaffected by the proposed development (with an impact of less than 0.02 m), though there is a small portion of the Great Western Highway (toward the southwest corner of the site) that is affected by an increase in flood level of between 0.02-0.05 m.

A flood velocity impact map is provided in Figure 4.15 which indicates that flood velocities in and around the proposed site remain more or less similar to the existing conditions and velocity differences are generally limited to ±0.1 m/s. However, flood velocities marginally increase by 0.3 m/s over the limited areas along the western and southern site boundary.

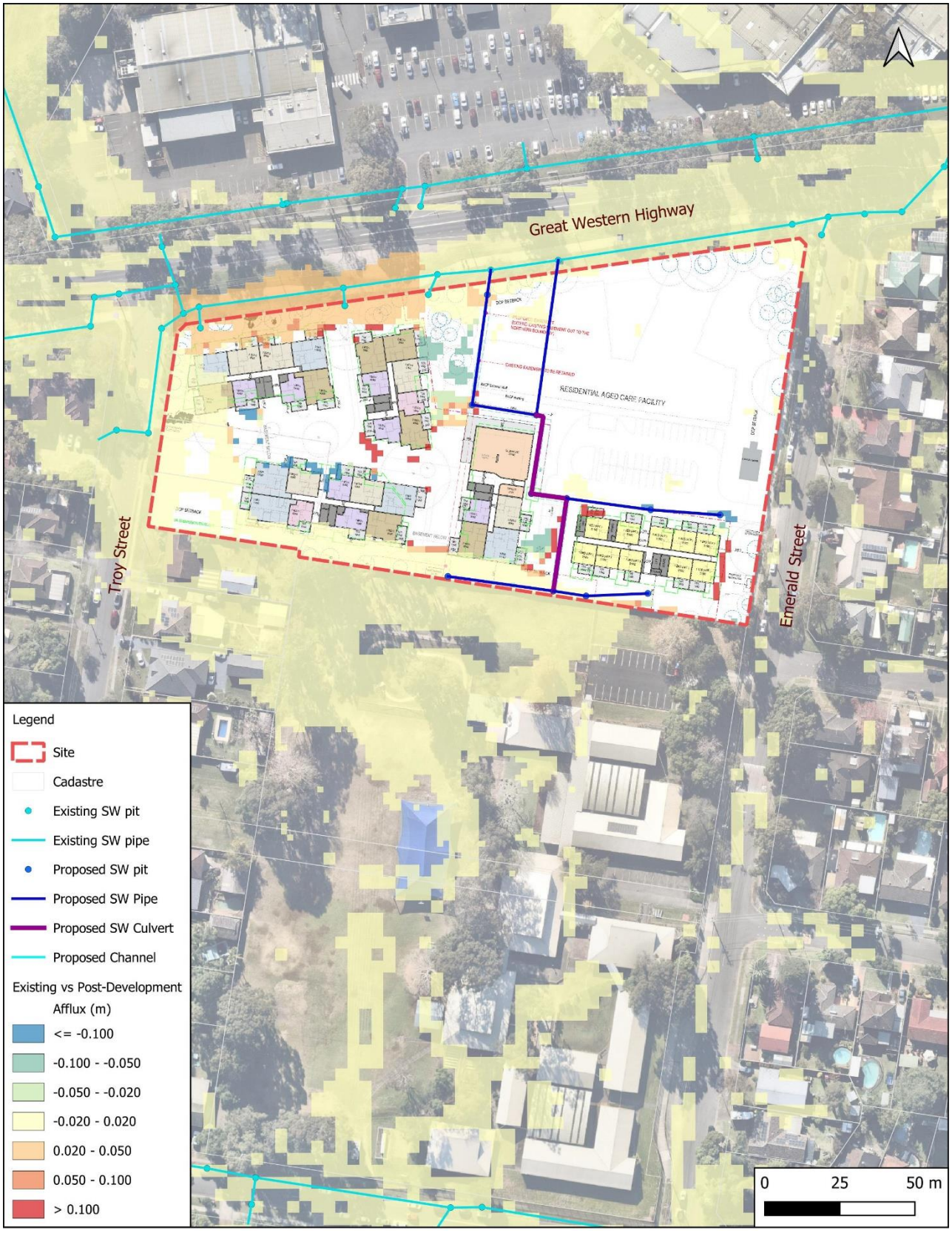


Figure 4.14: Impact of Proposed Development on Flood Level- 1% AEP Flood Event

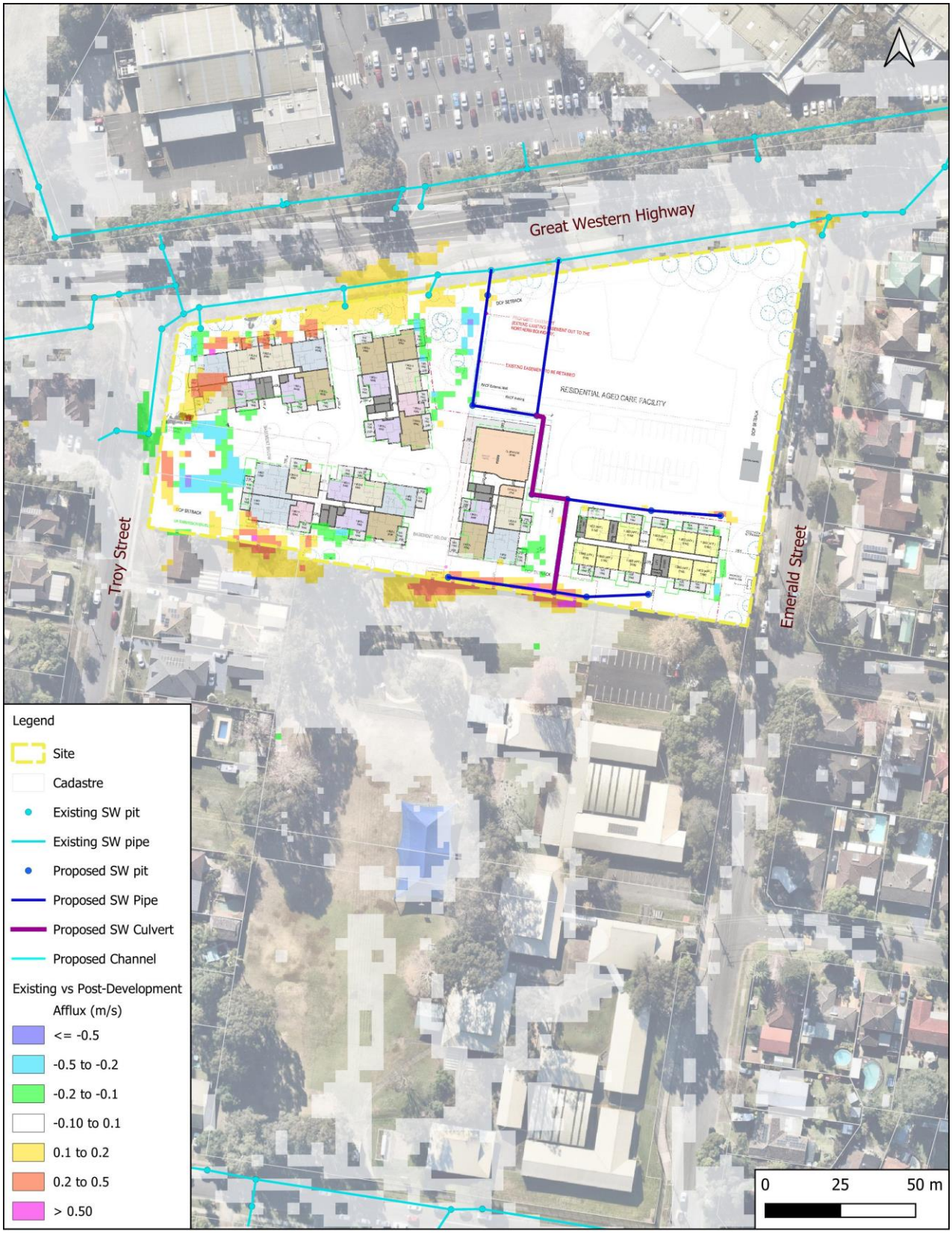


Figure 4.15: Impact of Proposed Development on Flood Velocity - 1% AEP Flood Event

4.7 Impact of Climate Change

A sensitivity analysis has been completed to determine the impact of climate change on flood conditions of the site. The impact of climate change was assessed through 19.7% increase in rainfall in accordance with the Emu Plains Overland Flow Flood Study (BMT, 2020).

Modelling results indicate that flood levels generally increase by 25 mm over the properties to the south as well as over Troy Street. Change in flood levels due to the climate change are shown in Figure 4.16.

4.8 Flood Emergency Response Strategy

As part of the Residential Aged Care Facility recently completed, a Flood Emergency Response Plan was developed for the site in consultation with the State Emergency Services. This adopts two separate approaches for the two mechanisms of flooding that occur on site.

For riverine flooding, evacuation is to follow the procedures dictated by Penrith City Council or the Bureau of Meteorology via flood alert, advice or warning.

For local overland flooding, a water level sensor has been installed on site that alerts staff and residents when the flood level indicates that the storm is greater than a 1% AEP event.

It is anticipated that this flood emergency response strategy will also be applied to the ILU site, with the emergency response system extending to the ILU apartments as well. Similar to the RACF, those evacuated from the ILUs will be directed to the RACF (refer to the Flood Emergency Response Plan for further details).

4.9 Other Requirements

As per the DCP, all structures are to have flood compatible building components at or below the flood planning level. It should be noted that the structural engineering design shall certify that all building materials used within flood affected areas are able to withstand the forces of floodwater including buoyancy and debris impact loads.

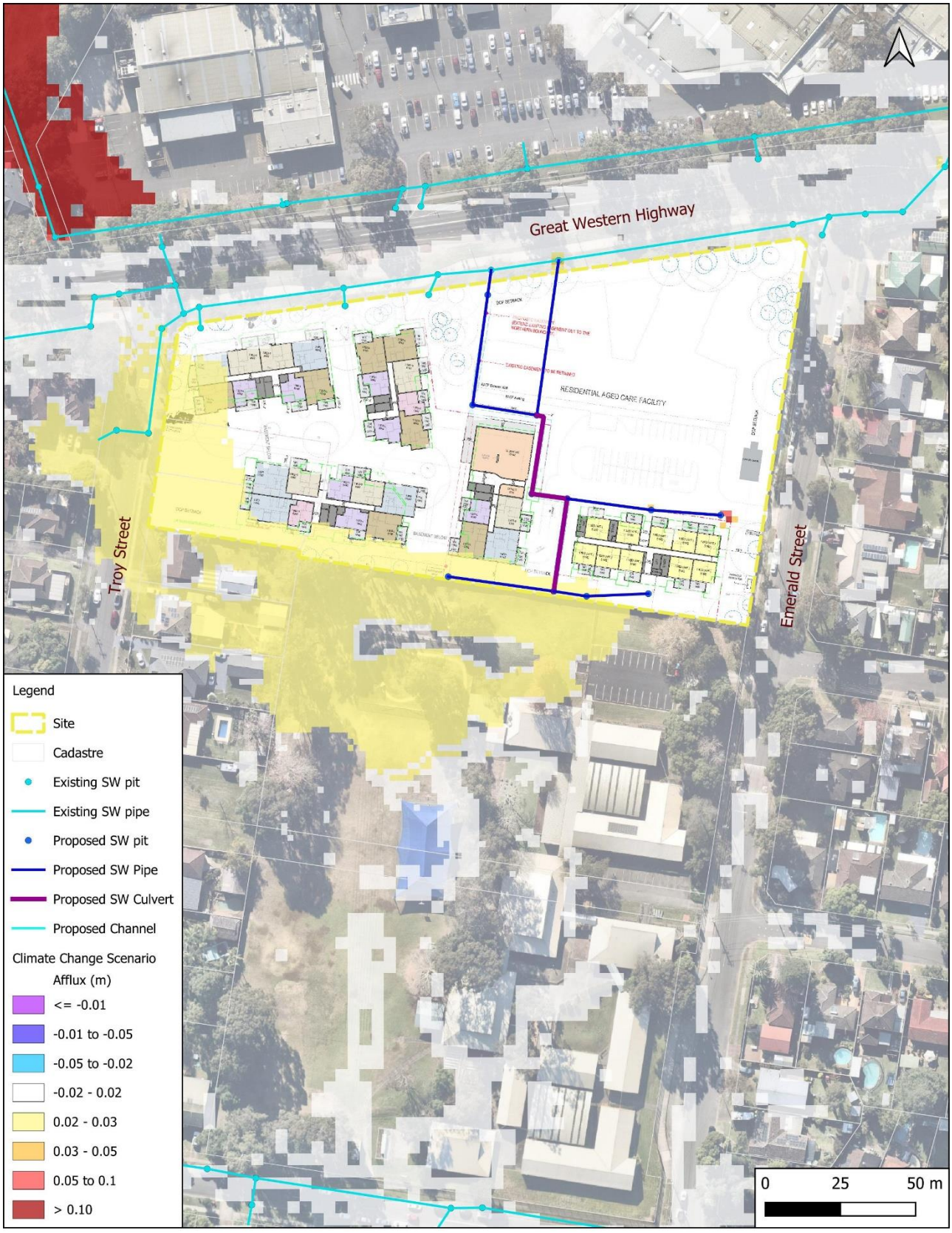


Figure 4.16: Flood level Increase due to Climate Change - 1% AEP Flood Event- Proposed Conditions

5.0 Conclusion

TTW has been engaged to provide the associated civil engineering design and documentation for the proposed Development Application of the Uniting Edinglassie Independent Living Units development. The civil works involved include the installation of a new in-ground pit and pipe system and stormwater quality measures.

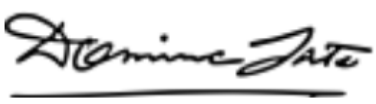
The existing 45 ILUs are in the south-eastern and north-western portions of the site and were constructed in the 1970s as villa style developments. This is being increased via the proposed redevelopment which will provide 147 ILUs with a unique identity and character.

Council requirements for provision of OSD for new developments are that post development flows are to be reduced to pre-development conditions. As the total impervious percentage of site is reduced post-development and existing catchments maintained, provision of OSD has not been proposed. This conclusion has been supported by development of a DRAINS model incorporating the surrounding Council stormwater network and demonstrates that capacity of the downstream system is sufficient for the 20% AEP minor design storm as requested by Council. Inundation of the downstream stormwater network is observed during larger storm events, at which point the post-development discharge from site is still reduced from existing conditions.

Penrith City Council Development Control Plan requires all new developments to install permanent stormwater pollution controls. Penrith City Council DCP provides specific pollutant reduction targets for new developments. Using the water quality devices listed below, the reduction targets were met and were acceptable shown via MUSIC-6 results in Figure 3.3.

- Pit filter baskets such as OceanGuards or equivalent.
- Vegetated swales provided within the site in soft landscaping areas.
- 18x 690mm PSorb StormFilter cartridges or approved equivalent

The details of this report are based on current available information and correspondence undertaken at the time of writing.

Prepared by	Prepared by	Authorised By
TTW (NSW) PTY LTD	**TTW (NSW) PTY LTD**	**TTW (NSW) PTY LTD**
		
DOMINIC TATE Civil Engineer	**ALI ATTAR** Senior Civil Engineer	**GRACE CARPP** Associate

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Appendix A

Civil Drawings

UNITING EDINGLASSIE EMU PLAINS

GENERAL NOTES

1. Contractor must verify all dimensions and existing levels on site prior to commencement of works. Any discrepancies to be reported to the Engineer .
2. Strip all topsoil from the construction area. All stripped topsoil shall be disposed of off-site unless directed otherwise.
3. Make smooth connection with all existing works.
4. Compact subgrade under buildings and pavements to minimum 98% standard maximum dry density in accordance with AS 1289 5.1.1. Compaction under buildings to extend 2m minimum beyond building footprint.
5. All work on public property, property which is to become public property, or any work which is to come under the control of the Statutory Authority, the Contractor is to ensure that the drawings used for construction have been approved by all relevant authorities prior to commencement site.
6. All work on public property, property which is to become public property, or any work which is to come under the control of the Statutory Authority is to be carried out in accordance with the requirements of the relevant Authority. The Contractor shall obtain these requirements from the Authority. Where the requirements of the Authority are different to the drawings and specifications, the requirements of the Authority shall be applicable.
7. For all temporary batters refer to geotechnical recommendations.

REFERENCE DRAWINGS

1. These drawings have been based from, and to be read in conjunction with the following Consultants drawings. Any conflict to the drawings must be notified immediately to the Engineer.

Consultant	Dwg Title	Dwg No	Rev	Date
VINCE MORGAN	SURVEY	1658Z19	A	20.09.21
TAYLOR BRAMMER	LANDSCAPE ARCHITECT	MASTERPLAN	–	26.09.23
GROUP GSA	BASEMENT PLAN	A 2000	B	02.10.23
GROUP GSA	GROUND FLOOR	A 2001	B	02.10.23

BOUNDARY AND EASEMENT NOTE

The property boundary and easement locations shown on Taylor Thomson Whitting drawing's have been based from information received from : VINCE MORGAN
REFER SURVEYOR FOR BOUNDARY INFORMATION
Taylor Thomson Whitting makes no guarantees that the boundary or easement information shown is correct.
Taylor Thomson Whitting will accept no liabilities for boundary inaccuracies. The contractor/builder is advised to check/confirm all boundaries in relation to all proposed work prior to the commencement of construction. Boundary inaccuracies found are to be reported to the superintendent prior to construction starting.

SURVEY AND SERVICES INFORMATION

SURVEY

Origin of levels : PM30074, RL25.775
Datum of levels : A.H.D. AUSTRALIAN HEIGHT DATUM
Coordinate system : MGA
Survey prepared by : VINCE MORGAN PTY LTD
Setout Points : CONTACT THE SURVEYOR

Taylor Thomson Whitting does not guarantee that the survey information shown on these drawings is accurate and will accept no liability for any inaccuracies in the survey information provided to us from any cause whatsoever.

UNDERGROUND SERVICES - WARNING

The locations of underground services shown on Taylor Thomson Whittings drawings have been plotted from diagrams provided by service authorities. This information has been prepared solely for the authorities own use and may not necessarily be updated or accurate.

The position of services as recorded by the authority at the time of installation may not reflect changes in the physical environment subsequent to installation.

Taylor Thomson Whitting does not guarantee that the services information shown on these drawings shows more than the presence or absence of services, and will accept no liability for inaccuracies in the services information shown from any cause whatsoever.

The Contractor must confirm the exact location and extent of services prior to construction and notify any conflict with the drawings immediately to the Engineer/Superintendent.

The contractor is to get approval from the relevant state survey department, to remove/adjust any survey mark. This includes but is not limited to; State Survey Marks (SSM), Permanent Marks (PM), cadastral reference marks or any other survey mark which is to be removed or adjusted in any way.
Taylor Thomson Whitting plans do not indicate the presence of any survey mark. The contractor is to undertake their own search.

STORMWATER DRAINAGE NOTES

1 Stormwater Design Criteria :
(A) Average exceedance probability –
1% AEP for roof drainage to first external pit
20% AEP for paved and landscaped areas
(B) Rainfall intensities –
Time of concentration: 5 minutes
1% AEP = 130 mm/hr
20% AEP = 127 mm/hr
(C) Rainfall losses –
Impervious areas: IL = 1.5 mm , CL = 0 mm/hr
Pervious areas: IL =32.2 mm , CL = 1.36mm/hr

2. Pipes 300 dia and larger to be reinforced concrete Class "3" approved spigot and socket with rubber ring joints U.N.O.
3. Pipes up to 300 dia may be sewer grade uPVC with solvent welded joints, subject to approval by the engineer
4. Equivalent strength VCP or FRP pipes may be used subject to approval.
5. Precast pits may be used external to the building subject to approval by the Engineer
6. Enlargers, connections and junctions to be manufactured fittings where pipes are less than 300 dia.
7. Where subsoil drains pass under floor slabs and vehicular pavements, unslotted uPVC sewer grade pipe is to be used.
8. Grates and covers shall conform with AS 3996–2006, and AS 1428.1 for access requirements.
9. Pipes are to be installed in accordance with AS 3725. All bedding to be type H2 U.N.O.
10. Care is to be taken with invert levels of stormwater lines. Grades shown are not to be reduced without approval.
11. All stormwater pipes to be 150 dia at 1.0% min fall U.N.O.
12. Subsoil drains to be slotted flexible uPVC U.N.O.
13. Adopt invert levels for pipe installation (grades shown are only nominal).

KERBING NOTES

Includes all kerbs, gutters, dish drains, crossings and edges.

1. All kerbs, gutters, dish drains and crossings to be constructed on minimum 75mm granular basecourse compacted to minimum 98% modified maximum dry density in accordance with AS 1289 5.2.1.
2. Expansion joints (EJ) to be formed from 10mm compressible cork filler board for the full depth of the section and cut to profile. Expansion joints to be located at drainage pits, on tangent points of curves and elsewhere at 12m centres except for integral kerbs where the expansion joints are to match the joint locations in slabs.
3. Weakened plane joints to be min 3mm wide and located at 3m centres except for integral kerbs where weakened plane joints are to match the joint locations in slabs.
4. Broomed finished to all ramped and vehicular crossings, all other kerbing or dish drains to be steel float finished.
5. In the replacement of kerbs –
Existing road pavement is to be sawcut 900mm from lip of gutter. Upon completion of new kerbs, new basecourse and surface is to be laid 900mm wide to match existing materials and thicknesses.
Existing allotment drainage pipes are to be built into the new kerb with a 100mm dia hole.
Existing kerbs are to be completely removed where new kerbs are shown.

CONCRETE NOTES

EXPOSURE CLASSIFICATION : External : B2

CONCRETE

Place concrete of the following characteristic compressive strength f'c as defined in AS 1379.

Location	AS 1379 f'c MPa at 28 days	Specified Slump	Nominal Agg. Size
Kerbs	S20	80	20
Retaining wall footing	S40	80	20

1. Use Type 'GP' cement, unless otherwise specified.
2. All concrete shall be subject to project assessment and testing to AS 1379.
3. Consolidate by mechanical vibration. Cure all concrete surfaces as directed in the Specification.
4. For all falls in slab, drip grooves, reglets, chamfers etc. refer to Architects drawings and specifications.
5. Unless shown on the drawings, the location of all construction joints shall be submitted to Engineer for review.
6. No holes or chases shall be made in the slab without the approval of the Engineer.
7. Conduits and pipes are to be fixed to the underside of the top reinforcement layer.
8. Slurry used to lubricate concrete pump lines is not to be used in any structural members.
9. All slabs cast on ground require sand blinding with a Concrete Underlay

FORMWORK

1. The design, certification, construction and performance of the formwork, falsework and backpropping shall be the responsibility of the contractor. Proposed method of installation and removal of formwork is to be submitted to the superintendent for comment prior to work being carried out.

CONCRETE FINISHING NOTES

1. All exposed concrete pavements are to be broomed finished.
2. All edges of the concrete pavement including keyed and dowelled joints are to be finished with an edging tool.
3. Concrete pavements with grades greater than 10 % shall be heavily broomed finished.
4. Carborundum to be added to all stair treads and ramped crossings U.N.O.

SAFETY IN DESIGN

Contractor to refer to Appendix B of the Civil Specification for the Civil Risk and Solutions Register.

EXISTING SERVICES

Contractor to be aware existing services are located within the site. Location of all services to be verified by the Contractor prior to commencing works. Contractor to confirm with relevant authority regarding measures to be taken to ensure services are protected or procedures are in place to demolish and/or relocate.

EXISTING STRUCTURES

Contractor to be aware existing structures may exist within the site. To prevent damage to existing structure(s) and/or personnel, site works to be carried out as far as practicably possible from existing structure(s).

EXISTING TREES

Contractor to be aware existing trees exist within the site which need to be protected. To prevent damage to trees and/or personnel, site works to be carried out as far as practicably possible from existing trees. Advice needs to be sought from Arborist and/or Landscape Architect on measures required to protect trees.

GROUNDWATER

Contractor to be aware ground water levels are close to existing surface level. Temporary de-watering may be required during construction works.

EXCAVATIONS

Deep excavations due to stormwater drainage works is required. Contractor to ensure safe working procedures are in place for works. All excavations to be fenced off and batters adequately supported to approval of Geotechnical Engineer.

GROUND CONDITIONS

Contractor to be aware of the site geotechnical conditions. Refer to geotechnical report for details.

HAZARDOUS MATERIALS

Existing asbestos products & contaminated material may be present on site. Contractor to ensure all hazardous materials are identified prior to commencing works. Safe working practices as per relevant authority to be adopted and appropriate PPE to be used when handling all hazardous materials. Refer to geotechnical/environmental report for details.

CONFINED SPACES

Contractor to be aware of potential hazards due to working in confined spaces such as stormwater pits, trenches and/or tanks. Contractor to provide safe working methods and use appropriate PPE when entering confined spaces.

MANUAL HANDLING

Contractor to be aware manual handling may be required during construction. Contractor to take appropriate measures to ensure manual handling procedures and assessments are in place prior to commencing works.

WATER POLLUTION

Contractor to ensure appropriate measures are taken to prevent pollutants from construction works contaminating the surrounding environment.

SITE ACCESS/EGRESS

Contractor to be aware site works occur in close proximity to footpaths and roadways. Contractor to erect appropriate barriers and signage to protect site personnel and public.

VEHICLE MOVEMENT

Contractor to supply and comply with traffic management plan and provide adequate site traffic control including a certified traffic marshall to supervise vehicle movements where necessary.

EROSION AND SEDIMENT CONTROL NOTES

1. All work shall be generally carried out in accordance with
(A) Local authority requirements,
(B) EPA – Pollution control manual for urban stormwater,
(C) LANDCOM NSW – Managing Urban Stormwater: Soils and Construction ("Blue Book").
2. Erosion and sediment control drawings and notes are provided for the whole of the works. Should the Contractor stage these works then the design may be required to be modified. Variation to these details may require approval by the relevant authorities.
The erosion and sediment control C02 shall be implemented and adapted to meet the varying situations as work on site progresses.
3. Maintain all erosion and sediment control devices to the satisfaction of the superintendent and the local authority.
4. When stormwater pits are constructed prevent site runoff entering the pits unless silt fences are erected around pits.
5. Minimise the area of site being disturbed at any one time.
6. Protect all stockpiles of materials from scour and erosion. Do not stockpile loose material in roadways, near drainage pits or in watercourses.
7. All soil and water control measures are to be put back in place at the end of each working day, and modified to best suit site conditions.
8. Control water from upstream of the site such that it does not enter the disturbed site.
9. All construction vehicles shall enter and exit the site via the temporary construction entry/exit.
10. All vehicles leaving the site shall be cleaned and inspected before leaving.
11. Maintain all stormwater pipes and pits clear of debris and sediment. Inspect stormwater system and clean out after each storm event.
12. Clean out all erosion and sediment control devices after each storm event.

Sequence Of Works

1. Prior to commencement of excavation the following soil management devices must be installed.
1.1. Construct silt fences below the site and across all potential runoff sites.
1.2. Construct temporary construction entry/exit and divert runoff to suitable control systems.
1.3. Construct measures to divert upstream flows into existing stormwater system.
1.4. Construct sedimentation traps/basin including outlet control and overflow.
1.5. Construct turf lined swales.
1.6. Provide sandbag sediment traps upstream of existing pits.
2. Construct geotextile filter pit surround around all proposed pits as they are constructed.
3. On completion of pavement provide sand bag kerb inlet sediment traps around pits.
4. Provide and maintain a strip of turf on both sides of all roads after the construction of kerbs.

WATER QUALITY TESTING REQUIREMENTS

Prior to discharge of site stormwater, groundwater and seepage water into council's stormwater system, contractors must undertake water quality tests in conjunction with a suitably qualified environment consultant outlining the following:

– Compliance with the criteria of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)
– If required subject to the environmental consultants advice, provide remedial measures to improve the quality of water that is to be discharged into Councils storm water drainage system.This should include comments from a suitably qualified environmental consultant confirming the suitability of these remedial measures to manage the water discharged from the site into Councils storm water drainage system. Outlining the proposed, ongoing monitoring, contingency plans and validation program that will be in place to continually monitor the quality of water discharged from this site. This should outline the frequency of water quality testing that will be undertaken by a suitably qualified environmental consultant.

PIT SCHEDULE

Note: Grate size does not necessarily reflect pit size, refer pit type details, shown on detail sheets – **C110**
Final internal pit dimensions are to comply with AS3500

Type	Description	Cover (Clear Opening)
A	Surface inlet pit	900 x 900 Class D galvanised mild steel grate hinged to frame
B	Junction pit	900 x 900 Class D cast iron cover with concrete infill
C	Stormfilters	690mm STORMFILTER CARTRIDGES
D		Existing pit to be remian

LEGEND

- EXTENT OF WORKS
- × F22.20 — FINISHED SURFACE LEVEL
- 22.50 — MAJOR FINISHED SURFACE CONTOUR 0.5m INTERVAL
- 22.10 — MINOR FINISHED SURFACE CONTOUR 0.1m INTERVAL
- KG — KERB AND GUTTER
- KO — KERB ONLY
- eSW — EXISTING STORMWATER PIPE
- STORMWATER PIPE, FLOW DIRECTION
- STORMWATER CULVERT FOR FLOODING
- GD — GRATED DRAIN
- HEADWALL OUTLET
- JUNCTION PIT
- GRATED INLET PIT
- SAG KERB INLET PIT
- SUBSOIL DRAINAGE LINE, ϕ100mm U.N.O.

ABBREVIATIONS

TOK	TOP OF KERB	eRL	EXISTING SURFACE LEVEL
IOK	INVERT OF KERB	F	FINISHED SURFACE LEVEL
RCL	ROAD CENTRELINE	F*	FUTURE SURFACE LEVEL
BDY	BOUNDARY		
		FFL	FINISHED FLOOR LEVEL
TOW	TOP OF WALL	SSL	STRUCTURAL SLAB LEVEL
BOW	BOTTOM OF WALL		
		CH	CHAINAGE
CL	COVER LEVEL	TP	TANGENT POINT
IL	INVERT LEVEL		
OL	OBVERT LEVEL	TWL	TOP WATER LEVEL

EXISTING SERVICES LEGEND

- eEA — EXISTING OVERHEAD ELECTRICAL
- eEU — EXISTING UNDERGROUND ELECTRICAL
- eG — EXISTING GAS
- eT — EXISTING TELECOMMUNICATIONS
- eS — EXISTING SEWER
- eW — EXISTING WATER
- eSW — EXISTING STORMWATER

WORKS NEAR EXISTING SERVICES
ALL EXISTING UNDERGROUND SERVICES ARE TO BE LOCATED ON SITE PRIOR TO COMMENCING WORKS

WORKS NEAR EXISTING TREES
PRECAUTIONS ARE TO BE UNDERTAKEN TO ENSURE EXISTING TREES IN THE VICINITY OF WORKS ARE NOT DAMAGED DURING CONSTRUCTION ACTIVITIES

HIGH PRESSURE GAS MAIN
PRECAUTIONS ARE TO BE UNDERTAKEN TO ENSURE HIGH PRESSURE GAS MAIN IN THE VICINITY OF WORKS IS NOT DAMAGED DURING CONSTRUCTION ACTIVITIES.
LIAISE WITH THE ASSET OWNER AS REQUIRED

HIGH VOLTAGE ELECTRICAL CABLE
PRECAUTIONS ARE TO BE UNDERTAKEN TO ENSURE HIGH VOLTAGE CABLE IN THE VICINITY OF WORKS IS NOT DAMAGED DURING CONSTRUCTION ACTIVITIES.
LIAISE WITH ASSET OWNER AS REQUIRED

EXISTING STORMWATER ASSETS
SIZE, INVERT LEVEL AND CONDITION OF ALL AFFECTED EXISTING STORMWATER ASSETS TO BE CONFIRMED PRIOR TO COMMENCING WORKS

THIS DRAWING MUST BE PRINTED IN COLOUR

CIVIL DOCUMENTATION LIST

Drawing No.	Drawing Title
C101	NOTES AND LEGENDS SHEET
C102	EROSION AND SEDIMENT CONTROL PLAN
C104	SITEWORKS AND STORMWATER MANAGEMENT PLAN
C105	BULK EARTHWORKS PLAN
C106	PAVEMENT PLAN
C110	DETAILS SHEET
C120	STORMWATER DRAINAGE LONGITUDINAL SECTION SHEET 1
C121	STORMWATER DRAINAGE LONGITUDINAL SECTION SHEET 2
C130	STORM FILTER CHAMBER 1 PLAN AND SECTIONS SHEET
C131	STORM FILTER CHAMBER 2 PLAN AND SECTIONS SHEET

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

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Rev	Description	Eng	Draft	Date
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P3	ISSUE FOR DA	ML	SH	10.11.22
P2	ISSUE FOR DA	ML	SH	09.11.22
P1	DRAFT DA	ML	SH	14.10.22

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Project
UNITING EDINGLASSIE EMU PLAINS

Sheet Subject
MASTER PLAN
NOTES AND LEGENDS SHEET

Scale : A1 NTS | Drawn SH | Authorised TM
Job No 211568 | Drawing No C101 | Revision P4
Plot File Created: Feb 16, 2024 - 2:06pm

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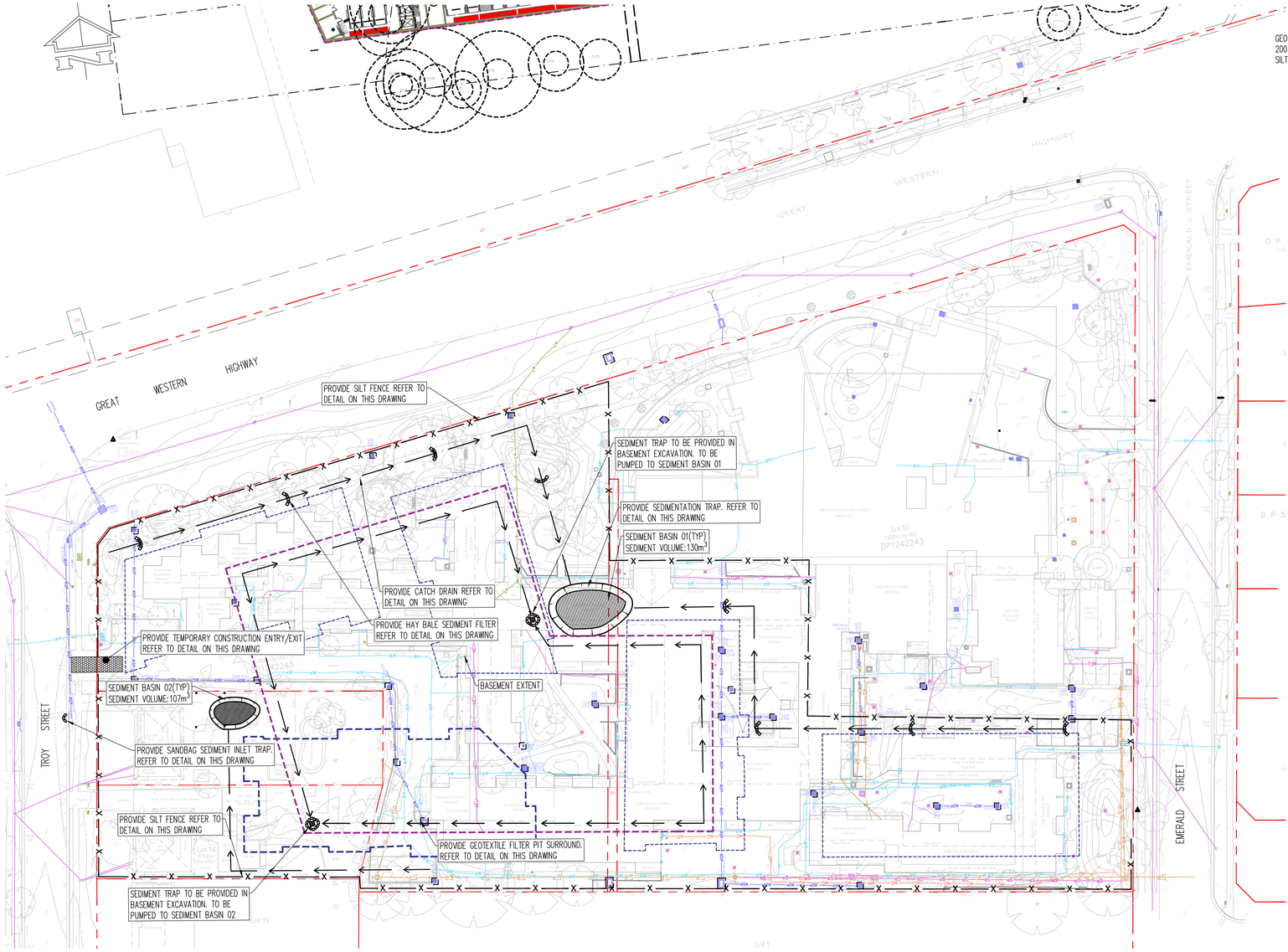

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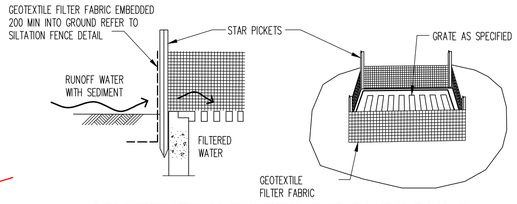
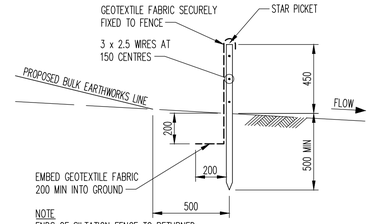
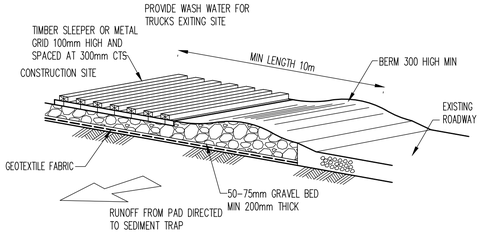


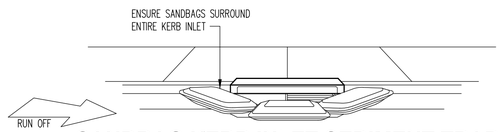
GEOTEXTILE FILTER PIT SURROUND
NTS



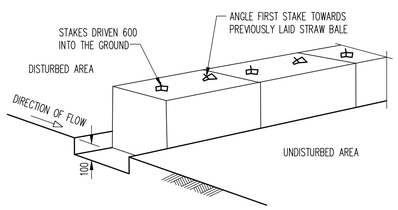
SILTATION FENCE DETAIL
SCALE 1: 20



TEMPORARY CONSTRUCTION VEHICLE EXIT
NTS

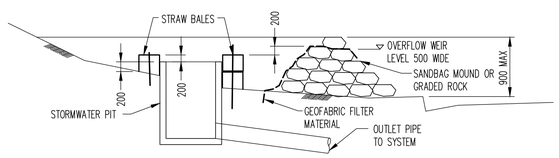


SANDBAG KERB INLET SEDIMENT TRAP
NTS

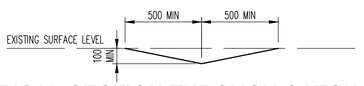


HAY BALE SEDIMENT FILTER
NTS

NOTE: STAKE TO BE EITHER TAR COATED STAR OR 50 x 50 HARDWOOD



SEDIMENTATION TRAP
NTS



TYPICAL SECTION THROUGH CATCH DRAIN
SCALE 1: 20

EROSION AND SEDIMENT CONTROL NOTES

1. All work shall be generally carried out in accordance with
   (A) Local authority requirements,
   (B) EPA – Pollution control manual for urban stormwater,
   (C) LANDCOM NSW – Managing Urban Stormwater: Soils and Construction ("Blue Book").
2. Erosion and sediment control drawings and notes are provided for the whole of the works. Should the Contractor stage these works then the design may be required to be modified. Variation to these details may require approval by the relevant authorities.
   The erosion and sediment control CO2 shall be implemented and adapted to meet the varying situations as work on site progresses.
3. Maintain all erosion and sediment control devices to the satisfaction of the superintendent and the local authority.
4. When stormwater pits are constructed prevent site runoff entering the pits unless silt fences are erected around pits.
5. Minimise the area of site being disturbed at any one time.
6. Protect all stockpiles of materials from scour and erosion. Do not stockpile loose material in roadways, near drainage pits or in watercourses.
7. All soil and water control measures are to be put back in place at the end of each working day, and modified to best suit site conditions.
8. Control water from upstream of the site such that it does not enter the disturbed site.
9. All construction vehicles shall enter and exit the site via the temporary construction entry/exit.
10. All vehicles leaving the site shall be cleaned and inspected before leaving.
11. Maintain all stormwater pipes and pits clear of debris and sediment. Inspect stormwater system and clean out after each storm event.
12. Clean out all erosion and sediment control devices after each storm event.

Sequence Of Works

1. Prior to commencement of excavation the following soil management devices must be installed.
1.1. Construct silt fences below the site and across all potential runoff sites.
1.2. Construct temporary construction entry/exit and divert runoff to suitable control systems.
1.3. Construct measures to divert upstream flows into existing stormwater system.
1.4. Construct sedimentation traps/basin including outlet control and overflow.
1.5. Construct turf lined swales.
1.6. Provide sandbag sediment traps upstream of existing pits.
2. Construct geotextile filter pit surround around all proposed pits as they are constructed.
3. On completion of pavement provide sand bag kerb inlet sediment traps around pits.
4. Provide and maintain a strip of turf on both sides of all roads after the construction of kerbs.

WATER QUALITY TESTING REQUIREMENTS

Prior to discharge of site stormwater, groundwater and seepage water into council's stormwater system, contractors must undertake water quality tests in conjunction with a suitably qualified environment consultant outlining the following:

- Compliance with the criteria of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)
- If required subject to the environmental consultants advice, provide remedial measures to improve the quality of water that is to be discharged into Councils storm water drainage system.This should include comments from a suitably qualified environmental consultant confirming the suitability of these remedial measures to manage the water discharged from the site into Councils storm water drainage system. Outlining the proposed, ongoing monitoring, contingency plans and validation program that will be in place to continually monitor the quality of water discharged from this site. This should outline the frequency of water quality testing that will be undertaken by a suitably qualified environmental consultant.

EROSION AND SEDIMENT CONTROL LEGEND

- Site Boundary
- Siltation fence
- Stormwater pit with Geotextile filter surround
- Hay bale barriers
- Sandbag sediment trap
- Catch drain
- Proposed Basement Outline
- Proposed Building Outline

0 5 10 15 20 25 30 35 40m
1:500 A1 1:1000 A3

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

FileName: C102.dwg – USER: sadmans – Plot File Created: Sep 14, 2023 - 2:58pm

A1

Rev	Description	Eng	Draft	Date
P4	ISSUE FOR DA	ML	SH	–
P3	ISSUE FOR DA	ML	SH	02.05.23
P2	ISSUE FOR DA	ML	SH	09.11.22
P1	DRAFT DA	ML	SH	14.10.22

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Project
UNITING EDINGLASSIE EMU PLAINS

Sheet Subject
MASTER PLAN
SEDIMENT & EROSION CONTROL PLAN

Scale : A1 AS SHOWN | Drawn SH | Authorised -
Job No 211568 | Drawing No C102 | Revision P4
Plot File Created: Sep 14, 2023 - 2:58pm

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING C101

GREAT WESTERN HIGHWAY

BUILDING A
FFL 27.35

BUILDING B
FFL 27.35

BUILDING C
FFL 27.35

BUILDING D
FFL 27.35

CLUB HOUSE

BUILDING E
FFL 27.35

BASEMENT OUTLINE

PORTION OF BUILDING A TO BE SUSPENDED FOR FLOOD CONVEYANCE

CONNECT TO EXISTING PIT
IL 24.56

US.IL24.80
600ø
0.5%
DS.IL24.56

STORWATER EASEMENT SHWON AS

REFER TO STORMWATER DRAINAGE LONGITUDINAL SECTIONS ON C121

US.IL25.50
450ø
1.0%
DS.IL25.27

US.IL25.12
450ø
6.2%
DS.IL24.85

US.IL24.89
600ø
0.5%
DS.IL24.80

EXISTING ø600 OUTLET PIPE IL24.83 TO BE RETAINED

3.25m DIA PRECAST SF CHAMBER WITH 10 x 690mm PSORB STORMFILTERS IN ONLINE CONFIGURATION.

US.IL25.53
450ø
1.0%
DS.IL25.27

US.IL25.73
450ø
1.0%
DS.IL25.55

US.IL25.05
1m X 0.45m
CULVERT
0.5%
DS.IL24.92

EXISTING PIT AT RL26.23

5.3m x 1.6m STORMFILTER CHAMBER 8 X 690mm PSORB STORMFILTERS IN OFFLINE CONFIGURATION

US.IL25.54
450ø
11.75%
DS.IL25.43

US.IL25.28
450ø
1.0%
DS.IL25.27

US.IL25.09
450ø
0.5%
DS.IL25.03

US.IL25.18
450ø
0.5%
DS.IL25.12

US.IL25.24
450ø
0.6%
DS.IL25.21

US.IL25.36
450ø
0.7%
DS.IL25.33

US.IL25.66
450ø
1.0%
DS.IL25.60

DUAL PIT STRUCTURE WITH INTERNAL DIVERSION WEIR TO STORMFILTER CHAMBER

US.IL25.30
300ø
0.5%
DS.IL25.18

US.IL25.73
375ø
0.7%
DS.IL25.56

US.IL25.85
300ø
0.7%
DS.IL25.76

GRATED DRAIN CONNECT TO STORMWATER VIA PUMP

US.IL25.10
1m X 0.45m
CULVERT
0.5%
DS.IL25.05

US.IL25.25
1m X 0.45m
CULVERT
0.5%
DS.IL25.10

US.IL25.73
450ø
1.3%
DS.IL25.25

SCAFFOLDING LINE

REFER TO STORMWATER DRAINAGE LONGITUDINAL SECTIONS ON C120

FOR CONTINUATION REFER TO BELOW THE SITEWORKS PLAN

FOR CONTINUATION REFER TO ABOVE THE INSET 'A'

INSET 'A'

US.IL25.37
450ø
1.0%
DS.IL25.10

US.IL25.65
450ø
1.0%
DS.IL25.39

US.IL25.35
450ø
1.0%
DS.IL25.25

US.IL25.64
450ø
1.0%
DS.IL25.37

RL27.00

RL26.36

LEGEND

- EXTENT OF WORKS
- × F22.20 FINISHED SURFACE LEVEL
- 22.50 MAJOR FINISHED SURFACE CONTOUR 0.5m INTERVAL
- 22.10 MINOR FINISHED SURFACE CONTOUR 0.1m INTERVAL
- KG KERB AND GUTTER
- KO KERB ONLY
- eSW EXISTING STORMWATER PIPE
- STORMWATER PIPE, FLOW DIRECTION
- STORMWATER CULVERT FOR FLOODING
- GD GRATED DRAIN
- HEADWALL OUTLET
- JUNCTION PIT
- GRATED INLET PIT
- SAG KERB INLET PIT
- SUBSOIL DRAINAGE LINE, ø100mm U.N.O.

EXISTING SERVICES LEGEND

- eEA EXISTING OVERHEAD ELECTRICAL
- eEU EXISTING UNDERGROUND ELECTRICAL
- eG EXISTING GAS
- eT EXISTING TELECOMMUNICATIONS
- eS EXISTING SEWER
- eW EXISTING WATER
- eSW EXISTING STORMWATER

NOTE:
SUBSOIL DRAINAGE TO BE PROVIDED BEHIND ALL KERBS, WALLS AND IN LANDSCAPING AREAS

WORKS NEAR EXISTING SERVICES
ALL EXISTING UNDERGROUND SERVICES ARE TO BE LOCATED ON SITE PRIOR TO COMMENCING WORKS

WORKS NEAR EXISTING TREES
PRECAUTIONS ARE TO BE UNDERTAKEN TO ENSURE EXISTING TREES IN THE VICINITY OF WORKS ARE NOT DAMAGED DURING CONSTRUCTION ACTIVITIES

HIGH PRESSURE GAS MAIN
PRECAUTIONS ARE TO BE UNDERTAKEN TO ENSURE HIGH PRESSURE GAS MAIN IN THE VICINITY OF WORKS IS NOT DAMAGED DURING CONSTRUCTION ACTIVITIES.
LIAISE WITH THE ASSET OWNER AS REQUIRED

HIGH VOLTAGE ELECTRICAL CABLE
PRECAUTIONS ARE TO BE UNDERTAKEN TO ENSURE HIGH VOLTAGE CABLE IN THE VICINITY OF WORKS IS NOT DAMAGED DURING CONSTRUCTION ACTIVITIES.
LIAISE WITH ASSET OWNER AS REQUIRED

EXISTING STORMWATER ASSETS
SIZE, INVERT LEVEL AND CONDITION OF ALL AFFECTED EXISTING STORMWATER ASSETS TO BE CONFIRMED PRIOR TO COMMENCING WORKS

0 2.5 5 7.5 10 12.5 15 17.5 20m
1:250 A1 1:500 A3

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

FileName: C104.dwg – USER: jheeh – Plot File Created: Feb 16, 2024 – 4:02pm

A1

Rev	Description	Eng	Draft	Date
P6	ISSUE FOR DA	GC	WW	10.11.22
P5	ISSUE FOR DA	GC	WW	09.11.22
P4	DRAFT DA	GC	WW	28.10.22
P3	DRAFT DA	GC	WW	25.10.22
P2	DRAFT DA	GC	WW	14.10.22
P1	FOR INFORMATION	GC	AW	28.07.22
P11	ISSUE FOR DA	ML	JH	16.02.24
P10	ISSUE FOR DA	GC	JH	12.10.23
P9	ISSUE FOR DA	GC	JH	29.09.23
P8	ISSUE FOR DRAFT	GC	SS	13.09.23
P7	ISSUE FOR DA	GC	WW	28.04.23

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Project
UNITING EDINGLASSIE EMU PLAINS

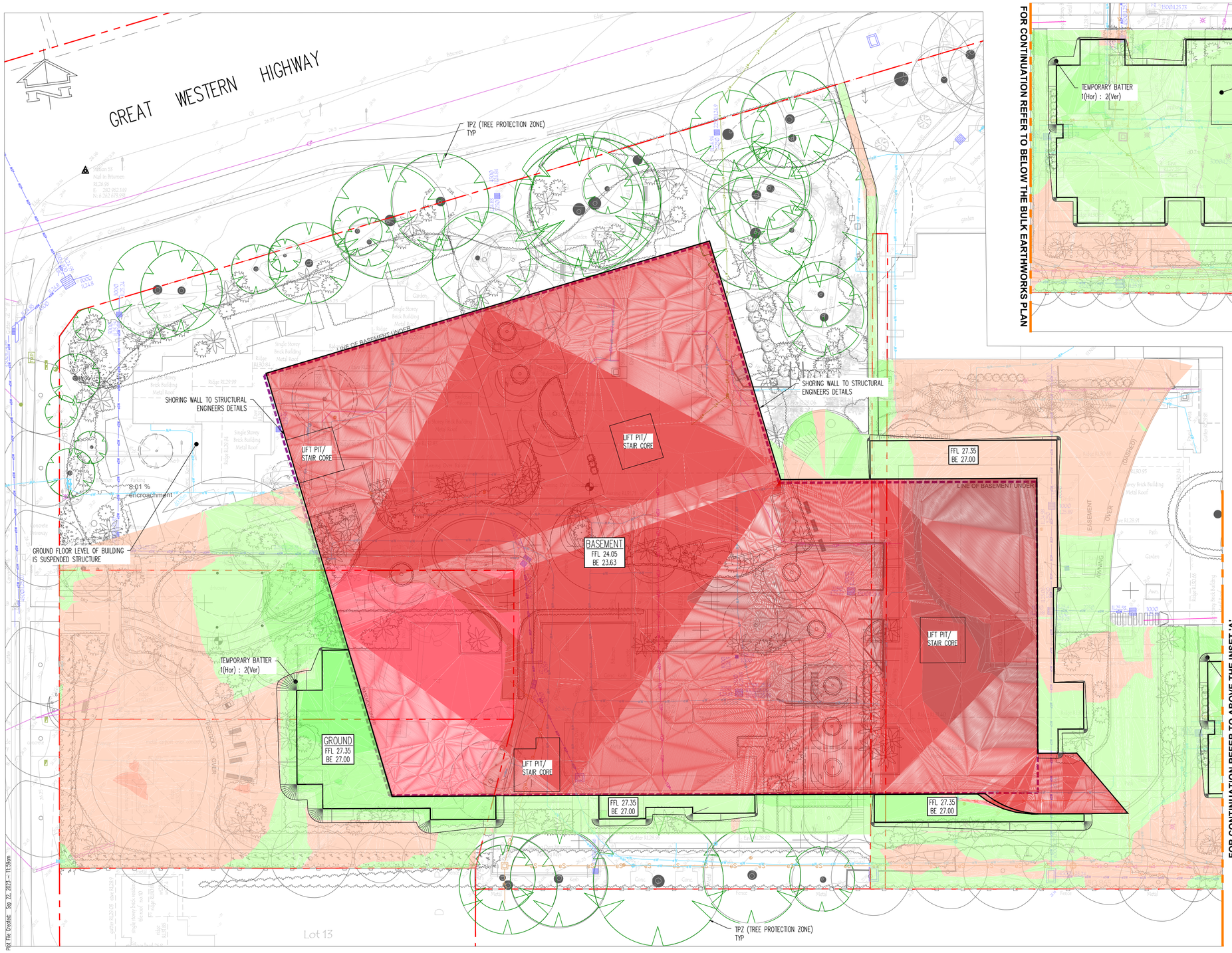
Sheet Subject
SITEWOEKS & STORMWATER MANAGEMENT PLAN

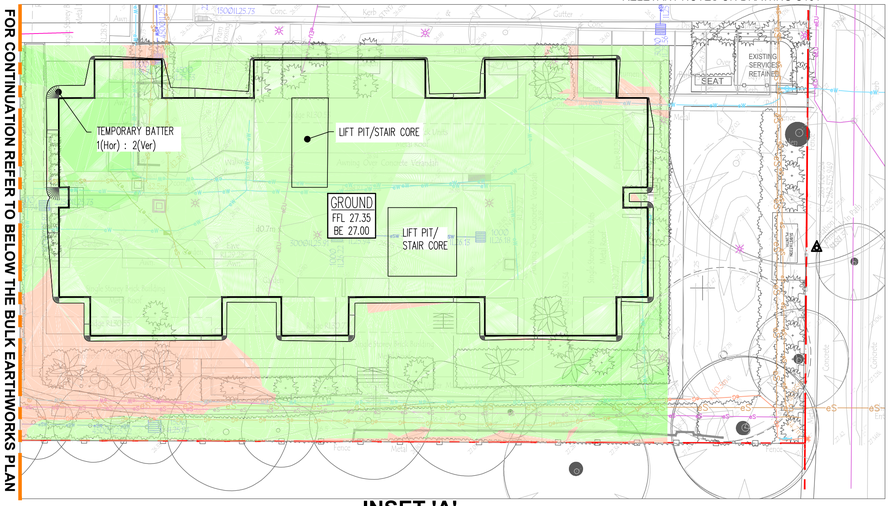
Scale : A1	Drawn	Authorised
1:250	SH	GC

Job No	Drawing No	Revision
211568	C104	P11

Plot File Created: Feb 16, 2024 - 4:02pm

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING C101





INSET 'A'

BULK EARTHWORKS PLAN

0 2.5 5 7.5 10 12.5 15 17.5 20m

1:250 A1 1:500 A3

A1

CUT/FILL SUMMARY

SITE AREA	CUT VOLUME	FILL VOLUME	TOTAL BALANCE
9,805 sq.m	13,510 Cu.m.	930 Cu.m.	12,580 Cu.m
			excess of cut over fill

NOTES:

1. TOPSOIL ASSUMED 150mm STRIPED
2. STRUCTURAL SLAB ON GROUND ASSUMED 350mm (250 SLAB PLUS 100mm ROADBASE)
3. BASEMENT SLAB 420mm (320 SLAB PLUS 100mm ROADBASE)
4. FOOTPATHS ASSUMED 220mm SETDOWN
5. LANDSCAPE ZONES ASSUMED 300mm DEPTH

BULK EARTHWORKS DEPTH RANGE TABLE

Lower_value		Upper_value		Colour
-4	to	-3.5	m	
-3.5	to	-3.0	m	
-3.0	to	-2.5	m	
-2.5	to	-2	m	
-2	to	-1.5	m	
-1.5	to	-1	m	
-1	to	-.5	m	
-.5	to	0.00	m	
0.00	to	0.5	m	
0.5	to	1	m	
1	to	1.5	m	
1.5	to	2	m	
2	to	2.5	m	
2.5	to	3	m	
3	to	3.5	m	
3.5	to	4	m	

BULK EARTHWORKS NOTES

1. All bulk earthworks setout from grid lines U.N.O.
2. All batters at a slope of 1(H) :2 (V) U.N.O.
3. Excavated material may be used as structural fill provided,
   (i) it complies with the specification requirements for fill material,
   (ii) the placement moisture content complies with the Geotechnical Consultants requirements, and allows filling to be placed and proofrolled in accordance with the specification. Where necessary the Contractor must moisture condition the excavated material to meet these requirements.
4. Compact fill areas and subgrade to not less than:

Location	Standard dry density (AS 1289 5.1.1.)	Moisture (OMC)
Under building slabs on ground:	98%	±2%
Under roads and carparks:	98%	±2%
Landscaped areas:	95%	±2%

5. Before placing fill, proof roll exposed subgrade with a 10 tonne minimum roller to test subgrade and then remove soft spots (areas with more than 3mm movement under roller). Soft spots to be replaced with GRANULAR fill U.N.O.
6. Contractor shall place safety barriers around excavations in accordance with relevant safety regulations.
7. For interpretation of bulk earthworks foot print line shown on the bulk earthworks drawings refer to the bulk earthworks construction legend.
8. Bulk earthwork drawings are not to be used for detailed excavation.
9. Refer to Geotechnical Report prepared by – EIAUSTRALIA, REF E25764.G03 DATED 15.09.22

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Rev	Description	Eng	Draft	Date
P3	ISSUE FOR DRAFT	GC	LW	???
P2	DRAFT DA	GC	WW	14.10.22
P1	FOR INFORMATION	GC	AW	28.07.22

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Project
UNITING EDINGLASSIE EMU PLAINS

Sheet Subject
BULK EARTHWORKS CUT AND FILL PLAN

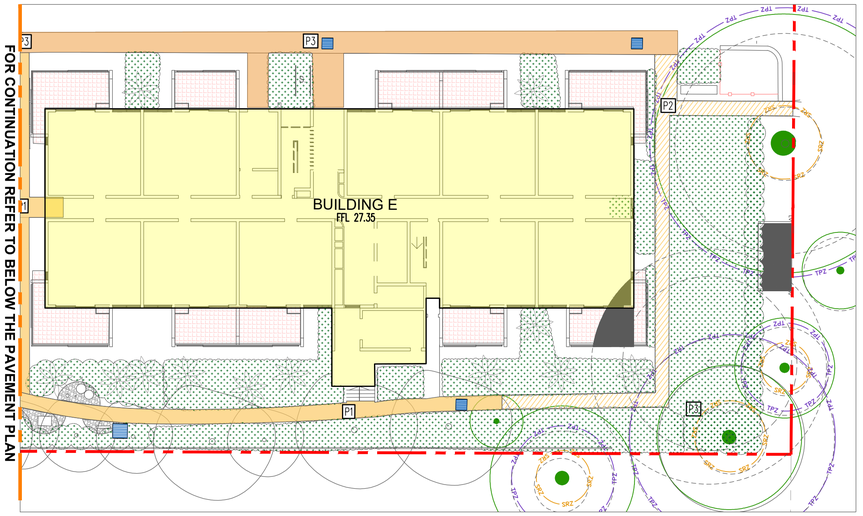
Scale : A1	Drawn	Authorised
1:250	SH	GC

Job No	Drawing No	Revision
211568	C105	P3

Plot File Created: Sep 22, 2023 - 11:59am

FileName: C105.dwg – USER: jhein – Plot File Created: Sep 22, 2023 - 11:59am

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING C101



INSET 'A'

PAVEMENT LEGEND

NOTE

– Asphaltic concrete shall conform to AS2150 and the specification

P1	PEDESTRIAN PAVEMENT REFER TO LANDSCAPE ARCHITECT'S DETAIL.
P2	PEDESTRIAN PAVEMENT REFER TO LANDSCAPE ARCHITECT'S DETAIL.
P3	PEDESTRIAN PAVEMENT REFER TO LANDSCAPE ARCHITECT'S DETAIL.
P4	PEDESTRIAN PAVEMENT REFER TO LANDSCAPE ARCHITECT'S DETAIL.
P5	VEHICULAR PAVEMENT
	LANDSCAPING

0 2.5 5 7.5 10 12.5 15 17.5 20m

1:250 A1 1:500 A3

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

FileName: C106.dwg – USER: jheath – Plot File Created: Feb 16, 2024 - 2:57pm

A1

Rev	Description	Eng	Draft	Date
P2	ISSUE FOR DA	CC	JH	16.02.24
P1	ISSUE FOR DA	CC	JHH	29.09.23

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Project
UNITING EDINGLASSIE EMU PLAINS

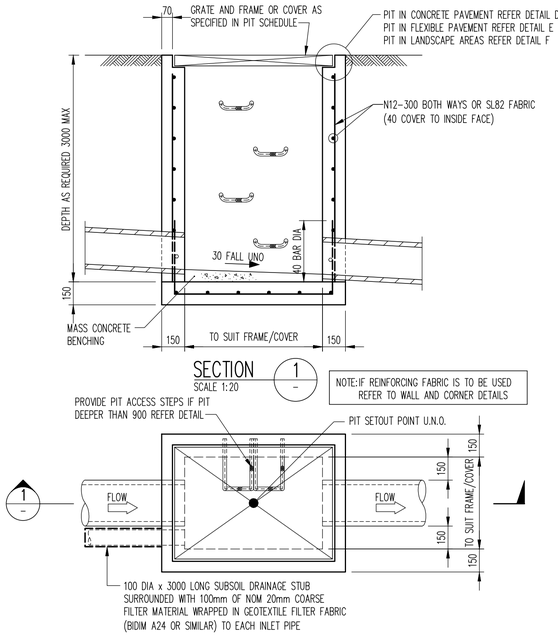
Sheet Subject
PAVEMENT PLAN

Scale : A1	Drawn	Authorised
1:250	SH	GC

Job No	Drawing No	Revision
211568	C106	P2

Plot File Created: Feb 16, 2024 - 2:57pm

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING C101

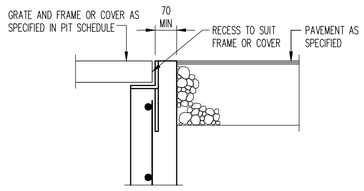


SECTION 1 –
SCALE 1:20

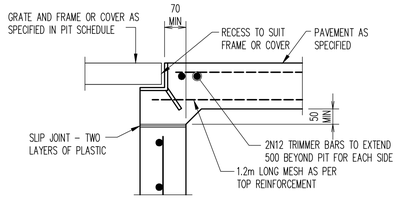
NOTE:IF REINFORCING FABRIC IS TO BE USED REFER TO WALL AND CORNER DETAILS

PLAN
SCALE 1: 20

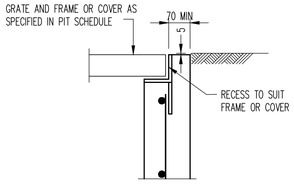
PIT TYPE A



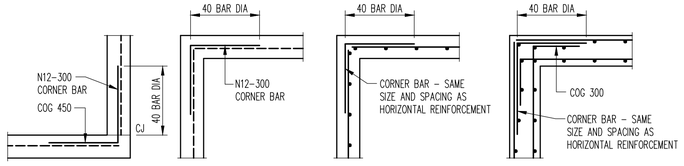
DETAIL E
SCALE 1: 10



DETAIL D
SCALE 1: 10



DETAIL F
SCALE 1: 10

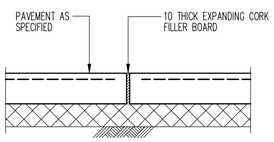


ELEVATION AT BASE | PLAN | PLAN–SINGLE LAYER | PLAN–DOUBLE LAYER

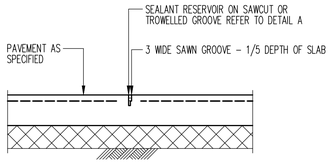
FABRIC REINFORCEMENT

PIT CORNER DETAILS
SCALE 1: 20

DESIGNER TO VERIFY EXTENT OF DETAILING

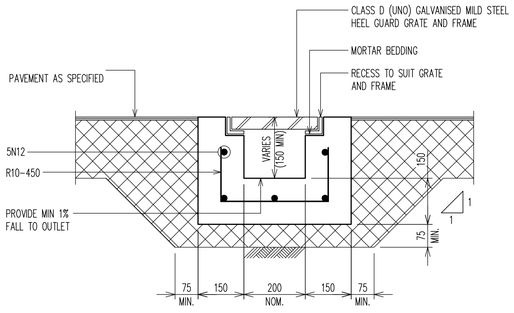


EXPANSION JOINT (EJ)
SCALE 1: 20

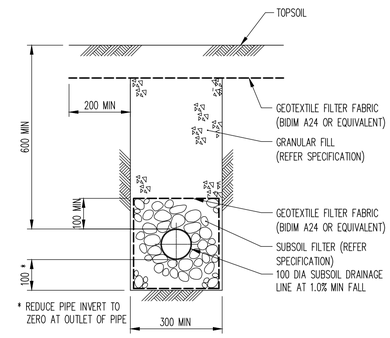


WEAKENED PLANE JOINT (WPJ)
SCALE 1: 20

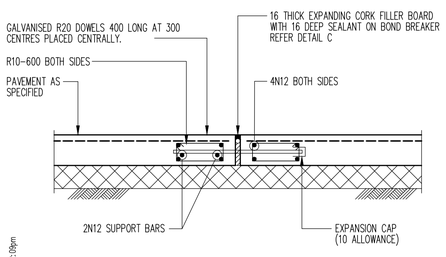
NOTE:REFER TO JOINTING NOTES, POINT 5 FOR TIMING OF SAW CUTS.



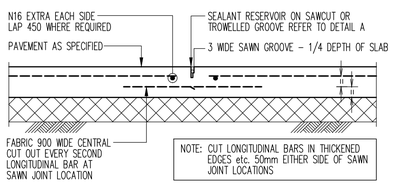
GRATED DRAIN TYPE A (GD)
SCALE 1:10



SUBSOIL IN LANDSCAPED AREAS
SCALE 1: 10

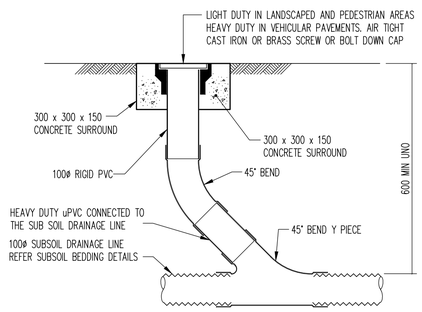


DOWELLED EXPANSION JOINT (DEJ)
SCALE 1: 20

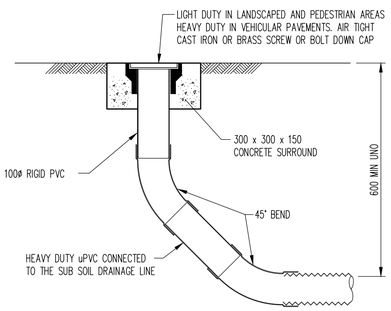


SAWN CONTROL JOINT (SJ)
SCALE 1: 20

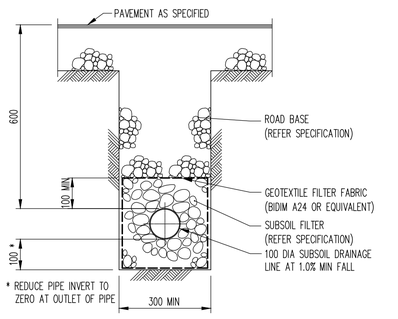
NOTE:REFER TO JOINTING NOTES, POINT 5 FOR TIMING OF SAW CUTS.



INTERMEDIATE RISER (IR)
SCALE 1: 10



FLUSHING POINT (FP)
SCALE 1: 10



SUBSOIL IN PAVED AREAS
SCALE 1: 10

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

FileName: C110.dwg – USER: jheeh – Plot File Created: Feb 16, 2024 - 2:09pm

A1

Rev	Description	Eng	Draft	Date
P3	ISSUE FOR DA	ML	JH	16.02.24
P2	ISSUE FOR DA	GC	WW	09.11.22
P1	DRAFT DA	ML	SH	14.10.22

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Project: UNITING EDINGLASSIE EMU PLAINS

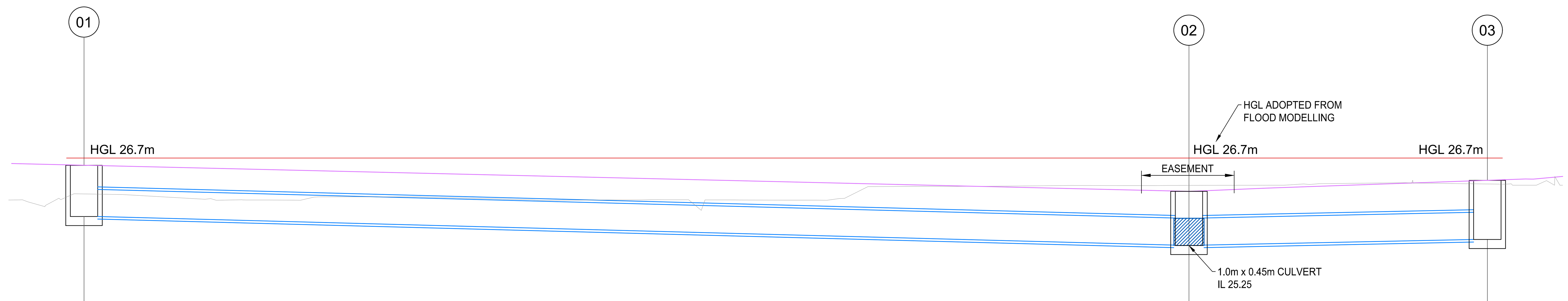
Sheet Subject: MASTER PLAN DETAILS SHEET

Scale : A1	Drawn	Authorised
AS SHOWN	SH	-

Job No	Drawing No	Revision
211568	C110	P3

Plot File Created: Feb 16, 2024 - 2:09pm

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING C101



	01 – 02	02 – 03
PIPE SIZE & CLASS	450Ø 2	450Ø 2
PIPE GRADE	1.3%	-1.0%
PIPE CAPACITY (L/s)	325.1 L/s	285.1 L/s
1% AEP DISCHARGE (L/s)	155.5 L/s	123.9 L/s

DATUM RL 19.00

	01	02	02	03	03
DEPTH TO INVERT	0.46	0.90	0.90	0.98	0.98
PIPE INVERT LEVEL	25.73	25.25	25.25	25.35	25.35
PROPOSED SURFACE LEVEL	26.58		26.15		26.36
EXISTING SURFACE LEVEL	26.10		26.25		26.27
CHAINAGE	0.00		36.63		46.52

STORMWATER PIPE LONGITUDINAL SECTION

Horizontal Scale 1:100
Vertical Scale 1:50

Filename: C120.dwg – USER: jheeh – Plot File Created: Feb 16, 2024 – 4:57pm

A1

PRELIMINARY
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Rev	Description	Eng	Draft	Date
P1	ISSUE FOR DA	ML	JH	16.02.24

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Project: UNITING EDINGLASSIE EMU PLAINS

Sheet Subject: STORMWATER DRAINAGE LONGITUDINAL SECTION SHEET 1

Scale : A1 AS SHOWN | Drawn JH | Authorised -

Job No 211568 | Drawing No C120 | Revision P1

Plot File Created: Feb 16, 2024 - 4:57pm

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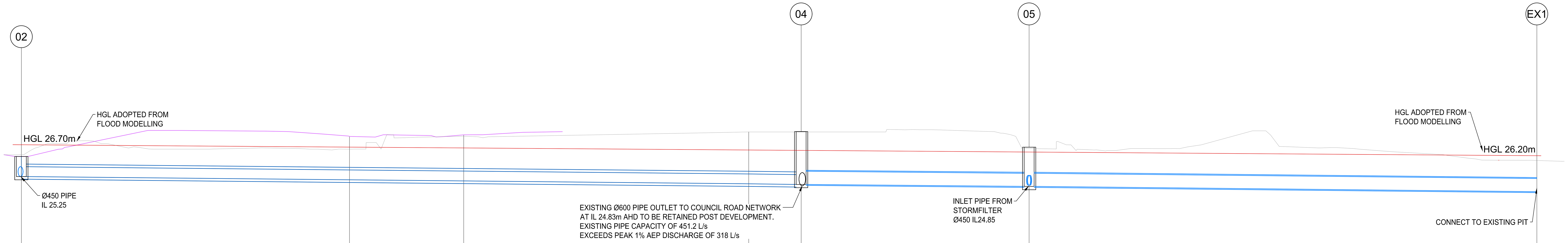

	02–(29.92)	(29.92)–(40.34)	(40.34)–(66.32)	(66.32)–04	04–05	05–EX1
PIPE SIZE & CLASS	1000 x 450 BC	1000 x 450 BC	1000 x 450 BC	1000 x 450 BC	600Ø 2	600Ø 2
PIPE GRADE	0.5%	0.5%	0.5%	0.6%	0.4%	0.5%
PIPE CAPACITY (L/s)	718.0 L/s	718.0 L/s	718.0 L/s	786.5 L/s	388.3 L/s	434.2 L/s
1% AEP DISCHARGE (L/s)	409.0 L/s	409.0 L/s	409.0 L/s	409.0 L/s	143.0 L/s	296.0 L/s

DATUM RL 12.00

DEPTH TO INVERT	0.91	1.98 / 1.98	2.10 / 2.10	0.48 / 0.48	2.41 / 2.41	1.79 / 1.79	1.42 / 1.42
PIPE INVERT LEVEL	25.25	25.10 / 25.10	25.05 / 25.05	24.92 / 24.92	24.89 / 24.89	24.80 / 24.80	24.56 / 24.56
PROPOSED SURFACE LEVEL	26.15	27.08	27.15	25.40	27.30	26.59	25.98
EXISTING SURFACE LEVEL	26.25	26.50	27.09	27.28	27.28	26.52	25.98
CHAINAGE	0.00	29.92	40.34	66.32	71.11	91.90	138.20

STORMWATER PIPE LONGITUDINAL SECTION

Horizontal Scale 1:200
Vertical Scale 1:100

Filename: C121.dwg - USER: jheeh - Plot File Created: Feb 16, 2024 - 4:58pm

A1

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Rev	Description	Eng	Draft	Date
P1	ISSUE FOR DA	ML	JH	16.02.24

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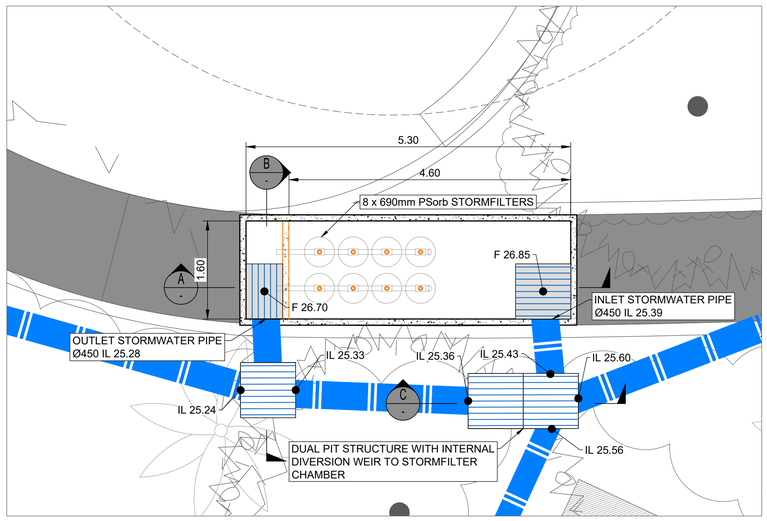
Project: UNITING EDINGLASSIE EMU PLAINS

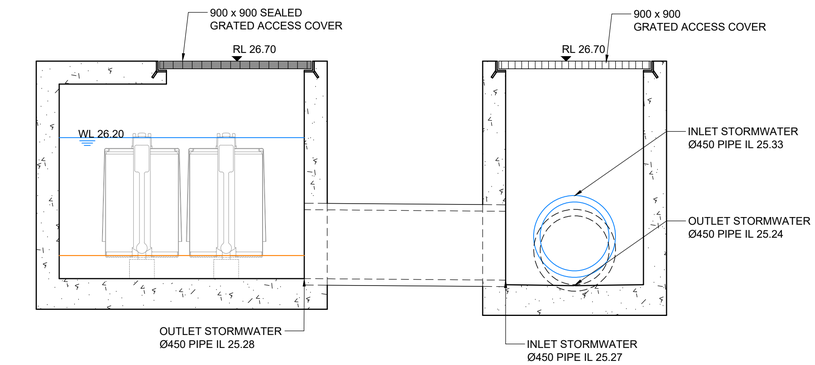
Sheet Subject: STORMWATER DRAINAGE LONGITUDINAL SECTION SHEET 2

Scale : A1: AS SHOWN
Drawn: JH
Authorised: -
Job No: 211568
Drawing No: C121
Revision: P1
Plot File Created: Feb 16, 2024 - 4:58pm

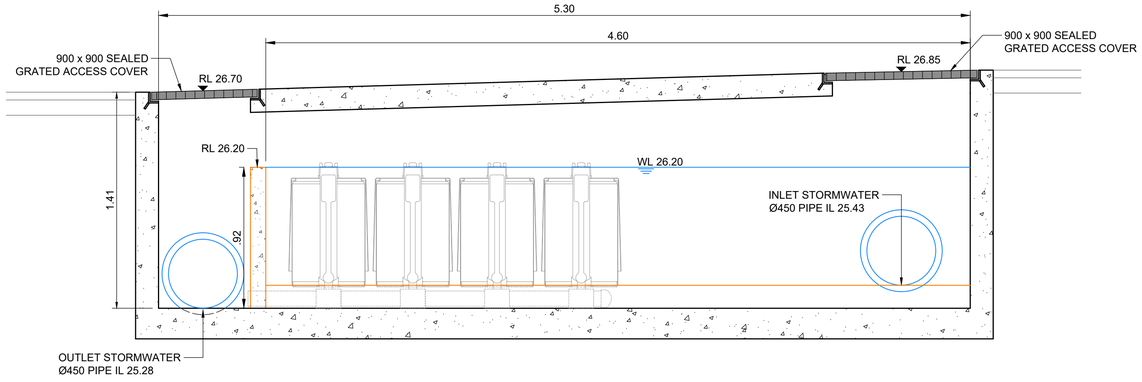
THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING C101



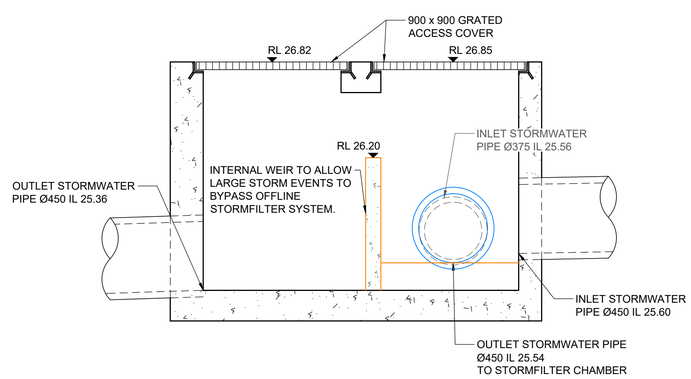
PLAN
SCALE 1:50



SECTION B
SCALE 1:20



SECTION A
SCALE 1:20



SECTION C
SCALE 1:20

FileName: C130.dwg - USER: jheath - Plot File Created: Feb 16, 2024 - 11:11am

A1

PRELIMINARY
NOT TO BE USED
FOR CONSTRUCTION

Rev	Description	Eng	Draft	Date
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Project
UNITING EDINGLASSIE EMU PLAINS

Sheet Subject
STORMFILTER CHAMBER 1
PLAN AND CROSS SECTIONS
SHEET

Scale : A1	Drawn	Authorised
AS SHOWN	JH	-

Job No	Drawing No	Revision
211568	C130	P1

Plot File Created: Feb 16, 2024 - 11:11am

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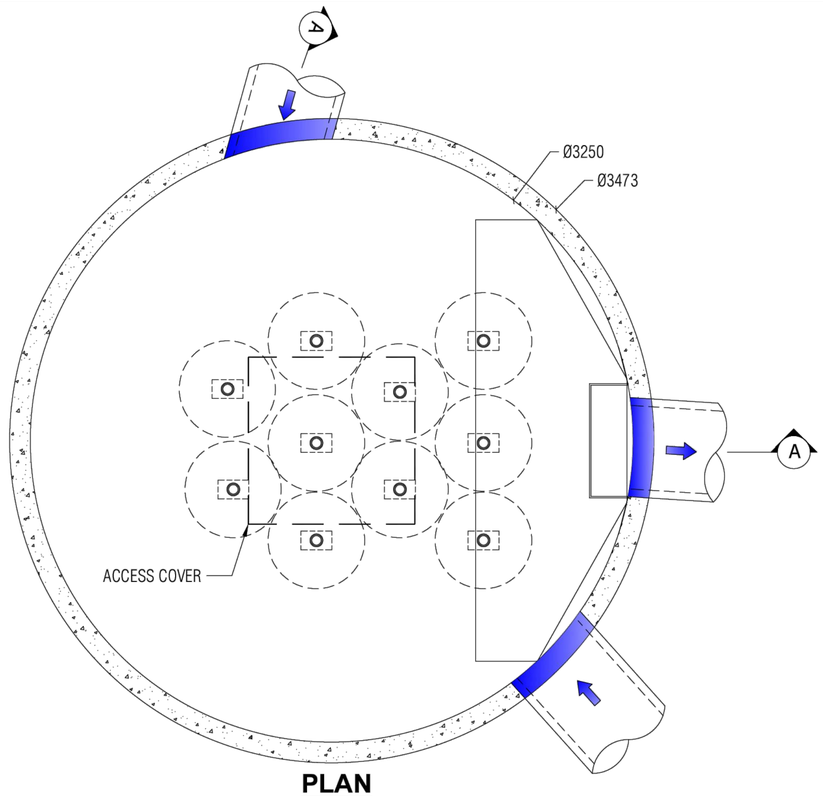
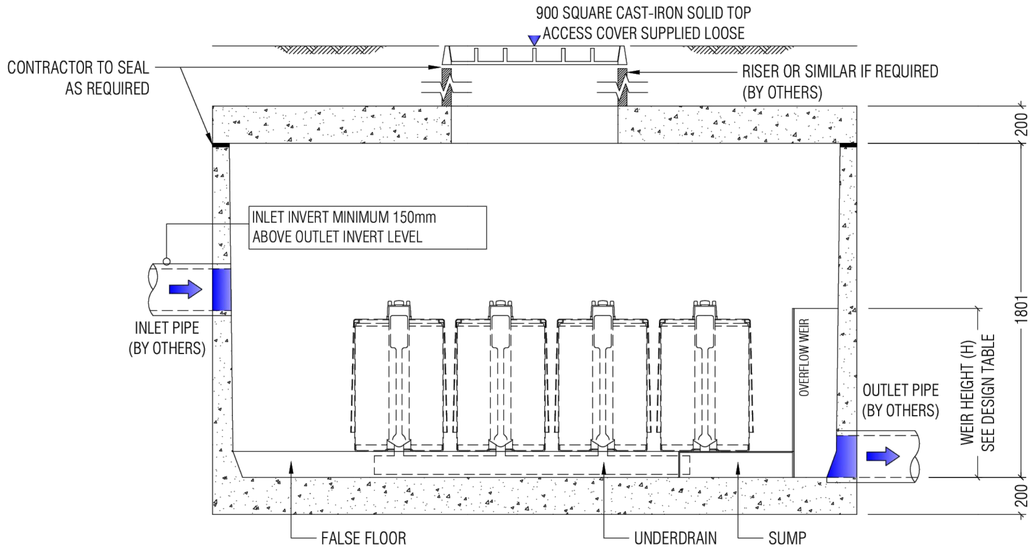
NOT FOR CONSTRUCTION



PLAN



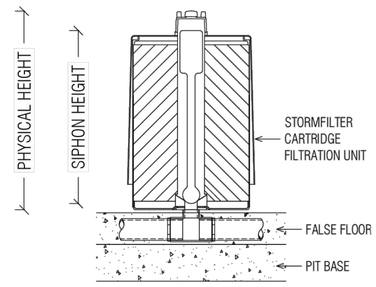
SECTION A-A

LAST MODIFIED: 09-11-18

STORMFILTER DESIGN TABLE

- STORMFILTER TREATMENT CAPACITY VARIES BY NUMBER OF FILTER CARTRIDGES INSTALLED.
- THE STANDARD CONFIGURATION IS SHOWN. ACTUAL CONFIGURATION OF THE SPECIFIED STRUCTURE(S) PER CERTIFYING ENGINEER WILL BE SHOWN ON SUBMITTAL DRAWING(S).
- FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF-CLEANING. RADIAL MEDIA DEPTH SHALL BE 178mm.

CARTRIDGE NAME / SIPHON HEIGHT (mm)	690	460	310
CARTRIDGE PHYSICAL HEIGHT (mm)	840	600	600
TYPICAL WEIR HEIGHT [H] (mm)	920	690	540
CARTRIDGE FLOW RATE FOR ZPG MEDIA (L/s)	1.6	1.1	0.7
CARTRIDGE FLOW RATE FOR PSORB MEDIA (L/s)	0.9	0.46	0.39



STORMFILTER CARTRIDGE DETAIL

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	[ ]
NUMBER OF CARTRIDGES REQ'D	10
SIPHON HEIGHT (310 / 460 / 690)	[690mm]
MEDIA TYPE (ZPG / PSORB)	[PSORB]
WATER QUALITY FLOW RATE (L/S)	[7.2 L/s]
HYDRAULIC CAPACITY (L/S)	90

PIPE DATA:	I.L.	MATERIAL	DIAMETER
INLET PIPE #1	[25.27]	[PVC]	[0.45]
INLET PIPE #2	[25.27]	[PVC]	[0.45]
INLET PIPE #3	[ ]	[ ]	[ ]
OUTLET PIPE	[25.12]	[PVC]	[0.45]

PRECAST MANHOLE WEIGHT	12,000kg
PRECAST LID WEIGHT	4,500kg

GENERAL NOTES

1. PRECAST STRUCTURE SUPPLIED WITH CORE HOLES TO SUIT OUTER DIAMETER OF NOMINATED PIPE SIZE / MATERIAL.
2. PRECAST STRUCTURE SHALL MEET W80 WHEEL LOAD RATING ASSUMING A MAXIMUM EARTH COVER OF 2.0m AND A GROUND WATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. CERTIFYING ENGINEER TO CONFIRM ACTUAL GROUNDWATER ELEVATION. PRECAST STRUCTURE SHALL BE IN ACCORDANCE WITH AS3600.
3. IF THE PEAK FLOW RATE, AS DETERMINED BY THE SITE CERTIFYING ENGINEER, EXCEEDS THE PEAK HYDRAULIC CAPACITY OF THE SYSTEM, AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.
4. ALL WATER QUALITY TREATMENT DEVICES REQUIRE PERIODIC MAINTENANCE. REFER TO OPERATION AND MAINTENANCE MANUAL FOR GUIDELINES AND ACCESS REQUIREMENTS.
5. SITE SPECIFIC PRODUCTION DRAWING WILL BE PROVIDED ON PLACEMENT OF ORDER.
6. DRAWING NOT TO SCALE.

INSTALLATION NOTES

1. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY CERTIFYING ENGINEER.
2. CONTRACTOR TO PROVIDE ALL EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE (LIFTING DETAIL PROVIDED SEPARATELY).
3. CONTRACTOR TO APPLY SEALANT TO ALL JOINTS AND TO PROVIDE, INSTALL AND GROUT INLET AND OUTLET PIPES.

OCEAN PROTECT

PHONE: 1300 354 722 www.oceanprotect.com.au

OCEAN PROTECT
10 CARTRIDGE STORMFILTER SYSTEM
DN3250 MANHOLE
SPECIFICATION DRAWING

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

FileName: C131.dwg – USER: jhein – Plot File Created: Feb 16, 2024 – 3:36pm

A1

Rev	Description	Eng	Draft	Date
P1	ISSUE FOR DA	ML	JH	16.02.24

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Project
UNITING EDINGLASSIE EMU PLAINS

Sheet Subject
STORMFILTER CHAMBER 2 PLAN AND CROSS SECTIONS SHEET

Scale : A1 AS SHOWN | Drawn JH | Authorised -
Job No 211568 | Drawing No C131 | Revision P1
Plot File Created: Feb 16, 2024 - 3:36pm

Appendix B

MUSIC-Link Report

PENRITH CITY COUNCIL

music@link

MUSIC-*link* Report

Project Details		Company Details	
Project:	Uniting Edinglassie ILU_For Review	**Company:**	Taylor Thomson Whitting (TTW)
Report Export Date:	14/02/2024	**Contact:**	Mitchell Leighton
Catchment Name:	240214_Design DA_For Council Review	**Address:**	Lvl 6, 73 Miller Street
Catchment Area:	1.287ha	**Phone:**	94397288
Impervious Area*:	55.69%	**Email:**	Mitchell.Leighton@ttw.com.au
Rainfall Station:	67113 PENRITH		
Modelling Time-step:	6 Minutes		
Modelling Period:	1/01/1999 - 31/12/2008 11:54:00 PM		
Mean Annual Rainfall:	691mm		
Evapotranspiration:	1158mm		
MUSIC Version:	6.3.0		
MUSIC-link data Version:	6.34		
Study Area:	Penrith		
Scenario:	Penrith Development		

* takes into account area from all source nodes that link to the chosen reporting node, excluding Import Data Nodes

Treatment Train Effectiveness

Node: Receiving Node	Reduction
Flow	-0.00425%
TSS	87.9%
TP	68.1%
TN	45%
GP	100%

Treatment Nodes

Node Type	Number
Sedimentation Basin Node	2
Swale Node	4
Generic Node	2
GPT Node	10

Source Nodes

Node Type	Number
Urban Source Node	24

Comments

Swales modelled in accordance with Council fill requirements regarding Overland Flow flood water conveyance per Civil DA Report. StormFilter nodes including basin and cartridge filtration units are modelled in accordance with Council MUSIC modelling guidlines using parameters provided to TTW by the water quality device manufacturer Ocean Protect as approved for use in Council.

Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
GPT	1 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	99	0.02
GPT	1 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	99	0.02
GPT	1 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	99	0.02
GPT	1 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	99	0.02
GPT	1 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	99	0.02
GPT	1 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	99	0.02
GPT	1 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	99	0.02
GPT	1 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	99	0.02
GPT	1 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	99	0.02
GPT	2 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	99	0.04
Receiving	Receiving Node	% Load Reduction	None	None	-0.00
Receiving	Receiving Node	GP % Load Reduction	90	None	100
Receiving	Receiving Node	TN % Load Reduction	45	None	45
Receiving	Receiving Node	TP % Load Reduction	60	None	68.1
Receiving	Receiving Node	TSS % Load Reduction	85	None	87.9
Sedimentation	SF Chamber 1_(4600x1600)	High Flow Bypass Out (ML/yr)	None	None	0
Sedimentation	SF Chamber 2_Pre-Cast (DIA 3250)	High Flow Bypass Out (ML/yr)	None	None	0
Swale	Swale E	Bed slope	0.01	0.05	0.01
Urban	Bypass E	Area Impervious (ha)	None	None	0.020
Urban	Bypass E	Area Pervious (ha)	None	None	0.041
Urban	Bypass E	Total Area (ha)	None	None	0.062
Urban	Bypass W	Area Impervious (ha)	None	None	0.006
Urban	Bypass W	Area Pervious (ha)	None	None	0.143
Urban	Bypass W	Total Area (ha)	None	None	0.15
Urban	Cat E1 (870 sq.m)	Area Impervious (ha)	None	None	0.031
Urban	Cat E1 (870 sq.m)	Area Pervious (ha)	None	None	0.055
Urban	Cat E1 (870 sq.m)	Total Area (ha)	None	None	0.087
Urban	Cat E2 (250 sq.m)	Area Impervious (ha)	None	None	0.007
Urban	Cat E2 (250 sq.m)	Area Pervious (ha)	None	None	0.017
Urban	Cat E2 (250 sq.m)	Total Area (ha)	None	None	0.025
Urban	Cat E3	Area Impervious (ha)	None	None	0.019
Urban	Cat E3	Area Pervious (ha)	None	None	0.023
Urban	Cat E3	Total Area (ha)	None	None	0.043
Urban	Cat E4	Area Impervious (ha)	None	None	0.039
Urban	Cat E4	Area Pervious (ha)	None	None	0.008
Urban	Cat E4	Total Area (ha)	None	None	0.048
Urban	Cat E5 (950 sq.m)	Area Impervious (ha)	None	None	0.023
Urban	Cat E5 (950 sq.m)	Area Pervious (ha)	None	None	0.071
Urban	Cat E5 (950 sq.m)	Total Area (ha)	None	None	0.095
Urban	Cat E6	Area Impervious (ha)	None	None	0.015

Only certain parameters are reported when they pass validation

Node Type	Node Name	Parameter	Min	Max	Actual
Urban	Cat E6	Area Pervious (ha)	None	None	0.028
Urban	Cat E6	Total Area (ha)	None	None	0.044
Urban	Cat E7 (130 sq.m)	Area Impervious (ha)	None	None	0.011
Urban	Cat E7 (130 sq.m)	Area Pervious (ha)	None	None	0.001
Urban	Cat E7 (130 sq.m)	Total Area (ha)	None	None	0.013
Urban	Cat E8 (240 sq.m)	Area Impervious (ha)	None	None	0.007
Urban	Cat E8 (240 sq.m)	Area Pervious (ha)	None	None	0.016
Urban	Cat E8 (240 sq.m)	Total Area (ha)	None	None	0.024
Urban	Cat E9	Area Impervious (ha)	None	None	0.004
Urban	Cat E9	Area Pervious (ha)	None	None	0.011
Urban	Cat E9	Total Area (ha)	None	None	0.016
Urban	Cat W1 (568 sq.m)	Area Impervious (ha)	None	None	0.022
Urban	Cat W1 (568 sq.m)	Area Pervious (ha)	None	None	0.034
Urban	Cat W1 (568 sq.m)	Total Area (ha)	None	None	0.057
Urban	Cat W2 (787 sq.m)	Area Impervious (ha)	None	None	0.019
Urban	Cat W2 (787 sq.m)	Area Pervious (ha)	None	None	0.059
Urban	Cat W2 (787 sq.m)	Total Area (ha)	None	None	0.079
Urban	Cat W3 (69 sq.m)	Area Impervious (ha)	None	None	0.002
Urban	Cat W3 (69 sq.m)	Area Pervious (ha)	None	None	0.004
Urban	Cat W3 (69 sq.m)	Total Area (ha)	None	None	0.007
Urban	Cat W4 (53 sq.m)	Area Impervious (ha)	None	None	0.001
Urban	Cat W4 (53 sq.m)	Area Pervious (ha)	None	None	0.003
Urban	Cat W4 (53 sq.m)	Total Area (ha)	None	None	0.005
Urban	Cat W5 (139 sq.m)	Area Impervious (ha)	None	None	0.011
Urban	Cat W5 (139 sq.m)	Area Pervious (ha)	None	None	0.002
Urban	Cat W5 (139 sq.m)	Total Area (ha)	None	None	0.014
Urban	Cat W6 (95 sq.m)	Area Impervious (ha)	None	None	0.003
Urban	Cat W6 (95 sq.m)	Area Pervious (ha)	None	None	0.006
Urban	Cat W6 (95 sq.m)	Total Area (ha)	None	None	0.01
Urban	Cat W7 (241 sq.m)	Area Impervious (ha)	None	None	0.009
Urban	Cat W7 (241 sq.m)	Area Pervious (ha)	None	None	0.014
Urban	Cat W7 (241 sq.m)	Total Area (ha)	None	None	0.024
Urban	Cat W9_GD (305 sq.m)	Area Impervious (ha)	None	None	0.006
Urban	Cat W9_GD (305 sq.m)	Area Pervious (ha)	None	None	0.024
Urban	Cat W9_GD (305 sq.m)	Total Area (ha)	None	None	0.031
Urban	Roof A	Area Impervious (ha)	None	None	0.096
Urban	Roof A	Area Pervious (ha)	None	None	0
Urban	Roof A	Total Area (ha)	None	None	0.096
Urban	Roof B (760 sq.m)	Area Impervious (ha)	None	None	0.076
Urban	Roof B (760 sq.m)	Area Pervious (ha)	None	None	0

Only certain parameters are reported when they pass validation

Node Type	Node Name	Parameter	Min	Max	Actual
Urban	Roof B (760 sq.m)	Total Area (ha)	None	None	0.076
Urban	Roof C	Area Impervious (ha)	None	None	0.11
Urban	Roof C	Area Pervious (ha)	None	None	0
Urban	Roof C	Total Area (ha)	None	None	0.11
Urban	Roof D (950 sq.m)	Area Impervious (ha)	None	None	0.095
Urban	Roof D (950 sq.m)	Area Pervious (ha)	None	None	0
Urban	Roof D (950 sq.m)	Total Area (ha)	None	None	0.095
Urban	Roof E (760 sq.m)	Area Impervious (ha)	None	None	0.076
Urban	Roof E (760 sq.m)	Area Pervious (ha)	None	None	0
Urban	Roof E (760 sq.m)	Total Area (ha)	None	None	0.076

Only certain parameters are reported when they pass validation

Failing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Sedimentation	SF Chamber 1_(4600x1600)	Notional Detention Time (hrs)	8	12	0.137
Sedimentation	SF Chamber 1_(4600x1600)	Total Nitrogen - k (m/yr)	500	500	1
Sedimentation	SF Chamber 1_(4600x1600)	Total Phosphorus - k (m/yr)	6000	6000	1
Sedimentation	SF Chamber 1_(4600x1600)	Total Suspended Solids - k (m/yr)	8000	8000	1
Sedimentation	SF Chamber 2_Pre-Cast (DIA3250)	Notional Detention Time (hrs)	8	12	0.134
Sedimentation	SF Chamber 2_Pre-Cast (DIA3250)	Total Nitrogen - k (m/yr)	500	500	1
Sedimentation	SF Chamber 2_Pre-Cast (DIA3250)	Total Phosphorus - k (m/yr)	6000	6000	1
Sedimentation	SF Chamber 2_Pre-Cast (DIA3250)	Total Suspended Solids - k (m/yr)	8000	8000	1
Swale	2x StormFilter Bypass Swales	Bed slope	0.01	0.05	0.005
Swale	Overland Flow Flood Conveyance Swale	Bed slope	0.01	0.05	0.005
Swale	Swale W	Bed slope	0.01	0.05	0.005

Only certain parameters are reported when they pass validation