BUNGENDORE HIGH SCHOOL

CIVIL ENGINEERING REPORT

Prepared for: NSW Department of Education
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ISSUE AUTHORISATION

PROJECT: Bungendore High School
Project No: 218485

Rev	Date	Purpose of Issue / Nature of Revision	Prepared by	Reviewed by	Issue Authorised by
001	28/01/2025	For Comment	MV	MJD	MJD
002	03/02/2025	Stat Planning Comments	MV	MJD	MJD
003	07/02/2025	Planning Consultant Comments	MJD	MJD	MJD
004	12/02/2025	Final	MJD	MJD	MJD
005	26/02/2025	Final (Site Description Updated)	MJD	MJD	MJD
006	17/03/2025	Assessment Team Comments	MJD	MJD	MJD

Executive Summary

enstruct have been engaged by Schools Infrastructure NSW (SINSW), on behalf of the NSW Department of Education, to provide civil engineering consultancy services and design development of Bungendore High School (hereafter BHS).

This Civil Engineering report has been prepared to support a Review of Environmental Factors (REF) report for the NSW Department of Education (DoE) for the construction and operation of the new Bungendore High School (the activity).

The report covers the following:

- Existing site conditions
- Stormwater treatment quality and quantity including onsite stormwater detention (OSD)
- Bulk Earthworks
- Erosion and Sediment control
- Pavement Design

Contents

1. Introduction

This Civil Engineering Report has been prepared to support a Review of Environmental Factors (REF) for the NSW Department of Education (DoE) for the construction and operation of the new high school at Bungendore (the activity).

The purpose of the REF is to assess the potential environmental impacts of the activity prescribed by State Environmental Planning Policy (Transport and Infrastructure) 2021 (T&I SEPP) as "development permitted without consent" on land carried out by or on behalf of a public authority under Part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act). The activity is to be undertaken pursuant to Chapter 3, Part 3.4, Section 3.37A of the T&I SEPP.

This document has been prepared in accordance with the Guidelines for Division 5.1 assessments (the Guidelines) by the Department of Planning, Housing and Infrastructure (DPHI) as well as the Addendum Division 5.1 guidelines for schools and Addendum October 2024 (Consideration of environmental factors for health services facilities and schools).

The purpose of this report is to evaluate the environmental impacts of the proposed Civil Engineering works and outline the mitigation measures proposed in response.

The NSW Department of Education (DoE) is the proponent and determining authority pursuant to Section 5.1 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

The Minister for Education and Early Learning is the landowner.

1.1 Site Description

The current street address is part of 18 Harp Avenue, Bungendore, NSW, 2621 (the site), and is legally described as part Lot 125 in Deposited Plan 1297613. As shown at **Figure 1**, the proposed school site forms part of a larger lot which is the subject of a proposed residential subdivision.

The site is located within the North Bungendore Precinct (Elm Grove Estate) in Bungendore. As a result of precinct wide rezonings, the surrounding locality is currently transitioning from a semi-rural residential area to an urbanised area with new low density residential development.

The site is zoned R2 Low Density Residential, with all adjoining land also zoned R2 Low Density Residential.

The site has three frontages:

- Approx 500m southern frontage to Birchfield Drive.
- Approx 500m northern frontage to Bridget Avenue.
- Approx 100m eastern frontage to Winyu Rise.

The site is currently cleared of all vegetation and consists of grassland, having been prepared for the purposes of future low density residential development.

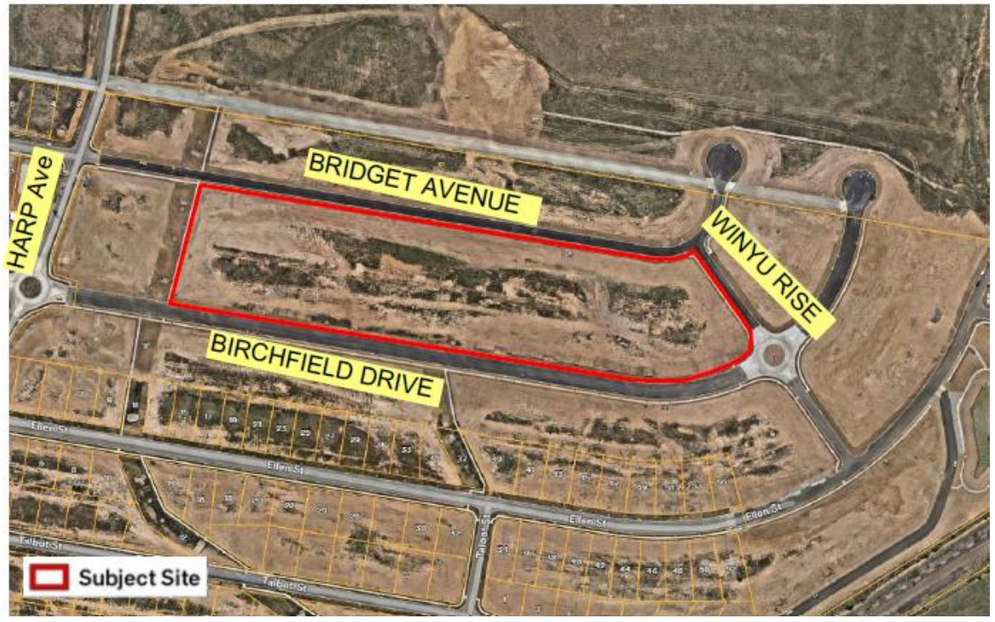


Figure 1: Aerial Photograph of the Site (Source: Urbis, 2024)

The subject site falls within the Local Government Area of the Queanbeyan-Palerang Regional Council (QPRC).

The site slopes from a high point of approximately RL 748m at Bridget Avenue in the north to low points of approximately RL 730m at the south eastern boundary, and approximately RL 720m at the south western boundary of the site.

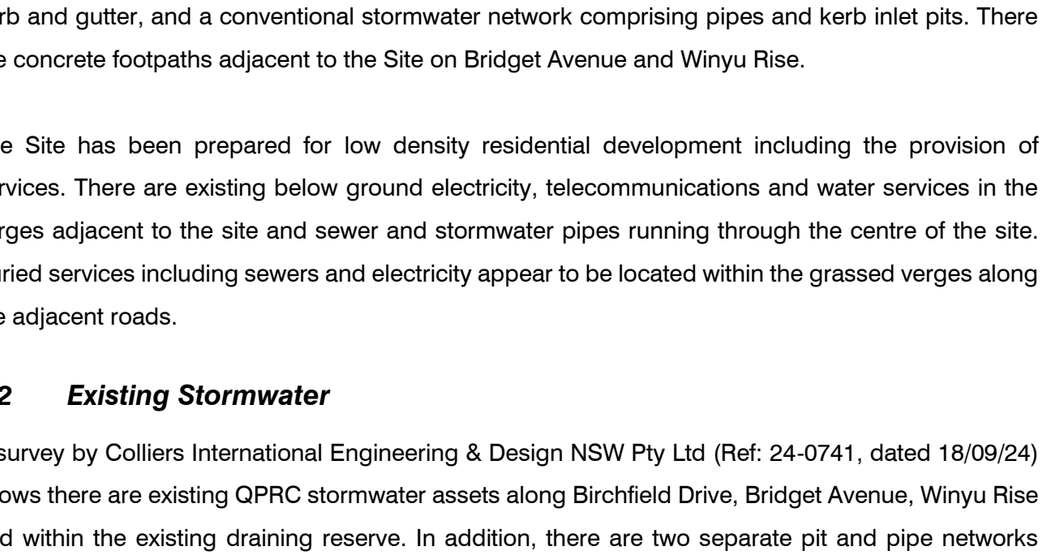
The roads surrounding the site were constructed recently as part of residential subdivision works which also included earthworks on the site. The roads are two-way single carriageways with concrete

kerb and gutter, and a conventional stormwater network comprising pipes and kerb inlet pits. There are concrete footpaths adjacent to the Site on Bridget Avenue and Winyu Rise.

The Site has been prepared for low density residential development including the provision of services. There are existing below ground electricity, telecommunications and water services in the verges adjacent to the site and sewer and stormwater pipes running through the centre of the site. Buried services including sewers and electricity appear to be located within the grassed verges along the adjacent roads.

1.2 Existing Stormwater

A survey by Colliers International Engineering & Design NSW Pty Ltd (Ref: 24-0741, dated 18/09/24) shows there are existing QPRC stormwater assets along Birchfield Drive, Bridget Avenue, Winyu Rise and within the existing draining reserve. In addition, there are two separate pit and pipe networks through the centre of the Site, which drain to the existing QPRC stormwater networks in Winyu Rise and the existing draining reserve. **Figure 2** provides an extract from Colliers' survey with the existing stormwater pipes depicted as green linework.



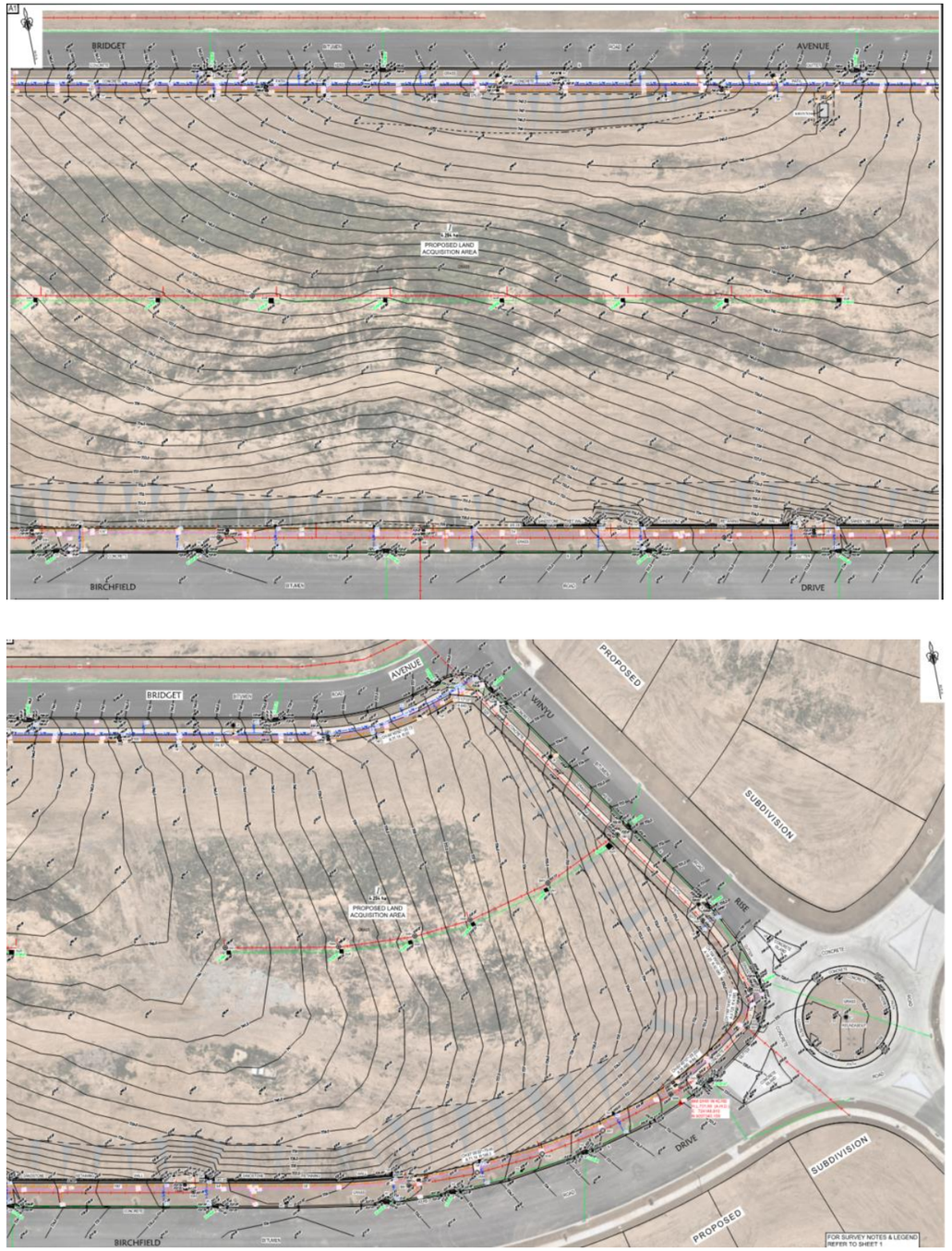


Figure 2: Existing Stormwater Assets Bungendore High School – shown in green [Source: Survey undertaken by Colliers International Engineering & Design NSW Pty Ltd (Ref: 24-0741, dated 18/09/24)]

2. Proposed Activity

The proposed activity is for the construction and operation of a new high school in Bungendore at part 18 Harp Avenue, Bungendore (the site). The new high school will accommodate 600 students and 68 staff. The school will provide 26 general learning spaces, and three support learning spaces across two buildings. The buildings will be predominantly three-storeys in height and will include permanent and support teaching spaces, specialist learning hubs, a library, administrative areas and a staff hub.

Additional core facilities are also proposed including a standalone school hall with covered outdoor learning area (COLA), a car park, a kiss and drop zone along Birchfield Drive, sports courts and a sports field. The new school also features a single storey building with associated paddocks in the far western portion of the site designed for livestock management and hands-on agricultural learning.

Specifically, the proposal involves the following:

- Building A, a three-storey learning hub accommodating general learning spaces, a special education learning unit (SELU), a physical education centre, a performing arts space, and other core facilities including administrative areas, staff hub, library and end of trip facilities.
- Building B, a part three/part four storey learning hub accommodating general learning spaces, specialist workshops for food, textile, wood and metal workshops, as well as visual arts studios, science labs and staff areas.
- Building C, a standalone school hall with COLA.
- Building D, a single-storey agricultural block comprising an animal storage space, a COLA and internal workshop.
- On-site staff car park with 50 spaces with access via Bridget Avenue.
- Kiss and drop zones and bus bays along Birchfield Drive.
- Open play space including a sports courts and sports field.
- Associated utilities and services including a 1000kv padmount substation.
- Main pedestrian entrance to be located off Birchfield Drive.
- Secondary pedestrian access from Bridget Avenue.
- Public domain/off-site works including the removal of street trees.

The design has been masterplanned to allow for an additional future stage. The second stage does not form part of this proposal.

Figure 3 provides an extract of the proposed site plan.

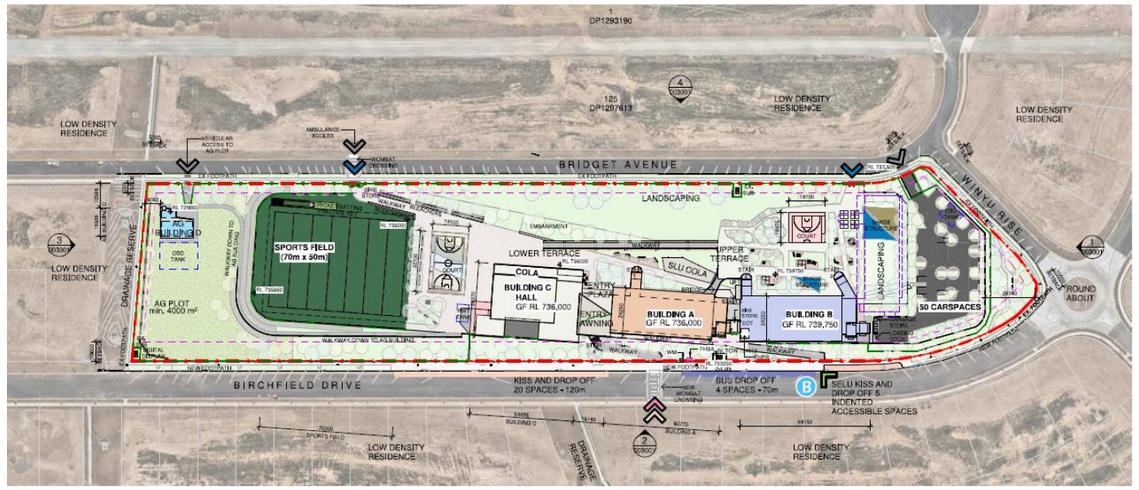


Figure 3: Site Plan (Source: NBRS, 2024)

2.1 Standards list

The civil design shall be in accordance with the latest revision of all relevant structural Australian Standards, relevant structural sections of the BCA and other statutory requirements. The design will be in accordance with the following relevant Australian Standards:

- Australian Rainfall & Runoff 2019
- Austroads: Guide to Pavement Technology
- AS1428.1 Design for Access & Mobility
- AS3500.3 Plumbing and Drainage: Stormwater Drainage
- Queanbeyan-Palerang Local Environmental Plan 2022
- Queanbeyan-Palerang Regional Council Development Design Specification D5 – Stormwater Drainage Design (2019),
- NSW MUSIC Modelling Guidelines 2015
- Queanbeyan-Palerang Regional Council Public Domain Guidelines
- Palerang Development Control Plan (2015)
- Queanbeyan Palerang Regional Council Development Design Specification D7 – Erosion Control and Stormwater Management (2018)
- AS 3500.3-1990 National Plumbing and Drainage Code - Stormwater drainage.
- Managing Urban Stormwater: Soils and Construction, “The Blue Book” – 4th edition 2004.
- Concrete Pipe Selection and Installation - Concrete Pipe Association 1990.

3. Stormwater Design

The stormwater design must be in accordance with Australian Standards, Queanbeyan Palerang Regional Council Development Design Specification D5 – Stormwater Drainage Design (2019), and Australian Rainfall and Runoff (2019).

In general, drainage is to be designed to ensure that site facilities are available for students' use in all weather conditions up to a 100 Year ARI storm event. All new roof stormwater will be collected in roof gutters and downpipes and conveyed to the in-ground pipe system. Surface stormwater will be collected in pits. The in-ground stormwater will be connected to water quality controls.

Pipes and pits will need to be designed to satisfy the minimum provisions of AS 3500.3. They must be designed to convey, at least, the 5% Annual Exceedance Probability (AEP) flows as per Education Facilities and Standards Guidelines and Technical Standards (ESFG guidelines). Where pipe capacity is exceeded i.e., greater than 5% AEP, stormwater will be conveyed as overland flow. Overland flow paths are to be designed to convey at the minimum 1% AEP stormwater flows with a Velocity x Depth to be less than 0.4m2/s.

Class B, C and D pits are to be used in accordance with AS 3996.

For further details, refer to the Stormwater drawings in **Appendix A**.

3.1 Onsite Stormwater Detention (OSD)

Generally, QPRC requires OSD for all individual dwellings, multi-unit developments, commercial and industrial developments.

Queanbeyan Palerang Regional Council Development Design Specification D5 – Stormwater Drainage Design (2019) stipulates that the OSD system must be designed and constructed to control stormwater runoff from development sites such that, for the 1%AEP and 20% AEP events, discharges do not exceed pre-development peak discharge rates.

OSD storage volume shall be provided such that the total OSD discharge and bypass flow from the site does not exceed the maximum permissible site discharge.

Two OSD tanks are proposed as a result of the Site levels and in consideration of the existing drainage regime. An OSD tank is proposed to be placed under the car park in the east of the Site with a connection to the existing stormwater network in Winyu Rise. The other proposed OSD tank is located in the west of the Site, adjacent to drainage reserve and below the proposed agricultural building. This OSD is proposed to connect into the existing stormwater network within the drainage reserve.

3.2 OSD Modelling

A DRAINS model has been used to determine the size of the OSD tanks required to manage stormwater flows from the site such that discharge does not exceed pre-development flows.

The pre-development flows have been calculated based on the Site being 100% pervious as per QPRC's requirements.

A **112m^3 OSD tank** is proposed in the east of the Site and a **430m^3 OSD tank** is proposed in the west of the Site. **Table 1** shows the pre-development flow rate from the Site in the 20% AEP and 1% AEP storm events, compared with the total post-development flow rate from the Site. **Appendix B** provides a summary of the drains model results for the 1% AEP storm event

Table 1: Site Discharge Rates

Storm Event	Pre-Development Flow Rate (PSD)	East OSD Discharge Rate	West OSD Discharge Rate	Bypass Flow Rate	Total Post-Development Flow Rate
20% AEP	430L/s	174L/s	127L/s	110L/s	**411L/s**
1% AEP	1010L/s	252L/s	331L/s	366L/s	**949L/s**

3.3 Flooding

Based on the Queanbeyan Floodplain Risk Management Study and Plan (2019) which explores the flooding effects of the Queanbeyan and Molongo Rivers on surrounding local areas, it is understood that the proposed development is outside the council's flood planning area. This is supported by a flood planning Area and Floodway map in the QPRC DCP, as seen in **Figure 4** below. Therefore, it is understood that no flood planning controls are in place for this development. For further information regarding flooding, refer to the flood consultant's (TTW) information.

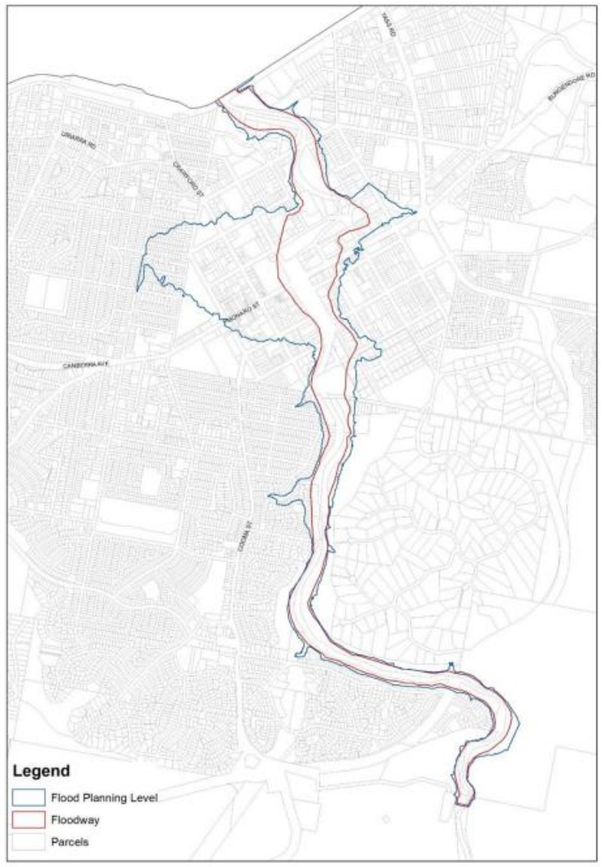


Figure 4: Queanbeyan Flood Planning Area Map (Source: QPRC DCP (2012)

3.4 Overland Flow Paths

If the piped in-ground stormwater system fails due to blockage or other obstruction, stormwater flows will be required to be conveyed as overland flow. Overland flow paths have been designed to direct stormwater flows away from buildings and towards the site's boundary.

Overland flow paths will be sized to accommodate the 1% AEP storm flows and not exceed safe Depth x Velocity products of 0.4m2/s for pedestrians and vehicles.

3.5 Water Sensitive Urban Design (WSUD)

Water Sensitive Urban Design typically includes rainwater water reuse, reducing the quantity of stormwater runoff, improving the quality of stormwater runoff, protecting downstream receiving watercourses and improving habitat for wildlife.

WSUD has been incorporated into the stormwater design as follows:

- The rate of runoff from the site will be controlled by OSD tanks and discharge controls so that the post-development discharge rates are similar to the pre-development rates (Refer to **Section 3.1**).
- Inclusion of stormwater quality improvement devices to mitigate impacts to downstream receiving watercourses. (Refer to **Section 3.6**).
- Rainwater collection and reuse via rainwater tanks to reduce potable water demand (Refer to the Hydraulic Engineer's information).

3.6 Stormwater Quality

Part D7.21 of QPRC's Development Design Specification D7 – Erosion Control and Stormwater Management (2018) sets out the requirements for treating stormwater prior to discharge into Council's system. The guidelines require all developments to achieve a minimum percentage reduction in average annual pollutant loads. The targets for stormwater treatment are given in **Table 2** below.

Table 2: Pollutant Reduction Targets Requirements as per QPRC Development Design Specification D7

Pollutant	Performance Requirements
Litter	100% retention of litter greater than 5mm for flows up to the 3-month ARI peak flow.
Suspended Solids (SS)	80% retention of average annual load.
Total Phosphorus (TP)	65% retention of average annual load.
Total Nitrogen (TN)	65% retention of average annual load.

The safety of the school population is to be considered when designing the stormwater treatment train. Consequently, mechanical (in lieu of natural removal) pollutant removal devices have been incorporated to remove gross pollutants and suspended solids, and reduce nutrient runoff including nitrogen and phosphorous.

The pollution control devices will require on-going maintenance. Pollutant removal devices will require at least a yearly inspection and maintenance.

A series of pollution control devices have been provided to treat stormwater runoff to the required level prior to discharge. The devices include litter screens in all pits and an end of line treatment device to remove nitrogen & phosphorus contaminants etc., prior to discharge to the Authority's stormwater system. This system is preferred as it will be able to achieve pollutant reductions required, is easily maintained, and does not require large open areas or pose safety risk to the school population.

3.7 MUSIC Model

A MUSIC Model has been developed to best evaluate stormwater quality treatment requirements for the project. The proposed water quality control devices for the site are:

- Two rainwater tanks of 5kL (assumed) and 100kL sizing servicing Blocks A, B, and C, respectively,
- 23 OceanProtect OceanGuard pit inserts within pits across the site,
- A 65m^2 Filterra bioretention basin,
- 10 690mm Psorb stormfilter cartridges within a 5m^2 water quality chamber in the western OSD tank, and
- 15 690mm Psorb stormfilter cartridges within a 20m^2 water quality chamber in the eastern OSD tank.

Table 3 below shows the percentage reduction in pollutants in comparison to QPRC's requirements and the conceptual MUSIC model is provided in **Appendix C**.

Table 3: Pollutant Reduction MUSIC Results Comparison (Stage 2)

Pollutant	Performance Requirement	Performance Result
Litter	100%	98.73%
Suspended Solids (SS)	80%	93.84%
Total Phosphorus	65%	87.55%
Total Nitrogen	65%	74.09%

The required reduction in pollutants has been achieved for each of the listed pollutants with the exception of Litter. Due to the topography of the Site and the proposed masterplan, it is not reasonably practical to collect runoff from some isolated low areas in the south-east and south-west of the Site. These areas bypass the stormwater network and treatment devices and therefore the model does not show that 100% of litter is captured. Given these areas are currently green and will remain green as part of the masterplan, it is not proposed to introduce additional stormwater treatment devices for these areas. The Music model treatment train is depicted in **Appendix B**.

3.8 Integrated Water Management Plan

The integrated water management plan is a holistic and collaborative approach to the water cycle and considers elements such as potable water, rainwater reuse, recycled water, wastewater, surface stormwater, groundwater, stormwater detention, and water quality, among others.

In this report, Enstruct has covered the elements related to surface stormwater, stormwater quality and stormwater detention. For potable water, rainwater storage and reuse and wastewater, refer to the Hydraulic engineering report and drawings. For groundwater, refer to the Geotechnical Engineering Preliminary Site Investigation report.

4. Erosion and Sediment Control

During construction and while the site is disturbed, erosion prevention and sediment control measures will be required. Erosion prevention generally involves managing stormwater by diverting overland flow around construction areas as well as collecting stormwater within the construction zones and directing runoff to sediment control devices. Devices to be incorporated include sediment basins, silt removal fences, hay bales, sandbags, catch drains and geotextile filters. An Erosion and Sediment Control plan is included in the civil drawing set in **Appendix A**.

Erosion prevention and sediment removal strategies need to be inspected regularly during construction works, cleaned, and maintained after storm events, and modified to suit construction work progress, decanting and demolition.

Erosion and sediment controls are to be designed, constructed, and installed in accordance with Managing Urban Stormwater: Soils and construction - Volume 1 and maintained until the site is fully stabilised to prevent pollution of the receiving environment.

5. Civil Design

5.1 Pavements

Pavement design has considered the geotechnical advice alongside ESFG and Austroads guidelines for vehicular pavements.

As a part of the geotechnical investigation, four-day soaked CBR tests on samples of residual clay from BH31, BH32 and BH33, compacted to 98% of their Standard Maximum Dry Density (SMDD), returned values of 6%, 5% and 2%.

The residual clays were found to have in-situ moisture contents of 1.4% 'wet' and 1.6% and 3.6% 'dry' of their Standard Optimum Moisture Contents. Soaking of the samples from BH32 and BH33 yielded swell values of 0.5% and 4.5%, whilst no swelling was measured on the sample from BH31.

As a result of the above, the Geotechnical report recommends the use of relatively thick pavements, placement of capping layers of select rockfill, some form of subgrade treatment to improve the subgrade quality or bound subbases for concrete pavements.

A Geotechnical Investigation report by JK Geotechnics (Ref: 37083LTrpt dated 31 January 2025) provides the following advice (summarised) regarding the pavement design:

- Where the subgrade comprises the residual silty clay or excavated clay from site used as engineered fill, design should be based on a CBR of 2%, or an estimated modulus of subgrade reaction of 20kPa/mm (750mm plate).
- Where pavements overlie areas of engineered fill imported to site, CBR testing of the engineered fill subgrade will be required to confirm the appropriate design parameters.
- Given the low CBR value, consideration could be given to the use of a select subgrade material or stabilisation of the subgrade as part of the overall pavement design in order to reduce the thickness of the overlying pavement material.
- A select layer comprising a minimum 300mm of good quality granular material, such as ripped and crushed sandstone with a CBR value of at least 10%, may be used below the pavement layers.
- Alternatively, the clay subgrade may be stabilised by the addition of lime to reduce the reactivity and increase subgrade strength. The effect and quality of lime required would need to be determined by laboratory testing, but as a guide the addition of say 2% to 4% of lime by dry weight may result in a soaked CBR of the treated material in the order of 6% to 8%. This higher CBR layer may then be considered as part of the pavement design.
- Concrete pavements should be underlain by a 150mm thick layer of lean-mix concrete subbase and the pavements be designed based on an effective subgrade strength of CBR 5%, correlating with a long-term Young's Modulus of 20MPa and short-term Young's Modulus of 33MPa. Slab joints should be designed to resist shear forces but not bending moments by providing dowelled or keyed joints.
- Surface and subsoil drainage should be provided on the high side of the pavements to reduce moisture ingress into the subgrade and pavement. The subsoil drains should extend to a depth of at least 0.3m below the adjacent subgrade level and the drains should have adequate falls to reduce ponding in the drains. In addition, the surface of the adjacent pavement subgrade should be provided with a uniform cross fall towards the subsoil drain to assist with drainage.

In addition to JK Geotechnics recommendations, the pavements have been designed based on the following parameters:

- All pavements to be designed for a 25-year life.
- For other vehicular traffic areas design for 1.0 x 105 repetitions of a standard axle load, as defined by AUSTROADS.
- Allow for movements in the foundations caused by moisture variations and mine subsidence.
- Design rigid pavements so there is no vertical differential movement between panels at joints.
- For truck turning areas pavements shall be rigid in construction and finished with a reinforced concrete surface.
- For other areas pavements may be either flexible or rigid in construction. For flexible construction finish with a surface coat of asphaltic concrete.
- Breccia or dolerite is not to be used in road base or concrete mix.
- Non-skid finish for vehicular trafficked pavements
- Non-slip finish for pedestrian trafficked pavements, including carpark
- AC for roads and parking to be AC10 and have minimum thickness of 40mm or greater as the design requires.
- AC for games courts to be AC5 and have minimum thickness of 25mm levelling course plus 25mm surface course or greater as the design requires.
- Limit fly ash content to 20% of cementitious content of mix by weight.
- For roads and parking areas concrete shall have minimum 32 MPa characteristic compressive strength.
- For rigid method of construction finish with a reinforced concrete surface.

- Concrete pavements for vehicles shall be a minimum 150mm thick and reinforced with not less than SL92 mesh at top and 100 mm thick road base.
- Other concrete pavements shall be a minimum 100mm thick and reinforced with no less than SL72 mesh at top.
- Provide a thicker pavement and heavier mesh as the design requires and to meet durability requirements for minimum cover to reinforcement.
- For flexible construction finish with a surface coat of asphaltic concrete.
- Paving is to fall away from the buildings and covered areas.
- Finished vertical grades to be limited to < 1 in 10. Provide vertical curves where change of grade exceeds 3%. Provide cross-falls, as required.

5.2 Bulk Earthworks

The bulk earthworks cut and fill works shall comply with AS3798-1996 Guidelines on earthworks for commercial and residential developments. This covers the execution and control testing of earthworks and associated site preparation works.

A 3D model has been used to calculate the approximate bulk earthworks volumes. The approximate volume are **40,378m3 of cut** and **40,550m3 of fill**, resulting in a **net fill of 172m3**.

In addition, the top of the sandstone rock layer has been modelled to estimate the volume of cut within rock. From this it is estimated that of the 40,378m3 of cut, **20,913m3 is within rock**.

This assumes that the bulk level will be set 300mm below design levels to account for pavements and soft landscaping build ups. The model also allows for a 200mm existing site strip across the bulk earthworks area to remove existing topsoil and organic materials. The **stripping volume is approximately 7,367m3** and this is not included in the above earthworks cut volumes.

Therefore, the bulk earthworks model represents a level comparison between the existing surface levels minus an averaged topsoil 200mm strip, and the formation levels of the proposed Development set at 300mm below proposed finished ground levels. Changes to these assumptions will impact the cut/fill volumes.

The cut/fill volumes do not include excavation for any below ground services including stormwater infrastructure and no allowance has been considered for service trenches, in ground tanks, structural footings, piling, floor slabs or lift pits.

No bulking factor has been applied to the bulk excavation volumes.

A report by JK Geotechnics (Ref: 37083LTrpt dated 31 January 2025) presents the results of a geotechnical investigation. The fieldwork included 35 boreholes across the Site.

The geotechnical engineering report describes subsoil conditions, including that:

- The Site is underlain by sandstone units of the Abercrombie Formation comprising “brown and buff to grey, thin- to thick-bedded, fine- to coarse-grained mica-quartz sandstone, interbedded with laminated siltstone and mudstone. Sporadic chert-rich units”.
- Fill was encountered in four boreholes to a depth of up to 1.4m.
- Residual silty clay was encountered below the fill or from the surface in all boreholes.
- Weathered sandstone and mudstone was encountered in all boreholes, except BH2, at depths ranging from 0.7m to 3.5m below existing surface levels. These depths correlate with levels ranging from RL744.2m to RL721.9m with the surface of the rock appearing to dip down to the south-west and south-east from the crest of the hill on the northern site boundary.
- The weathered sandstone and mudstone generally comprised an upper layer of extremely weathered material although this layer was less frequently encountered within the eastern portion of the site.
- The extremely weathered material is effectively a hard clay with structure from the parent rock. The extremely weathered layer was generally less than 1m thick although some thicker layers, up to 1.7m, were encountered within the central portion of the site.
- The bedrock generally increased in strength to medium or high strength at relatively shallow depths below the rock surface with ‘TC’ bit refusal generally occurring within 1.5m of initial contact in the deeper boreholes.
- No groundwater was encountered during or on completion of drilling in any of the boreholes.

The following paragraphs provide a further summary of the JK Geotechnics report.

Earthworks in cut areas will encounter weathered sandstone and mudstone bedrock at relatively shallow depths. Due to the depths of cut, the rock excavation volumes will be significant and require specialised rock excavation equipment.

Conventional earthmoving equipment is expected to be sufficient to excavate the soils and extremely weathered to low strength sandstone and mudstone. A ripping tyne and/or by ripping with a dozer is likely to be necessary for the very low to low strength bedrock or iron indurated bands within the extremely weathered profile.

There is limited volumes of existing fill on the site which should be considered uncontrolled fill unless records are provided to show that the material has been appropriately placed and compacted as engineered fill. Uncontrolled fill below proposed buildings and other movement sensitive structures will need to be removed unless suspended slab construction is adopted.

Residual clays can be used as fill as long as they are compacted at close to optimum moisture content and must not be over compacted.

Sandstone and mudstone bedrock excavated as part of the bulk earthworks cut may be used for filling. These materials have varying potential for reactive movements when compacted as engineered fill. Laboratory testing is recommended to test the reactivity of the rock and its suitability for use as fill.

Where there is sufficient space, both temporary and permanent battering can be used to form the proposed levels through the soil and weathered bedrock.

A temporary batter slope angle for the residual clays and the extremely weathered sandstone/mudstone may be formed no steeper than 1 Vertical (V) in 1 Horizontal (H), subject to inspection by a geotechnical engineer. Steeper 1V:0.5H batter slopes may be formed through bedrock of low or higher strength.

Permanent batters are proposed to transition between platform levels and to meet existing surface levels. Batters through the residual soils and all bedrock up to and including very low strength should be battered at not steeper than 1V:3H. In the low and higher strength bedrock permanent batters should be no steeper than 1V:1H. However, steeper batters may be achievable subject to inspection by the geotechnical engineers.

6 *Evaluation of environmental Impacts*

Earthworks associated with forming the proposed development levels could result in sediment and nutrient laden runoff leaving the site. This could pollute downstream watercourses and/or result in blockages to the public stormwater network. Erosion and sediment control measures have been included as a mitigation measure to address the potential impacts.

As a result of the increase in impervious area associated with the new school buildings and external pavements, the development will result in an increase in stormwater runoff compared with the existing pre-developed Site. If runoff is not controlled, it would increase flows in downstream receiving stormwater networks and waterways. Therefore, a stormwater drainage system including onsite detention is required to manage and restrict stormwater flows.

Similarly, if left untreated, stormwater runoff from the development could damage downstream receiving stormwater networks and waterways. Therefore, stormwater quality control measures have been incorporated into the stormwater design.

7 Mitigation Measures

The table below is a summary of the proposed mitigation measures. These are described in further detail in the proceeding sections of this report.

Table 4: Mitigation Measures

Mitigation Number/ Name	Aspect/ Section	Mitigation Measure	Reason for Mitigation Measure
Erosion and Sediment Control	During Design and Construction	**Erosion and Sediment Control** measures as described in **Section 4** and on the Erosion and Sediment control plan in **Appendix A**. Erosion and sediment controls are to be maintained until the Site is fully stabilised to prevent pollution of the receiving environment.	To avoid polluting the water and/or blocking the stormwater network, erosion and sediment control measures have been detailed. To prevent sediment from leaving the Site with stormwater runoff. Stormwater will pass through sediment/siltation fences, but the fence will trap the sediment. To remove ground materials from construction vehicle wheels prior to the vehicle leaving the Site, to prevent the depositing of material onto the public roadway. To prevent sediment discharged from the Site from entering the stormwater inlet structure and contaminating the water course.
Stormwater Quantity Control	During Design, Construction and Operation	**Stormwater Quantity Control** as described in **Section 3, 3.1 and 3.2** through the provision of two onsite stormwater detention (OSD) tanks.	To ensure the development is not worsening flow conditions in downstream receiving stormwater networks and waterways.
Stormwater Quality Control	During Design, Construction and Operation	Provision of stormwater quality treatment measures as part of the water sensitive urban design as described in **Section 3.5, 3.6 and 3.7** and shown on the stormwater drawings in **Appendix A**	To ensure that stormwater discharge is of adequate quality to protect downstream receiving stormwater networks and waterways, in accordance with Council's requirements.

8 Conclusion

The civil works associated with the design and construction of the new Bungendore High School will be carried out in accordance with normal engineering practice and will meet the requirements of relevant standard.

Erosion and sediment control measures are to be in place during construction to prevent contamination of the downstream stormwater system and tracking of grit and sediment onto the roadway.

WSUD systems will ensure the stormwater drainage network to meet council standards. An on-site-detention (OSD) system will be provided to meet acceptable stormwater runoff discharge rates from the site, taking into consideration the flood levels for the downstream neighbouring site.

Based on a preliminary bulk earthworks design, approximately 40,378m3 of cut (excluding 7,367 cubic meters from stripping) and 40,550m3 of fill will be required for the bulk earthworks, resulting in net fill of 172m3. 20,913m3 of the cut earthworks is estimated to be within rock. The bulk earthworks volumes assumes that the bulk level will be set 300mm below the design levels, with a 200mm strip across the entire site at the start of construction.

The extent and nature of potential environmental impacts associated with the Civil works are considered low and will not have significant impact on the locality, community and/or the environment.

Potential impacts can be appropriately mitigated or managed to ensure that there is minimal impact on the locality, community and/or the environment.

APPENDIX A

CIVIL ENGINEERING DRAWINGS

enstruct
MEMBER OF WSP

CIVIL ENGINEERING WORKS

BUNGENDORE HIGH SCHOOL

BIRCHFIELD DRIVE 2621, NSW

LOCALITY PLAN
SCALE 1:2000

TO BE PRINTED IN FULL COLOUR

CIVIL ENGINEERING WORKS DRAWING LIST:

NOT FOR CONSTRUCTION

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rev	date	description	drn	ch'k
2	24/01/25	REISSUE FOR CONCEPT DESIGN	MZV	MD
1	28/11/2024	ISSUED FOR CONCEPT DESGIN	SM	MD

rev	date	description	drn	ch'k

NSW GOVERNMENT Education School Infrastructure

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project
BUNGENDORE HIGH SCHOOL

BIRCHFIELD DRIVE, BUNGENDORE, NSW 2621

drawing title
COVER SHEET AND LOCALITY PLAN

status
CONCEPT DESIGN

scale at A1	drawn	checked	approved
1:2000	SM	MD	NOV-24

project no.	sheet	rev.
218485	CV-0001	2

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
NBRS ARCHITECTURE	SITE PLAN	BHS-NBRS-ZZ-ZZ-DR-A-000200	T2	20.01.25

2

SURVEY

1. The survey as shown on Enstruct drawings was prepared by COLLIERS
   Date 18.09.2024
   Revision 00
   Datum of levels A.H.D
   Coordinate system SSM132522 MGA GDA2020
2. Enstruct 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.
3. Existing contours shown reflect site conditions at time of survey.
4. enstruct plans do not indicate the presence of any survey mark. The contractor is to undertake their own search.
5. 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.

UNDERGROUND SERVICES - WARNING

The locations of underground services shown on enstruct 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.

enstruct 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.
enstruct plans do not indicate the presence of any survey
mark. The contractor is to undertake their own search.

BOUNDARY AND EASEMENTS NOTE

The property boundary and easements locations shown on enstruct drawing's have been based from information received from the surveyour.
Enstruct makes no guarantees that the boundary or easement information shown is correct. enstruct 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.

CIVIL SAFETY IN DESIGN

enstruct (NSW) Pty Ltd operates under Safe Work Australia's code of Conduct for the Safe Design of Structures.
These drawings shall be read in conjunction with the enstruct Civil risk and Solutions Register.
Under the Code of Conduct it is the Client's responsibility to provide a copy of the Civil Risk and Solutions Register to the Principal Contractor.
It is the Principal Contractor's responsibility to review the hazards and risks identified during the design process to ensure a safe workplace is maintained for the construction, maintenance and eventual demolition of the civil infrastructure.

TENDER NOTES

1. These drawings are preliminary drawings issued for tender as an indication of the extent of works only. They are not a complete construction set of drawings.
2. To determine the full extent of work, these drawings shall be read in conjunction with the architectural drawings and other contract documents. Allow for all items shown on architectural and other drawings as not all items are shown on the structural/civil works drawings.
3. Should any ambiguity, error, omissions, discrepancy, inconsistency or other fault exist or seem to exist in the documents, immediately notify in writing to the Superintendendent.
4. Rates shown on the drawings are for the final structure/civil works in place and do not allow for any wastage, rolling margins, over supply or fabrication requirements. etc.

SITEWORKS NOTES

1. All basecourse material to comply with RMS specification No 3051 and compacted to minimum 98% modified dry density in accordance with AS 1289 5.2.1.
2. All trench backfill material shall be compacted to the same density as the adjacent material.
3. All service trenches under vehicular pavements shall be backfilled with an approved select material and compacted to a minimum 98% standard maximum dry density in accordance with AS 1289 5.1.1

BULK EARTHWORKS GENERAL NOTES

1. All bulk earthworks setout from grid lines U.N.O.
2.Batters are not to exceed the Geotechnical engineer specifications
(i) All permanent batter max slope of 3(H) :1(V) U.N.O.
(ii) All temporary batter max slope of 1(H) :1(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 Engineers' 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 (AS1289 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 to provide proof roll compaction evidence for signoff.
7. Contractor shall place safety barriers around excavations in accordance with relevant safety regulations.
8. For interpretation of bulk earthworks foot print line shown on the bulk earthworks drawings refer to the bulk earthworks construction legend.
9. Bulk earthwork drawings are not to be used for detailed excavation.
10. Refer to the Geotechnical Report prepared by JK Geotechnics for detailed information.

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
Pavements	S32	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. 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. Slurry used to lubricate concrete pump lines is not to be used in any concrete members.
8. All building slabs cast on ground require sand blinding with a Concrete Underlay. Refer to structural drawings.

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 REINFORCEMENT NOTES

1. Fix reinforcement as shown on drawings. The type and grade is indicated by a symbol as shown below. On the drawings this is followed by a numeral which indicates the size in millimetres of the reinforcement.
   N. Hot rolled ribbed bar grade D500N
   R. Plain round bar grade R250N
   SL. Square mesh grade 500L
   RL. Rectangular mesh grade 500L
2. Provide bar supports or spacers to give the following concrete cover to all reinforcement unless otherwise noted on drawings.

   Footings - 50 top, 50 bottom, 50 sides.

   Walls - 30 generally.
   - 30 when cast in forms but later exposed to weather or ground.
   - .. when cast directly in contact with ground.
3. Cover to reinforcement ends to be 50 mm u.n.o.
4. Provide N12-450 support bars to top reinforcement as required, Lap 500 U.N.O.
5. Maintain cover to all pipes, conduits, reglets, drip grooves etc
6. All cogs to be standard cogs unless noted otherwise.
7. Fabric end and side laps are to be placed strictly in accordance with the manufacturers requirements to achieve a full tensile lap. Fabric shall be laid so that there is a maximum of 3 layers at any location.

FABRIC LAPS

8. Laps in reinforcement shall be made only where shown on the drawings unless otherwise approved. Lap lengths as per table below.

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.

KERBING NOTES

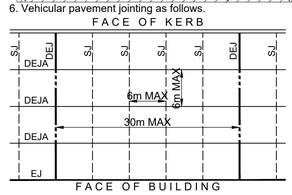
Includes all kerbs, gutters, dish drains, crossings and edges.

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, invert of kerb, or edge of dish drain. Upon completion of new kerbs, new basecourse and surface is to be laid 900mm wide to match existing materials and thicknesses.
6. Existing allotment drainage pipes are to be built into the new kerb with a 100mm dia hole.
7. Existing kerbs are to be completely removed where new kerbs are shown.

JOINTING NOTES

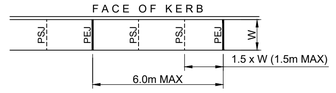
Vehicular Pavement Jointing

1. All vehicular pavements to be jointed as shown on drawings.
2. Keyed construction joints should generally be located at a maximum of 6m centres.
3. Sawn joints should generally be located at a maximum of 6m centres or 1.5 x the spacing of keyed joints, where key joint spacing is less than 4m, with dowelled expansion joints at maximum of 30m centres.
4. Provide 10mm wide full depth expansion joints between buildings and all concrete or unit pavers.
5. The timing of the saw cut is to be confirmed by the contractor on site. Site conditions will determine how many hours after the concrete pour before the saw cuts are commenced. Refer to the specification for weather conditions and temperatures required.
6. Vehicular pavement jointing as follows.



Pedestrian Footpath Jointing

1. Expansion joints are to be located where possible at tangent points of curves and elsewhere at max 6.0m centres.
2. Weakened plane/Sawcut joints are to be located at a max 1.5 x width of the pavement.
3. Where possible joints should be located to match kerbing and / or adjacent pavement joints.
4. All pedestrian footpath jointings as follows (uno).



STORMWATER DRAINAGE NOTES

1. Stormwater Design Criteria :
   (A) Average exceedance probability -
   1% AEP for roof drainage to first external pit
   5% AEP for paved and landscaped areas
   (B) Rainfall intensities -
   Time of concentration: 6 minutes
   1% AEP = 177 mm/hr
   5% AEP = 135 mm/hr
   (C) Rainfall losses -
   Impervious areas: IL= 1.0 mm , CL = 0 mm/hr
   Pervious areas: IL= 19mm , CL =3.3 mm/hr
2. Pipes 300 dia and larger to be reinforced concrete Class "2" approved spigot and socket with rubber ring joints U.N.O. Pipes in public roadways (including public domain) to be class "4" reinforced concrete.
3. Pipes up to 225 dia may be sewer grade uPVC with solvent welded joints, subject to approval by the engineer
5. Enlargers, connections and junctions to be manufactured fittings where pipes are less than 300 dia.
6. Pipes are to be installed in accordance with AS 3725. All bedding to be type H2 U.N.O.
7. Care is to be taken with invert levels of stormwater lines. Grades shown are not to be reduced without approval.
8. Adopt invert levels for pipe installation (grades shown are only nominal).
8. All downpipe connections are to be 150mm DIA or the same size as the downpipe (whichever is larger) laid at 1% minimum fall connection to the nearest pit. Minimum cover 450mm in non-trafficable landscaped areas.
9. Pits in roadways (including public domain) are to be insitu to council details.
10. Pit grates and covers shall conform with AS3996-2006, and AS1428.1 for access requirements.

SUBSOIL NOTES

1. Subsoil drains to be slotted flexible uPVC U.N.O.
2. All subsoil drainage shall outlet to drainage pits or land drains.
3. Pavement subsoil drains are to be placed in accordance with standard drawings behind all kerb and gutter, on the low side of all pavements, and road crossings at sag vertical curves.
4. Where subsoil drains pass under floor slabs and/or vehicular pavements, unslotted uPVC sewer grade pipe is to be used.

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project: BUNGENDORE HIGH SCHOOL
BIRCHFIELD DRIVE, BUNGENDORE, NSW 2621

drawing title: NOTES SHEET

status: CONCEPT DESIGN

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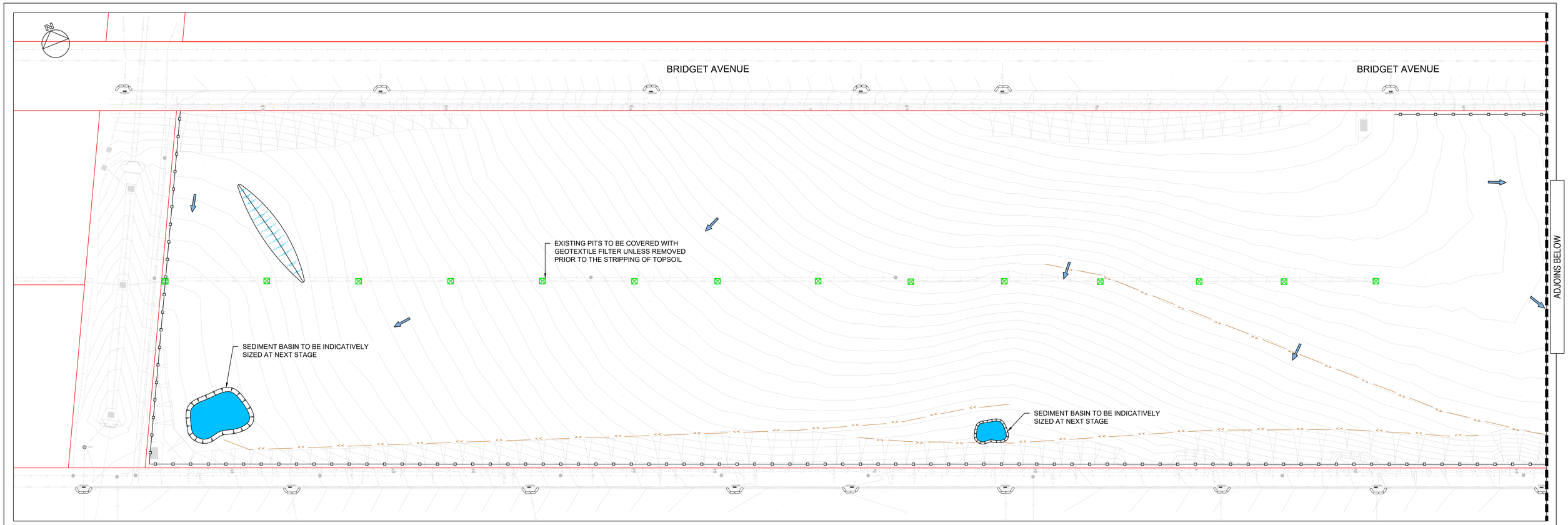
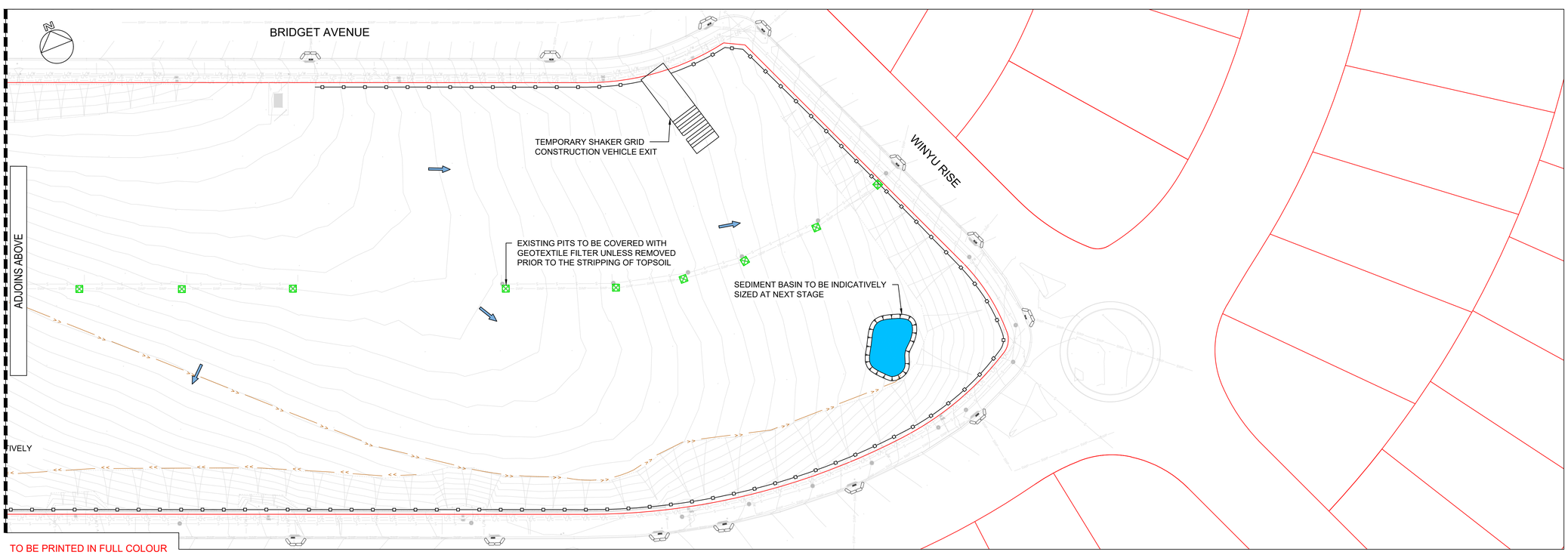
A1





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EROSION AND SEDIMENT CONTROL LEGEND

- Siltation fence, with star pickets at max 2.5m centres (typ)
- Catch drain
- Direction of runoff from existing surface
- Stockpile
- Stormwater pit, with Geotextile filter
- Sandbag sediment trap

SCALE 1:500

0 10 20 30 m

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2	24/01/25	REISSUE FOR CONCEPT DESIGN	MZV	MD
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project
BUNGENDORE HIGH SCHOOL

BIRCHFIELD DRIVE, BUNGENDORE, NSW 2621

drawing title
EROSION AND SEDIMENT CONTROL PLAN

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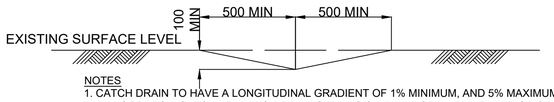
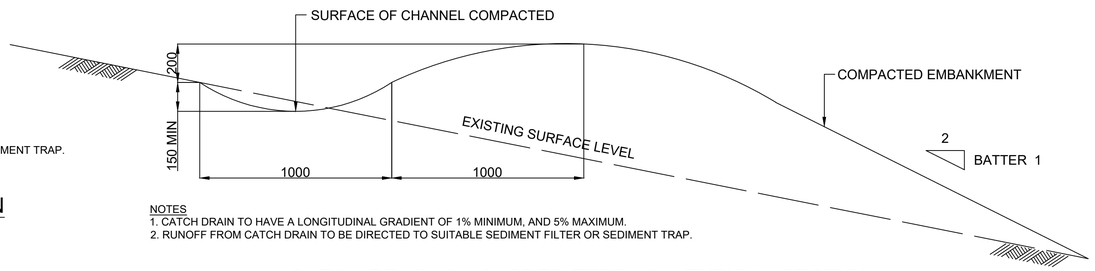


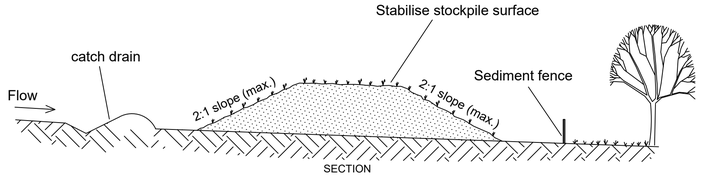
NOTES
1. CATCH DRAIN TO HAVE A LONGITUDINAL GRADIENT OF 1% MINIMUM, AND 5% MAXIMUM.
2. RUNOFF FROM CATCH DRAIN TO BE DIRECTED TO SUITABLE SEDIMENT FILTER OR SEDIMENT TRAP.

CATCH DRAIN ON FLAT TERRAIN - TYPICAL SECTION
SCALE 1:20



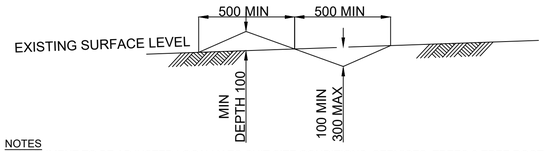
NOTES
1. CATCH DRAIN TO HAVE A LONGITUDINAL GRADIENT OF 1% MINIMUM, AND 5% MAXIMUM.
2. RUNOFF FROM CATCH DRAIN TO BE DIRECTED TO SUITABLE SEDIMENT FILTER OR SEDIMENT TRAP.

CATCH DRAIN ON SLOPED TERRAIN - TYPICAL SECTION
SCALE 1:20



Construction Notes
1. PLACE STOCKPILES MORE THAN 2 (PREFERABLY 5) METRES FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD AREAS. COORDINATE WITH ARBORIST IF REQUIRED.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT, ELONGATED MOUNDS.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2 METRES IN HEIGHT.
4. WHERE THEY ARE TO BE IN PLACE FOR MORE THAN 10 DAYS, STABILISE FOLLOWING THE APPROVED ESCP OR SWMP
5. CONSTRUCT EARTH BANKS (TYP) ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES (TYP) 1 TO 2 METRES DOWNSLOPE. REFER TO TYPICAL DETAILS

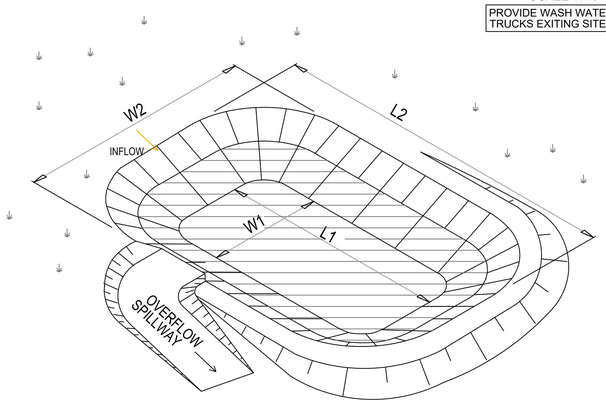
STOCKPILES
NTS



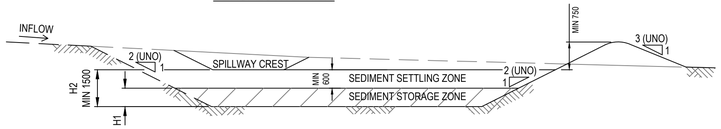
NOTES
1. ALIGNMENT TO BE ADJUSTED LOCALLY TO SUIT SITE CONDITIONS: SERVICES, TREES & TREE ROOTS, & PROPOSED WORKS.
2. EXCAVATED MATERIAL TO BE PLACED ON LOW SIDE AND COMPACTED TO 98% STD

TYPICAL SECTION THROUGH CUT OFF SWALE
SCALE 1:20

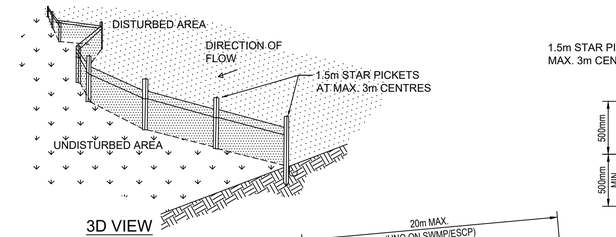
PROVIDE WASH WATER FOR TRUCKS EXITING SITE



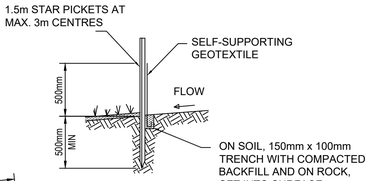
PERSPECTIVE VIEW



TYPICAL LONGSECTION



3D VIEW
NTS



SECTION
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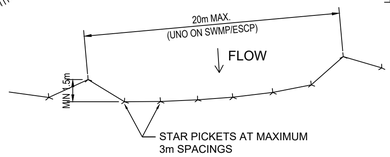
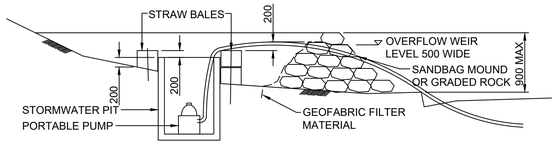


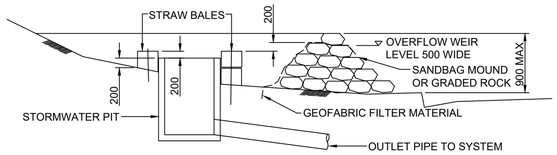
PLAN
NTS



SEDIMENTATION TRAP WITH PUMP OUTLET
NTS

SILTATION FENCE DETAIL

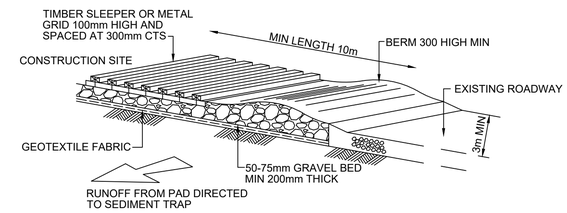
NOTES
1. CONSTRUCT SEDIMENT FENCE AS CLOSE AS POSSIBLE TO PARALLEL TO THE CONTOURS OF THE SITE.
2. DRIVE 1.5m LONG STAR PICKETS INTO GROUND, 3 METRES APART.
3. DIG A 200mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
4. BACKFILL TRENCH OVER BASE OF FABRIC.
5. FIX SELF-SUPPORTING GEOTEXTILE TO UPSLOPE SIDE OF POSTS WITH WIRE TIES OR AS RECOMMENDED BY GEOTEXTILE MANUFACTURER.
6. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150mm OVERLAP.



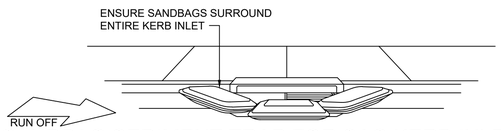
SEDIMENTATION TRAP CONNECTED TO NETWORK
NTS

Notes
1. Configuration to be used only for types D (Dispersible) and F (Fines). Refer to 'Bluebook' for further information on soil classification.
2. Prepare the site under the embankment by ripping at least 150mm and compact the existing substrate.
3. Select fill free of roots, wood, rock, large stone or foreign material. Spread fill in 100 to 150mm laters and compact it at optimum moisture content.
4. Temporary basin will remain for the duration of excavation and bulk earthworks.
5. Maintenance must be performed at a regular basis for the duration of works, basin must be emptied when full or after a considerable storm event, once the particles settled.
6. Refer to the civil plans for its desired location and further notes.

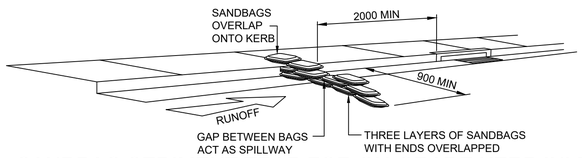
SEDIMENT BASIN TYPE 'D' AND 'F' (WET)
NTS



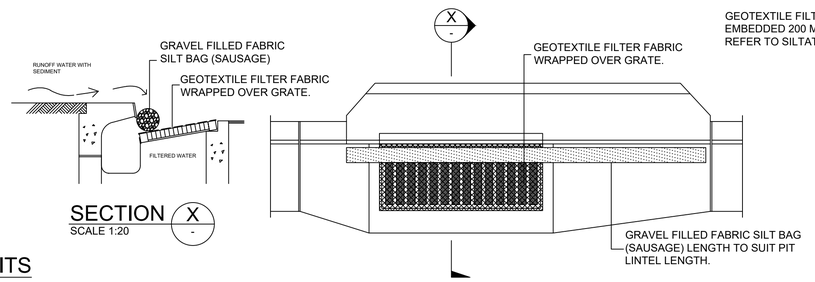
TEMPORARY SHAKER GRID CONSTRUCTION VEHICLE EXIT
NTS



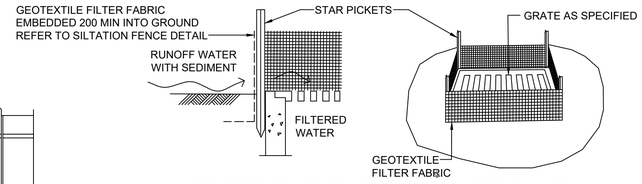
SANDBAG SEDIMENT TRAP FOR SAG KERB INLET PITS
NTS



SANDBAG SEDIMENT TRAP FOR ON-GRADE KERB INLET PITS
NTS



KERB INLET SEDIMENT TRAP
SCALE 1:20



GEOTEXTILE FILTER PIT SURROUND
NTS

SCALE 1:20
0 200 400 600 800 1000mm

TO BE PRINTED IN FULL COLOUR

NOT FOR CONSTRUCTION

rev	date	description	drn	ch'k
2	24/01/25	REISSUE FOR CONCEPT DESIGN	MZV	MD
1	28/11/2024	ISSUED FOR CONCEPT DESGIN	SM	MD

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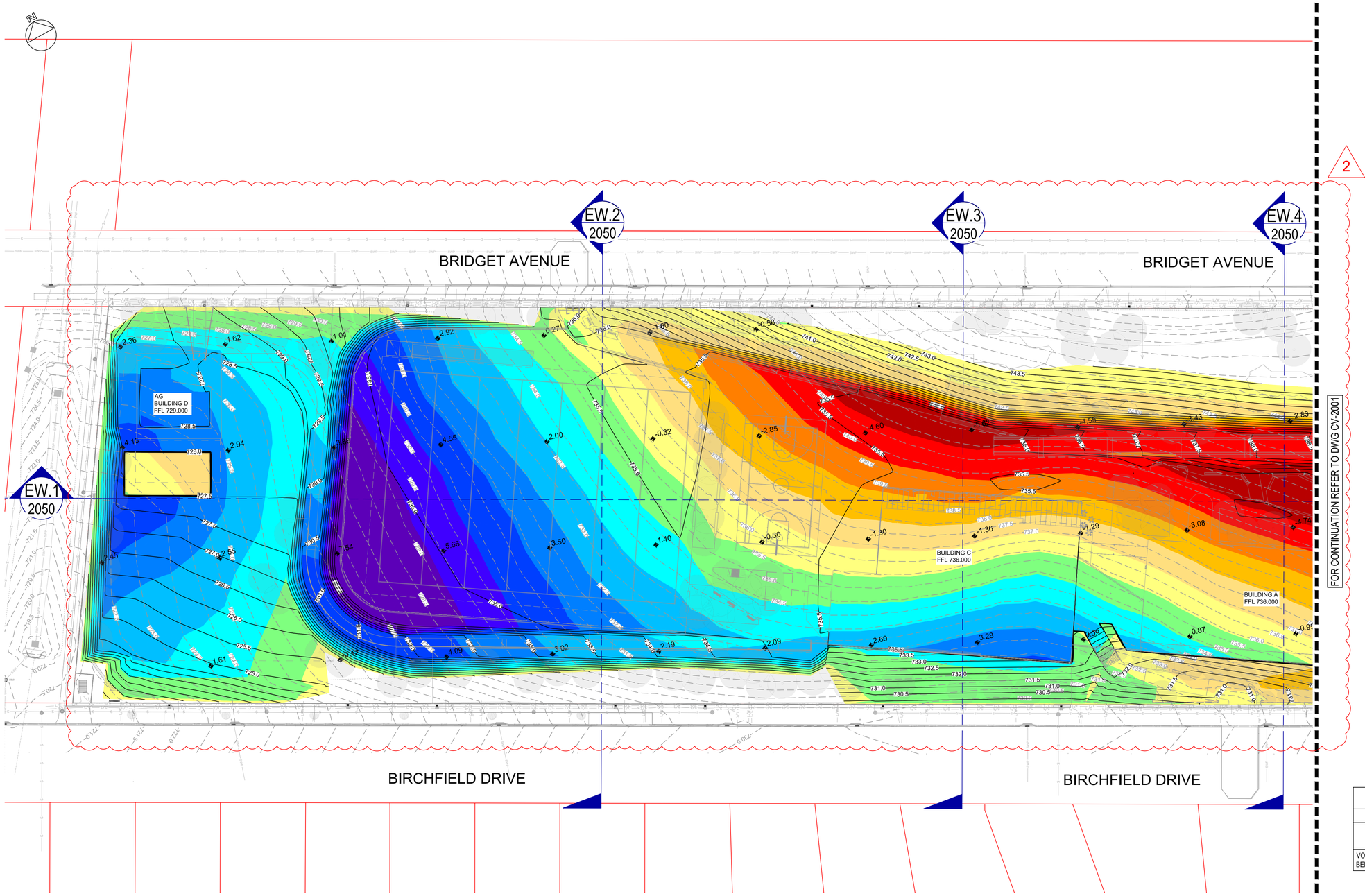
drawing title
EROSION AND SEDIMENT CONTROL DETAILS

status: CONCEPT DESIGN

scale at A1	drawn	checked	approved
NTS	SM	MD	NOV-24

project no.	sheet	rev.
218485	CV-1001	2



BULK EARTHWORKS MODEL NOTES

1. THIS DRAWING IS AN ESTIMATE FOR INFORMATION ONLY WHICH SHOULD NOT BE TAKEN AS AN ACCURATE MEASUREMENT AND SHOULD NOT BE USED FOR CONSTRUCTION.
2. THIS MODEL REPRESENTS A LEVEL COMPARISON BETWEEN:
   A) THE EXISTING SURFACE LEVELS MINUS AN AVERAGED TOPSOIL 200mm STRIP, AND
   B) THE FORMATION LEVELS OF THE PROPOSED DEVELOPMENT. THE FORMATION LEVELS ARE SET AT 300mm BELOW THE FINISHED GROUND LEVELS.
3. THE EXISTING SURFACE LEVELS ARE BASED ON THE TIN MODEL FROM THE SURVEY FILE. REFER TO SURVEY NOTES.
4. THIS ESTIMATE DOES NOT INCLUDE EXCAVATION FOR ANY BELOW GROUND SERVICES INCLUDING STORMWATER INFRASTRUCTURE.
5. NO ALLOWANCE HAS BEEN CONSIDERED FOR SERVICE TRENCHES, IN GROUND TANKS, STRUCTURAL FOOTINGS, PILING, FLOOR SLABS OR LIFT PITS.
6. NO BULKING FACTOR HAVE BEEN APPLIED TO THE BULK EXCAVATION VOLUMES.
7. IT HAS BEEN ASSUMED THAT ALL EXCAVATED MATERIAL IS NOT CONTAMINATED AND CAN BE USED AS FILL MATERIAL ON SITE (NOT INCLUDING TOPSOIL). IF CONTAMINATION IS PRESENT, A SEPARATE ASSESSMENT SHOULD TAKE PLACE.
8. ANY DAMAGE TO EXISTING ROADS OR EXISTING BUILDINGS WILL BE RECTIFIED BY THE CONTRACTOR AT HIS EXPENSE.
9. ALL ENVIRONMENTAL MEASURES INCLUDING VEGETATION PROTECTION AND EROSION AND SEDIMENT CONTROLS SHALL BE PLACE PRIOR TO THE COMMENCEMENT OF ANY WORK.
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11. ALL ARCHITECTURAL FINISHED SURFACE LEVELS SUPERSEDE THOSE INDICATED ON THE BULK EARTHWORKS PLAN. THE CONTRACTOR SHALL CONFIRM THE FINAL BUILDING PAD LEVEL REQUIRED TO SUIT THE STRUCTURAL DESIGN WITH THE STRUCTURAL DRAWINGS PRIOR TO COMMENCEMENT OF WORK.
12. REFER GEOTECHNICAL REPORT / ENGINEER FOR SUITABILITY OF MATERIAL WON FROM EXCAVATION BACKFILL.
13. NOT TO BE USED FOR DETAILED EXCAVATION, WHICH INCLUDES: LIFT PITS, TRENCHING, FOOTINGS AND OTHER EXCAVATION OF SIMILAR NATURE

2

BULK EARTHWORKS CUT/FILL DEPTHS

Number	Colour	Minimum Cut/Fill Depth (m)	Maximum Cut/Fill Depth (m)
1		-8.000	-5.000
2		-5.000	-4.000
3		-4.000	-3.000
4		-3.000	-2.000
5		-2.000	-1.000
6		-1.000	0.000
7		0.000	1.000
8		1.000	2.000
9		2.000	3.000
10		3.000	4.000
11		4.000	5.000
12		5.000	6.000
13		6.000	8.500

OVERALL CUT AND FILL TABLE

NAME	CUT VOLUME (m^3)	FILL VOLUME (m^3)	BALANCE (m^3)
VOLUME	40,378 (20,913 IN ROCK)	40,550	172 (FILL)

VOLUME CALCULATION ASSUMPTIONS: 200mm EXISTING TOPSOIL STRIPPING; FORMATION LEVELS 300mm BELOW PROPOSED FINISHED GROUND SURFACE.

LEGEND

735.5 EXISTING CONTOURS

735.5 PROPOSED FORMATION SURFACE CONTOURS

SCALE 1:250

0 5 10 15 m

TO BE PRINTED IN FULL COLOUR

NOT FOR CONSTRUCTION

rev	date	description	drn	ch'k
2	09/01/2025	EARTHWORKS UPDATED	SM	MD
1	28/11/2024	ISSUED FOR CONCEPT DESGIN	SM	MD

rev	date	description	drn	ch'k

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BIRCHFIELD DRIVE, BUNGENDORE, NSW 2621

drawing title
BULK EARTHWORKS PLAN SHEET 01

status
CONCEPT DESIGN

scale at A1	drawn	checked	approved
1:250	SM	MD	NOV-24

project no.	sheet	rev.
218485	CV-2000	2

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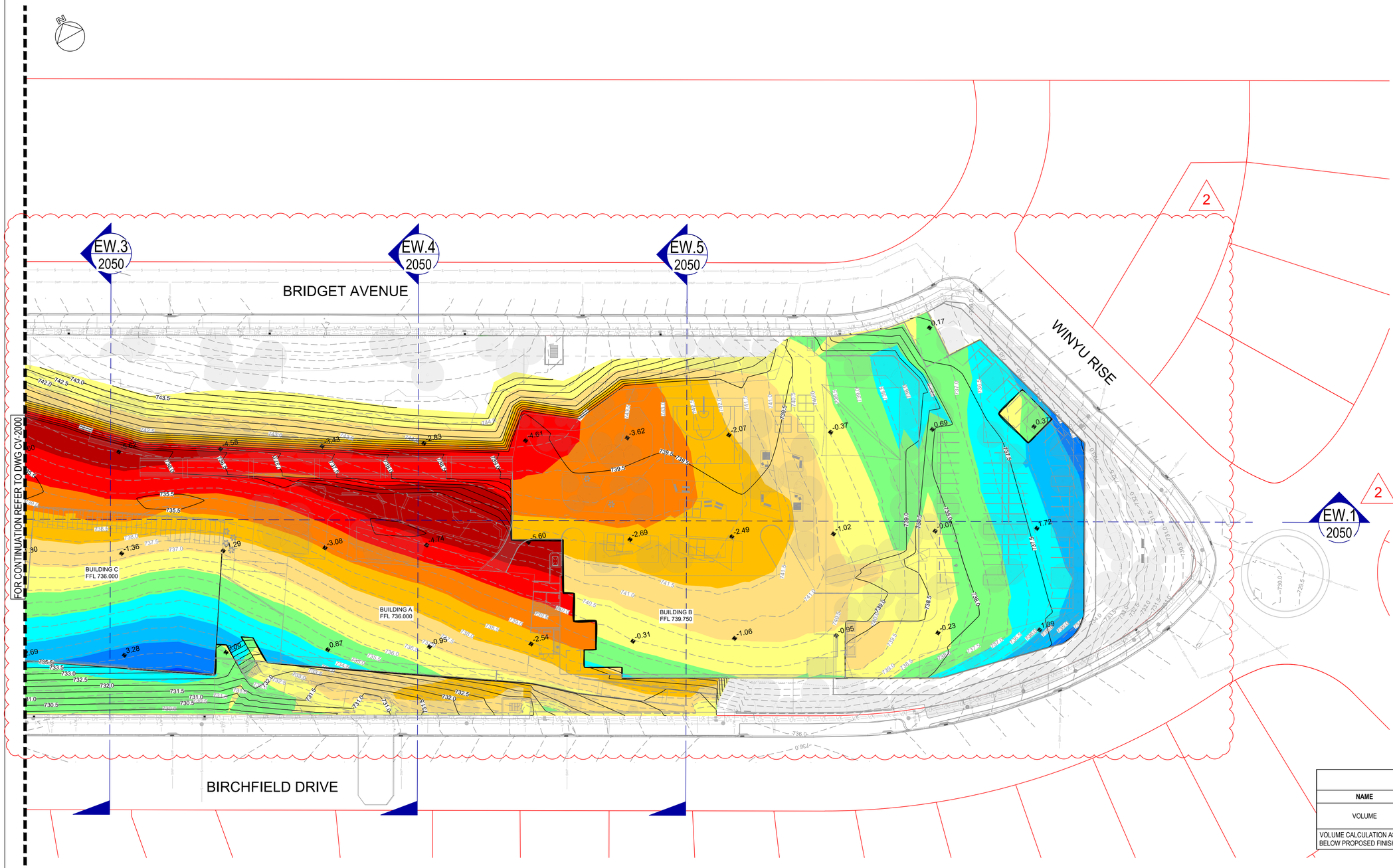

BULK EARTHWORKS CUT/FILL DEPTHS

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6		-1.000	0.000
7		0.000	1.000
8		1.000	2.000
9		2.000	3.000
10		3.000	4.000
11		4.000	5.000
12		5.000	6.000
13		6.000	8.500

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LEGEND

735.5 EXISTING CONTOURS

735.5 PROPOSED FORMATION SURFACE CONTOURS

SCALE 1:250

0 5 10 15 m

TO BE PRINTED IN FULL COLOUR

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rev	date	description	drn	ch'k
2	09/01/2025	EARTHWORKS UPDATED	SM	MD
1	28/11/2024	ISSUED FOR CONCEPT DESGIN	SM	MD

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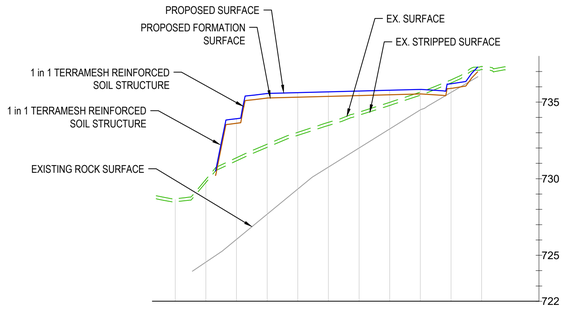
drawing title: BULK EARTHWORKS PLAN SHEET 02

status: CONCEPT DESIGN

scale at A1	drawn	checked	approved
1:250	SM	MD	NOV-24

project no.	sheet	rev.
218485	CV-2001	2

2



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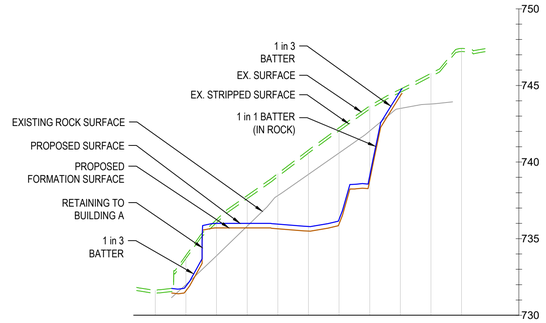

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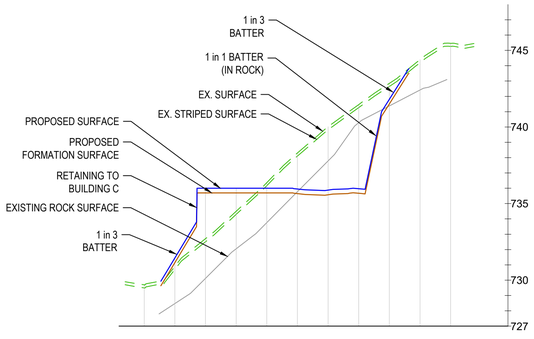

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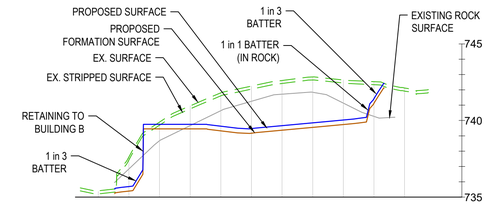

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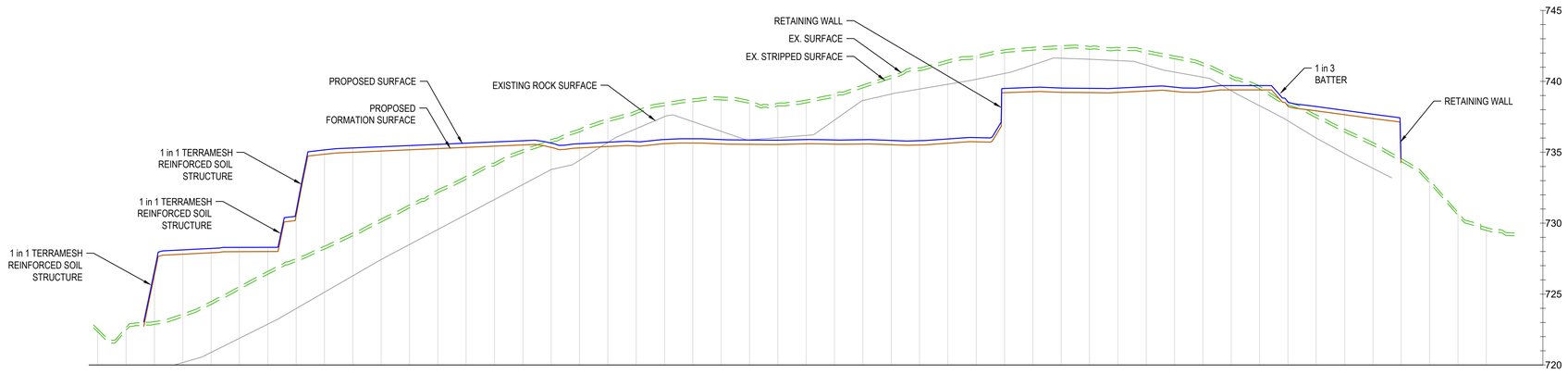

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SCALE (H) 1:250
SCALE (V) 1:50

SCALE 1:50
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SCALE 1:250
0 5 10 15 m

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2	09/01/2025	EARTHWORKS UPDATED	SM	MD
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rev	date	description	drn	ch'k

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drawing title
BULK EARTHWORKS SECTIONS

status
CONCEPT DESIGN

scale at A1	drawn	checked	approved
1:250	SM	MD	NOV-24

project no.	sheet	rev.
218485	CV-2050	2

A1

BRIDGET AVENUE

BIRCHFIELD DRIVE

AG BUILDING D

EXISTING SEWER TO BE ABANDONED. REFER TO HYDRAULIC ENGINEER.

EXISTING STORMWATER TO BE ABANDONED. REFER TO STORMWATER PLANS.

BLEACHER SEATING

RW3

WA07

WA03

DD

FOR CONTINUATION REFER TO DWG CV-3002

2

SITEWORKS LEGEND

- Property boundary
- 22.20 Finished surface level
- 10.00 Finished contour
- -1.0% Design slope
- K&G Kerb and gutter
- KO Kerb only
- FK Flush kerb
- DD Dish drain
- GD Grated drain
- Vehicular guard rail and pedestrian fall protection
- WA06 Blockwork wall
- WA01 Free-standing blockwork wall wrapped in gabions
- WA05 Brickwork wall
- WA03 Bleacher wall
- WA07 Terramesh earth retaining structure (design subject to specialist advice in consultation with geotechnical engineer)

SCALE 1:250

0 5 10 15 m

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2	24/01/25	REISSUE FOR CONCEPT DESIGN	MZV	MD
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BIRCHFIELD DRIVE, BUNGENDORE, NSW 2621

drawing title: SITEWORKS PLAN SHEET 01

status: CONCEPT DESIGN

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1:250	SM	MD	NOV-24

project no.	sheet	rev.
218485	CV-3001	2

A1

2

SITEWORKS LEGEND

- Property boundary
- 22.20 — Finished surface level
- 10.00 — Finished contour
- -1.0% — Design slope
- K&G — Kerb and gutter
- KO — Kerb only
- FK — Flush kerb
- DD — Dish drain
- GD — Grated drain
- Vehicular guard rail and pedestrian fall protection
- WA06 — Blockwork wall
- WA01 — Free-standing blockwork wall wrapped in gabions
- WA05 — Brickwork wall
- WA03 — Bleacher wall
- WA07 — Terramesh earth retaining structure (design subject to specialist advice in consultation with geotechnical engineer)

BRIDGET AVENUE

BUILDING C

BUILDING A

BIRCHFIELD DRIVE

1 in 3 CUT BATTER IN RESIDUAL SOILS

1 in 1 CUT BATTER IN STANDSTONE

BLEACHER SEATING

EXISTING SEWER TO BE ABANDONED. REFER TO HYDRAULIC ENGINEER.

EXISTING STORMWATER TO BE ABANDONED. REFER TO STORMWATER PLANS.

EXISTING SANDSTONE RETAINING WALLS TO BE DEMOLISHED AND REMOVED

FOR CONTINUATION REFER TO DWG CV-3001

FOR CONTINUATION REFER TO DWG CV-3003

SCALE 1:250

0 5 10 15 m

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rev	date	description	drn	ch'k
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1	28/11/2024	ISSUED FOR CONCEPT DESGIN	SM	MD

rev	date	description	drn	ch'k

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SITEWORKS PLAN SHEET 02

status
CONCEPT DESIGN

scale at A1	drawn	checked	approved
1:250	SM	MD	NOV-24

project no.	sheet	rev.
218485	CV-3002	2

A1

2

SITEWORKS LEGEND

- Property boundary
- 22.20 — Finished surface level
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- -1.0% — Design slope
- K&G — Kerb and gutter
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- WA03 — Bleacher wall
- WA07 — Terramesh earth retaining structure (design subject to specialist advice in consultation with geotechnical engineer)

BRIDGET AVENUE

WINYU RISE

BIRCHFIELD DRIVE

BUILDING A

BUILDING B

1 in 3 CUT BATTER IN RESIDUAL SOILS

1 in 1 CUT BATTER IN STANDSTONE

EXISTING STORMWATER TO BE ABANDONED. REFER TO STORMWATER PLANS. EXISTING SEWER TO BE ABANDONED. REFER TO HYDRAULIC ENGINEER.

EXISTING SANDSTONE RETAINING WALLS TO BE DEMOLISHED AND REMOVED

FOR CONTINUATION REFER TO DWG CV-3002

SCALE 1:250

0 5 10 15 m

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1	28/11/2024	ISSUED FOR CONCEPT DESGIN	SM	MD

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status: CONCEPT DESIGN

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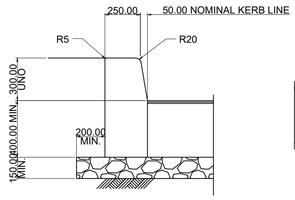
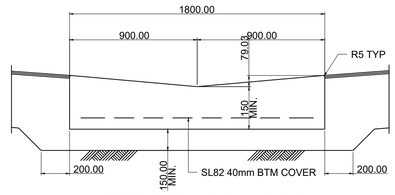
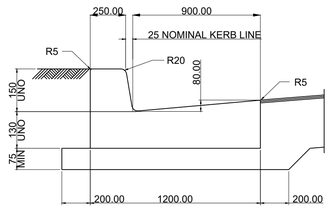


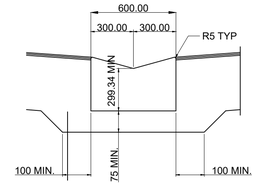
KERB ONLY (KO)
SCALE 1:10



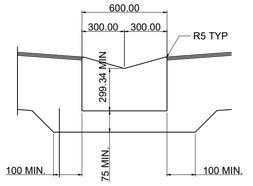
900 DISH DRAIN (DD)
SCALE 1:10



KERB AND GUTTER (K&G)
SCALE 1:10



DISH DRAIN TYPE A (DDA)
SCALE 1:10



DISH DRAIN TYPE A (DDA)
SCALE 1:10

PRELIMINARY PAVEMENT DESIGN

PAV01, PAV02, PAV03, PAV04 & PAV06 (COLOURED CONCRETE)

- REFER TO LANDSCAPE ARCHITECT DRAWINGS.
- 125mm THICKNESS CONCRETE (F'c = 32MPa) WITH SL72 (40mm COVER MIN.)
- 150mm LEAN MIX CONCRETE SUBBASE (F'c = 5MPa)
- 300mm CAPPING USING SELECT GRANULAR MATERIAL TO ACHIEVE MIN 10% CBR. E.G. CRUSHED ROCK; OR
- LIME STABILISATION OF SUBGRADE WITH 2%-4% LIME BY DRY WEIGHT. QUANTITY OF LIME TBC BY LABORATORY TESTING.

PAV05 (COMPACTED GRAVEL)

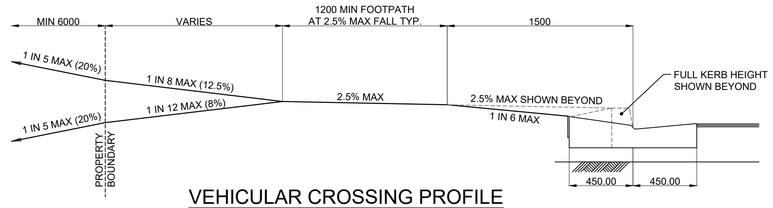
- 220mm COMPACTED THICKNESS FINE CRUSHED ROCK (DGB20)
- 300mm CAPPING USING SELECT GRANULAR MATERIAL TO ACHIEVE MIN 10% CBR. E.G. CRUSHED ROCKCAPPING (RIPPED AND CRUSHED SANDSTONE) LAYER; OR
- LIME STABILISATION OF SUBGRADE WITH 2%-4% LIME BY DRY WEIGHT. QUANTITY OF LIME TBC BY LABORATORY TESTING.

ASPHALT

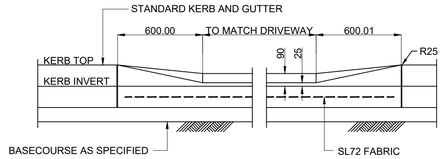
- 50mm THICKNESS ASPHALTIC CONCRETE (AC10)
- 160mm COMPACTED THICKNESS FINE CRUSHED ROCK (DGB20)
- 310mm COMPACTED THICKNESS FINE CRUSHED ROCK (DGS40)
- 300mm CAPPING USING SELECT GRANULAR MATERIAL TO ACHIEVE MIN 10% CBR. E.G. CRUSHED ROCK; OR
- LIME STABILISATION OF SUBGRADE WITH 2%-4% LIME BY DRY WEIGHT. QUANTITY OF LIME TBC BY LABORATORY TESTING. THE THICKNESS OF THE DGB20 AND DGS40 MAY BE REDUCED TO 100mm AND 170mm RESPECTIVELY SUBJECT TO THE SUBGRADE ACHIEVING A MIN CBR OF 6% FOLLOWING LIME STABILISATION

NOTE:

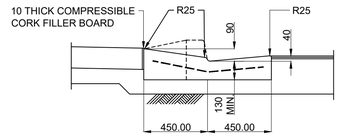
- FOR PAVEMENT TYPE REFERENCES (E.G. PAV01) REFER TO THE LANDSCAPE ARCHITECTS DRAWINGS
- REFER TO JK GEOTECHNICS REPORT FOR CAPPING AND SUBGRADE STABILISATION RECOMENDATIONS
- LIME STABILISATION MAY BE USED TO REDUCE REQUIRED PAVEMENT THICKNESSES



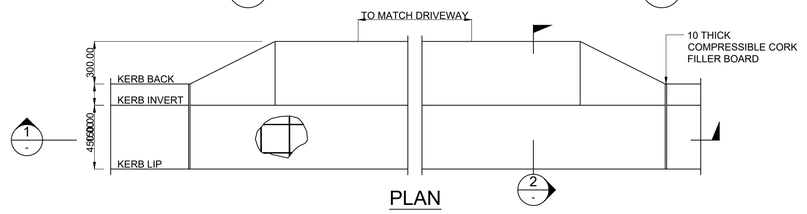
VEHICULAR CROSSING PROFILE
SCALE 1:20



SECTION 1
SCALE 1: 20

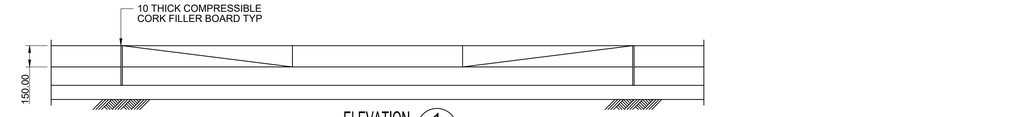


SECTION 2
SCALE 1: 20

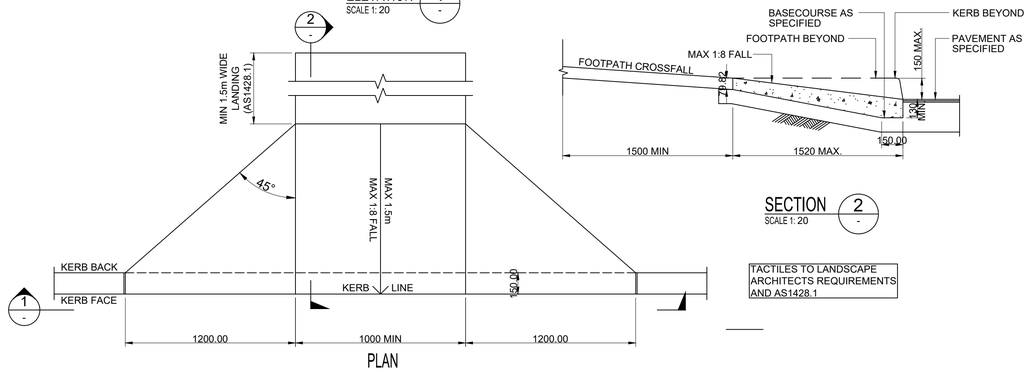


PLAN

VEHICULAR CROSSING
SCALE 1:20



ELEVATION 1
SCALE 1: 20



SECTION 2
SCALE 1: 20

TACTILES TO LANDSCAPE ARCHITECTS REQUIREMENTS AND AS1428.1

PLAN

KERB RAMP
SCALE 1:20

SCALE 1:10
0 100 200 300 400 500mm

SCALE 1:20
0 200 400 600 800 1000mm

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rev	date	description	drn	ch'k
2	24/01/25	REISSUE FOR CONCEPT DESIGN	MZV	MD
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rev	date	description	drn	ch'k

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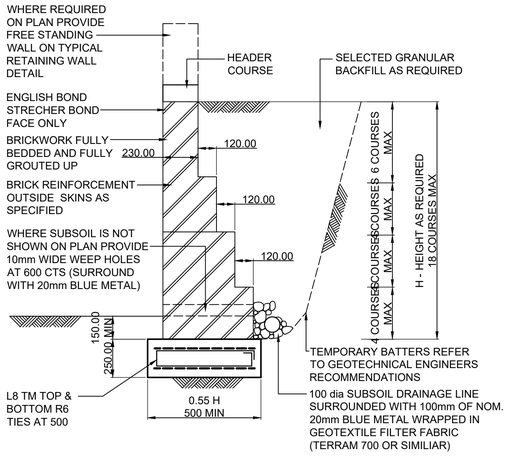
project
BUNGENDORE HIGH SCHOOL
BIRCHFIELD DRIVE, BUNGENDORE, NSW 2621

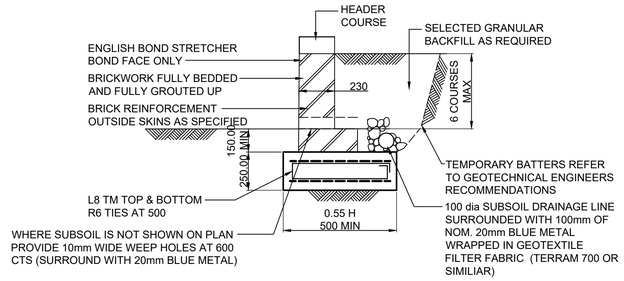
drawing title
SITEWORKS DETAILS

status
CONCEPT DESIGN

scale at A1	drawn	checked	approved
NTS	SM	MD	NOV-24

project no.	sheet	rev.
218485	CV-3050	2

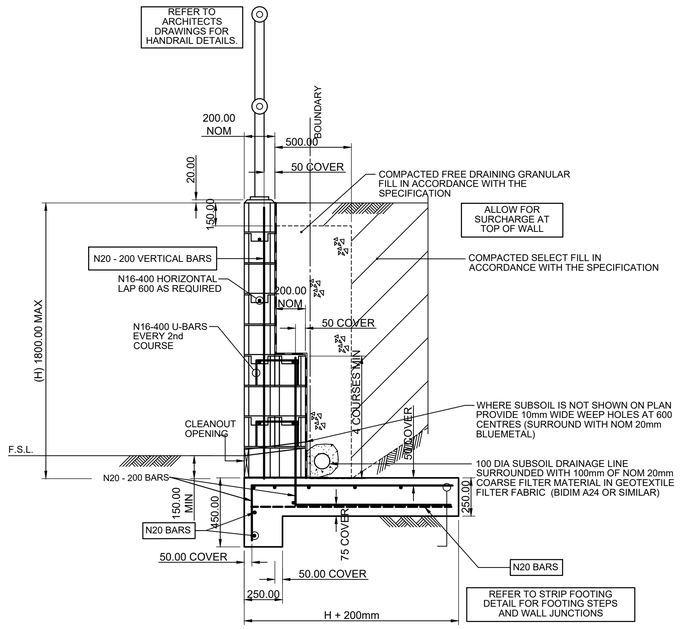




BRICK RETAINING WALL (WA05)

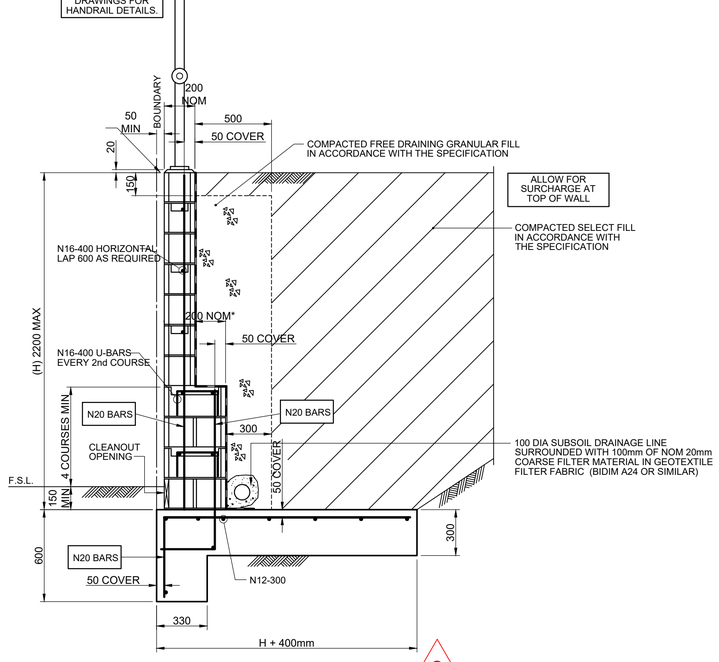
SCALE 1:20

ALL WALLS SUBJECT TO DETAILED DESIGN



RETAINING WALL (WA06)

SCALE 1:20



RETAINING WALL (WA06) 2

SCALE 1:20

SCALE 1:20

0 200 400 600 800 1000mm

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rev	date	description	drn	ch'k
2	24/01/25	REISSUE FOR CONCEPT DESIGN	MZV	MD
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BUNGENDORE HIGH SCHOOL
BIRCHFIELD DRIVE, BUNGENDORE, NSW 2621

drawing title
RETAINING WALL DETAILS

status
CONCEPT DESIGN

scale at A1	drawn	checked	approved
NTS	SM	MD	NOV-24

project no.	sheet	rev.
218485	CV-3201	1

A1

OCEANPROTECT FILTERRA BIORETENTION BASIN. 65m² x 0.15m DEPTH.

BRIDGET AVENUE

2

DRAINAGE LEGEND

- SW — Stormwater pipe with
- IL10.00 / 600 Ø / 1.25% / IL9.65 — Invert level upstream, Pipe size, Pipe grade, Invert level downstream
- Grated and solid lid pits
- On-grade kerb inlet and sag pit
- GD — Grated drain
- Grass catch drain
- DD — Dish drain
- X — Existing Stormwater to be demolished and removed

IL727.924
Ø225
1.00%
IL727.711

IL727.487
Ø600
1.0%
IL727.335

IL727.315
Ø675
1.0%
IL727.256

IL727.348
Ø225
20.0%
IL726.500

IL726.695
Ø675
6.5%
IL726.500

IL728.163
Ø600
3.73%
IL727.507

IL728.430
Ø600
3.30%
IL728.183

IL728.963
Ø600
2.66%
IL728.450

IL729.726
Ø600
3.85%
IL728.983

IL730.776
Ø600
7.5%
IL730.175

IL730.155
Ø600
4.34%
IL729.726

IL734.704
Ø225
1.0%
IL734.404

IL734.384
Ø300
1.0%
IL74.092

IL734.072
Ø300
1.0%
IL733.772

IL732.892
Ø600
1.0%
IL732.592

IL733.212
Ø600
1.0%
IL732.912

IL733.452
Ø600
1.0%
IL733.232

PROPOSED STORMWATER DRAINAGE NETWORK TO DISCHARGE TO EXISTING STORMWATER DRAINAGE PIT ON SITE.

EXISTING STORMWATER DRAINAGE PIPE SIZE TO BE CONFIRMED. PIPE TO BE UPGRADED TO 300Ø IF EXISTING IS SMALLER.

IL723.394
Ø300
20.01%
IL721.880

IL725.100
Ø300
1.0%
IL725.076

OSD TANK 1.
VOLUME: 430m³
AVERAGE DEPTH 2.15m
REFER TO DETAIL ON
218485-CV-4052

5m² WATER QUALITY CHAMBER. REFER TO OSD TANK 1 DETAIL ON 218485-CV-4052

EXISTING STORMWATER TO BE ABANDONED.
EXISTING SEWER TO BE ABANDONED.
REFER TO HYDRAULIC ENGINEER.

FOR CONTINUATION REFER TO DWG CV-4002

BIRCHFIELD DRIVE

SCALE 1:250

0 5 10 15 m

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rev	date	description	drn	ch'k
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BUNGENDORE HIGH SCHOOL

BIRCHFIELD DRIVE, BUNGENDORE, NSW 2621

drawing title
STORMWATER DRAINAGE PLAN SHEET 01

status
CONCEPT DESIGN

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1:250	SM	MD	NOV-24

project no.	sheet	rev.
218485	CV-4001	2

A1

2

BRIDGET AVENUE

BIRCHFIELD DRIVE

FOR CONTINUATION REFER TO DWG CV-4001

FOR CONTINUATION REFER TO DWG CV-4003

IL734.690
Ø300
0.99%
IL734.643

IL734.623
Ø300
1.0%
IL734.417

IL733.887
Ø450
0.5%
IL733.739

IL734.879
Ø300
1.0%
IL734.723

IL734.001
Ø450
0.5%
IL733.907

IL734.989
Ø300
1.0%
IL734.874

IL734.115
Ø450
0.5%
IL734.021

IL734.230
Ø450
0.5%
IL734.135

IL734.610
Ø375
1.01%
IL734.543

IL734.839
Ø300
0.5%
IL734.689

IL733.719
Ø525
1.0%
IL733.572

IL733.452
Ø600
1.0%
IL733.232

IL733.552
Ø525
1.0%
IL733.472

IL734.579
Ø300
1.07%
IL734.439

IL734.828
Ø300
1.48%
IL734.599

IL734.313
Ø375
0.5%
IL734.250

IL734.385
Ø375
0.5%
IL734.333

IL735.024
Ø225
1.0%
IL734.862

IL734.521
Ø375
0.5%
IL734.405

IL734.691
Ø300
0.5%
IL734.541

EXISTING STORMWATER TO BE ABANDONED.
EXISTING SEWER TO BE ABANDONED.
REFER TO HYDRAULIC ENGINEER.

100kL RAINWATER TANK BY HYDRAULIC ENGINEER. OVERFLOW PIPE TO CONNECT TO PIT D2. OVERFLOW PIPE SIZING BY HYRDRAULIC ENGINEER.

GD

TO BE PRINTED IN FULL COLOUR

DRAINAGE LEGEND

- SW — Stormwater pipe with
- IL10.00 / 600 Ø / 1.25% / IL9.65 — Invert level upstream, Pipe size, Pipe grade, Invert level downstream
- Grated and solid lid pits
- On-grade kerb inlet and sag pit
- GD — Grated drain
- Grass catch drain
- DD — Dish drain
- X — Existing Stormwater to be demolished and removed

SCALE 1:250

0 5 10 15 m

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rev	date	description	drn	ch'k
2	24/01/25	REISSUE FOR CONCEPT DESIGN	MZV	MD
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BUNGENDORE HIGH SCHOOL

BIRCHFIELD DRIVE, BUNGENDORE, NSW 2621

drawing title
STORMWATER DRAINAGE PLAN SHEET 02

status
CONCEPT DESIGN

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1:250	SM	MD	NOV-24

project no.	sheet	rev.
218485	CV-4002	2

A1

2

DRAINAGE LEGEND

- SW — Stormwater pipe with
- IL10.00 / 600 Ø / 1.25% / IL9.65 — Invert level upstream, Pipe size, Pipe grade, Invert level downstream
- Grated and solid lid pits
- On-grade kerb inlet and sag pit
- GD — Grated drain
- Grass catch drain
- DD — Dish drain
- X — Existing Stormwater to be demolished and removed

BRIDGET AVENUE

BIRCHFIELD DRIVE

FOR CONTINUATION REFER TO DWG CV-4002

IL737.367
Ø375
3.92%
IL736.250

IL736.230
Ø375
0.5%
IL736.174

IL737.422
Ø375
0.51%
IL737.387

IL737.477
Ø375
0.5%
IL737.442

IL738.594
Ø225
1.0%
IL738.306

IL737.783
Ø375
1.0%
IL737.497

IL735.034
Ø225
0.5%
IL734.914

IL738.286
Ø225
1.00%
IL738.123

IL738.103
Ø300
1.0%
IL737.803

IL738.578
Ø300
0.5%
IL734.499

IL738.714
Ø225
0.5%
IL738.598

IL735.011
Ø300
0.5%
IL734.711

IL735.107
Ø225
1.0%
IL735.031

IL736.154
Ø375
0.5%
IL736.064

IL737.364
Ø225
3.36%
IL737.007

IL737.854
Ø225
1.2%
IL736.764

IL736.987
Ø225
3.61%
IL736.874

IL736.337
Ø225
1.0%
IL736.204

IL737.490
Ø225
1.36%
IL737.314

IL735.550
Ø300
19.99%
IL734.345

IL731.025
Ø300
1.01%
IL730.980

IL736.494
Ø225
0.99%
IL736.475

IL736.402
Ø225
1.0%
IL736.357

IL736.559
Ø225
1.0%
IL736.442

IL736.699
Ø225
1.0%
IL736.579

IL737.294
Ø225
1.98%
IL736.719

PROPOSED STORMWATER DRAINAGE NETWORK TO DISCHARGE TO EXISTING COUNCIL STORMWATER DRAINAGE PIT.

20m² WATER QUALITY CHAMBER. REFER TO OSD TANK 2 DETAIL ON 218485-CV-4052

OSD TANK 2.
VOLUME: 112m³
AVERAGE DEPTH 1.4m
REFER TO DETAIL ON 218485-CV-4052

CONNECTION STUB FOR FUTURE BUILDING STORMWATER DRAINAGE.

EXISTING STORMWATER TO BE ABANDONED. EXISTING SEWER TO BE ABANDONED. REFER TO HYDRAULIC ENGINEER.

CONNECTION TO BE INSTALLED FOR FUTURE BUILDING STORMWATER DRAINAGE.

SCALE 1:250

0 5 10 15 m

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2	24/01/25	REISSUE FOR CONCEPT DESIGN	MZV	MD
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BUNGENDORE HIGH SCHOOL

BIRCHFIELD DRIVE, BUNGENDORE, NSW 2621

drawing title
STORMWATER DRAINAGE PLAN SHEET 03

status
CONCEPT DESIGN

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1:250	SM	MD	NOV-24

project no.	sheet	rev.
218485	CV-4003	2

STORMWATER DRAINAGE PIT SCHEDULE

NOTES:
1. LID SIZE DOES NOT NECESSARILY REFLECT PIT SIZE. REFER TO PIT TYPE DETAILS, SHOWN ON DETAIL SHEETS.
2. FINAL INTERNAL PIT DIMENSIONS TO COMPLY WITH AS3500.
3. ALL JUNCTION PITS TO HAVE CLASS D CAST IRON COVER WITH CONCRETE INFILL U.N.O.
4. ALL SURFACE INLET PITS TO HAVE CLASS D GALVANIZED MILD STEEL GRATE HINGED TO FRAME U.N.O.

PIT NUMBER	PIT TYPE	LID SIZE	NOTES
A1	EXISTING PIT TO REMAIN	-	
A2	JUNCTION PIT	900 x 900	
A3	JUNCTION PIT	900 x 900	OSD ACCESS LID
A4	SURFACE INLET PIT	900 x 900	OSD ACCESS LID. HEEL SAFE GRATE HINGED TO FRAME.
A5	JUNCTION PIT	900 x 900	OSD ACCESS LID
A6	JUNCTION PIT	900 x 900	OSD ACCESS LID
A7	SURFACE INLET PIT	1200 x 1200	
A8	LETTERBOX INLET PIT	1500 x 1500	CLASS D GALVANIZED MILD STEEL GRATE HINGED TO FRAME.
A9	SURFACE INLET PIT	900 x 900	
A10	SURFACE INLET PIT	900 x 900	
A11	SURFACE INLET PIT	900 x 900	
A12	SURFACE INLET PIT	900 x 900	
A13	SURFACE INLET PIT	900 x 900	
A14	SURFACE INLET PIT	900 x 900	
A15	SURFACE INLET PIT	900 x 900	
A16	SURFACE INLET PIT	1200 x 1200	OCEANPROTECT OCEANGUARD PIT INSERT
A17	SURFACE INLET PIT	900 x 900	
A18	SURFACE INLET PIT	900 x 900	
A19	SURFACE INLET PIT	900 x 900	
A20	SURFACE INLET PIT	900 x 900	
A21	SURFACE INLET PIT	900 x 900	OCEANPROTECT OCEANGUARD PIT INSERT
A22	SURFACE INLET PIT	900 x 900	OCEANPROTECT OCEANGUARD PIT INSERT
A23	SURFACE INLET PIT	900 x 900	OCEANPROTECT OCEANGUARD PIT INSERT
A24	SURFACE INLET PIT	900 x 900	OCEANPROTECT OCEANGUARD PIT INSERT
A25	JUNCTION PIT	900 x 900	
A26	SURFACE INLET PIT	900 x 900	
A27	SURFACE INLET PIT	900 x 900	
A28	SURFACE INLET PIT	900 x 900	
A29	SURFACE INLET PIT	900 x 600	
A30	SURFACE INLET PIT	600 x 600	
A31	SURFACE INLET PIT	600 x 600	
B1	SURFACE INLET PIT	900 x 600	
B2	SURFACE INLET PIT	600 x 600	
C1	SURFACE INLET PIT	900 x 600	OCEANPROTECT OCEANGUARD PIT INSERT
C2	SURFACE INLET PIT	900 x 600	OCEANPROTECT OCEANGUARD PIT INSERT
C3	SURFACE INLET PIT	600 x 600	
D1	SURFACE INLET PIT	900 x 600	OCEANPROTECT OCEANGUARD PIT INSERT
D2	SURFACE INLET PIT	600 x 600	
E1	SURFACE INLET PIT	600 x 600	
E2	SURFACE INLET PIT	600 x 600	OCEANPROTECT OCEANGUARD PIT INSERT
F1	SURFACE INLET PIT	600 x 600	OCEANPROTECT OCEANGUARD PIT INSERT
G1	SURFACE INLET PIT	600 x 600	
H1	SURFACE INLET PIT	900 x 600	OCEANPROTECT OCEANGUARD PIT INSERT
H2	SURFACE INLET PIT	900 x 600	OCEANPROTECT OCEANGUARD PIT INSERT
H3	SURFACE INLET PIT	900 x 600	OCEANPROTECT OCEANGUARD PIT INSERT
I1	JUNCTION PIT	600 x 600	
J1	EXISTING PIT TO REMAIN	-	
J2	JUNCTION PIT	1500 x 1500	
J3	SURFACE INLET PIT	900 x 900	OSD ACCESS LID
J4	SURFACE INLET PIT	900 x 900	OSD ACCESS LID
J5	SURFACE INLET PIT	900 x 900	OSD ACCESS LID
J6	SURFACE INLET PIT	900 x 900	OSD ACCESS LID
J7	SURFACE INLET PIT	900 x 900	
J8	SURFACE INLET PIT	900 x 600	
J9	SURFACE INLET PIT	900 x 900	
J10	SURFACE INLET PIT	900 x 900	OCEANPROTECT OCEANGUARD PIT INSERT
J11	SURFACE INLET PIT	900 x 900	OCEANPROTECT OCEANGUARD PIT INSERT
J12	SURFACE INLET PIT	900 x 900	OCEANPROTECT OCEANGUARD PIT INSERT
J13	SURFACE INLET PIT	900 x 600	
J14	SURFACE INLET PIT	600 x 600	
K1	KERB INLET PIT	3m LINTEL	OCEANPROTECT OCEANGUARD PIT INSERT
K2	KERB INLET PIT	2m LINTEL	OCEANPROTECT OCEANGUARD PIT INSERT
K3	KERB INLET PIT	2m LINTEL	OCEANPROTECT OCEANGUARD PIT INSERT
K4	KERB INLET PIT	2m LINTEL	
K5	KERB INLET PIT	2m LINTEL	
K6	KERB INLET PIT	1m LINTEL	
L1	SURFACE INLET PIT	900 x 900	OCEANPROTECT OCEANGUARD PIT INSERT
M1	SURFACE INLET PIT	900 x 600	
M2	SURFACE INLET PIT	900 x 600	
M3	SURFACE INLET PIT	600 x 600	
N1	SURFACE INLET PIT	900 x 900	OCEANPROTECT OCEANGUARD PIT INSERT
N2	SURFACE INLET PIT	900 x 900	OCEANPROTECT OCEANGUARD PIT INSERT
N3	SURFACE INLET PIT	600 x 600	OCEANPROTECT OCEANGUARD PIT INSERT

2

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project
BUNGENDORE HIGH SCHOOL
BIRCHFIELD DRIVE, BUNGENDORE, NSW 2621

drawing title
STORMWATER DRAINAGE PIT SCHEDULE

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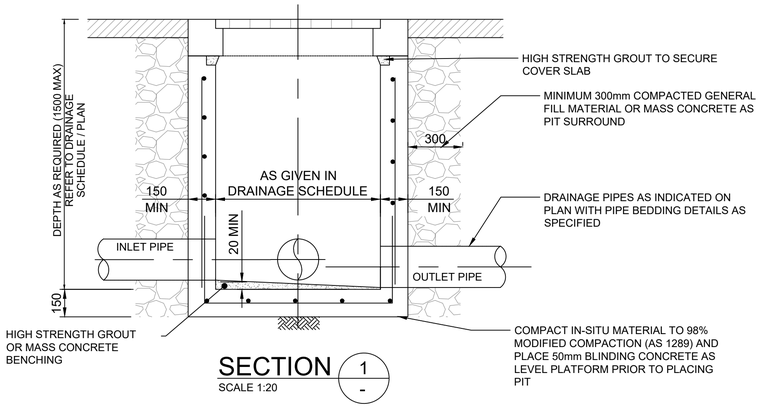
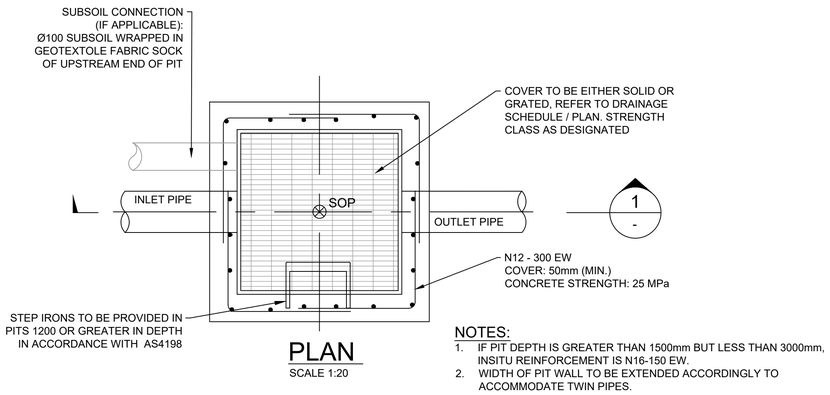
218485	CV-4010	2



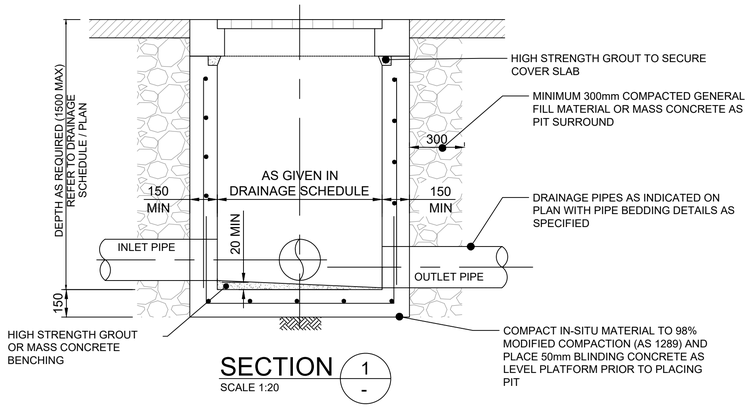
SECTION 1 -
SCALE 1:20



PLAN
SCALE 1:20

NOTES:
1. IF PIT DEPTH IS GREATER THAN 1500mm BUT LESS THAN 3000mm, INSITU REINFORCEMENT IS N16-150 EW.
2. WIDTH OF PIT WALL TO BE EXTENDED ACCORDINGLY TO ACCOMMODATE TWIN PIPES.

IN-SITU GRATED PIT TYPICAL DETAIL
SCALE 1:20



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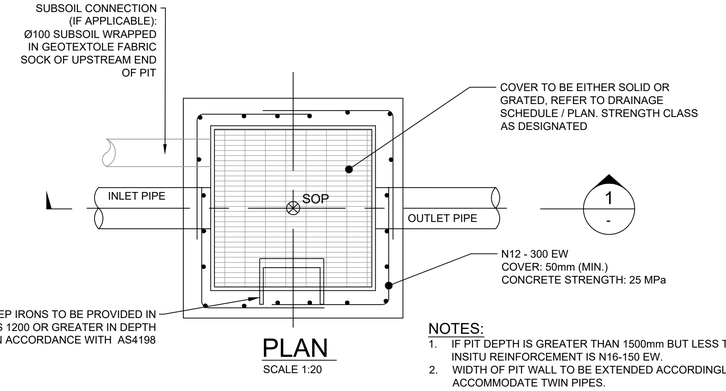
SCALE 1:20



PLAN
SCALE 1:20

NOTES:
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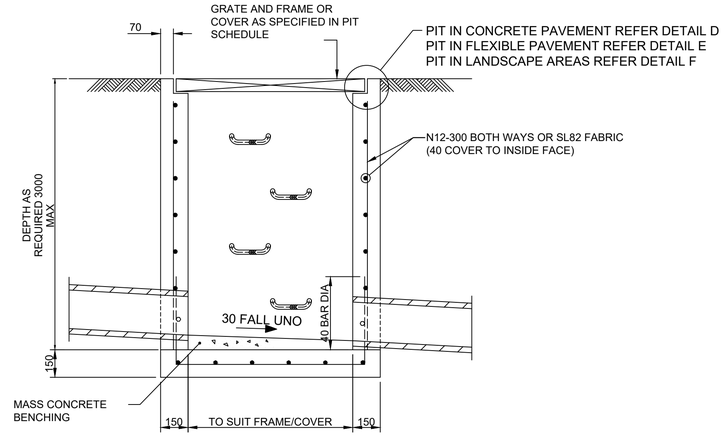
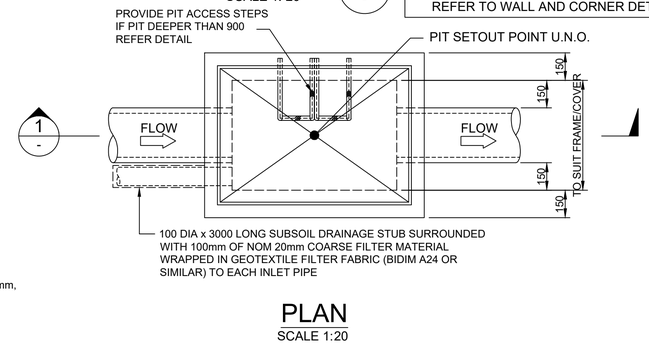
2. WIDTH OF PIT WALL TO BE EXTENDED ACCORDINGLY TO ACCOMMODATE TWIN PIPES.

IN-SITU GRATED PIT TYPICAL DETAIL
SCALE 1:20



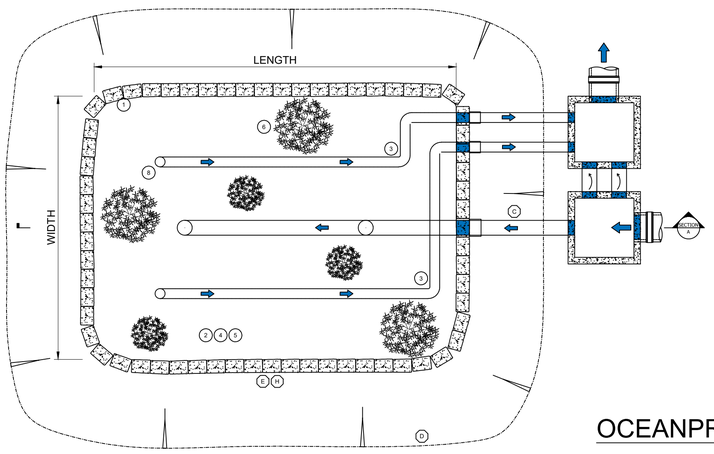
SECTION 1 -
SCALE 1: 20

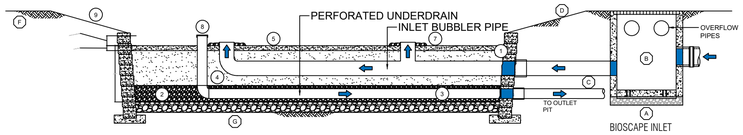
NOTE:IF REINFORCING FABRIC IS TO BE USED REFER TO WALL AND CORNER DETAILS



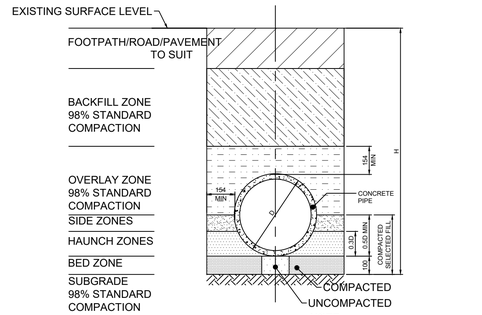
PLAN
SCALE 1:20

IN-SITU REGULAR JUNCTION PIT





OCEANPROTECT FILTERRA BIORETENTION BASIN TYPICAL DETAIL
SCALE: NTS



TYPICAL TRENCH 'HS' SUPPORT FOR CONCRETE PIPES
SCALE 1:10

NOTE:
1. TRENCHING AS PER AS3725
2. DRAINAGE PIPE TO BE MIN. 375Ø, MAX. SIZE 900Ø U.N.O. REINFORCED CONCRETE PIPE

SCALE 1:10
0 100 200 300 400 500mm

SCALE 1:20
0 200 400 600 800 1000mm

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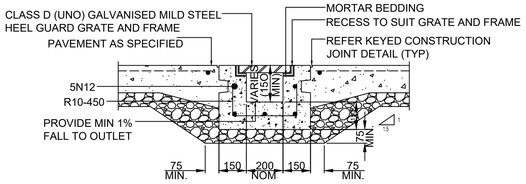
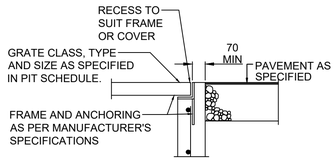


GRATED DRAIN IN CONCRETE PAVEMENT

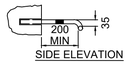
SCALE 1:10

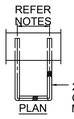


DETAIL E
INTERFACE WITH FLEXIBLE PAVEMENT

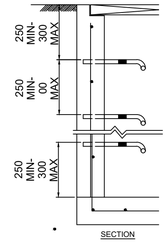
SCALE 1:10

IN EXISTING PITS:
DRILL 30mm DIA HOLE x 120mm DEEP AND EPOXY INTO WALL WITH EPOXY MORTAR EQUAL TO EPIREZ 633 (NON SAG)
IN PRECAST PITS:
DEPTH OF EMBEDMENT IS TO BE IN ACCORDANCE WITH PIT MANUFACTURER'S DETAILS





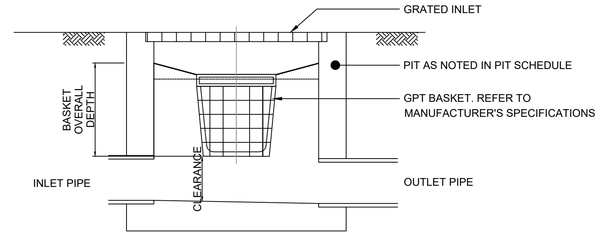
NOTES
1 WHEN POSITIONED IN STRAIGHT ALIGNMENT, STEP TO BE 400 WIDE.
2 STAGGERED STEPS TO BE 200 WIDE, STEPS TO BE STAGGERED 200 CENTRE TO CENTRE FOR ALTERNATE STEPS.
3 SPACING OF STEPS TO BE UNIFORM TO WITHIN ±5mm IN EACH PIT.



ACCESS STEP DETAIL (STEP 1)

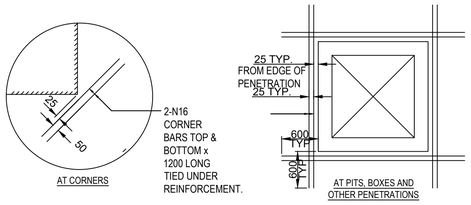
SCALE 1:10

TO BE PROVIDED FOR PITS DEEPER THAN 900mm



GROSS POLLUTANT TRAP (GPT) PIT BASKET INSERT FOR SURFACE INLET PITS

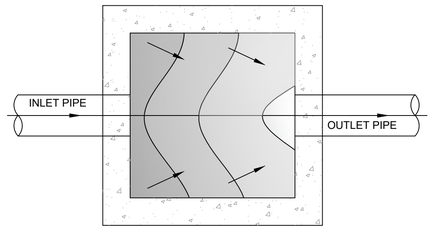
SCALE: NTS

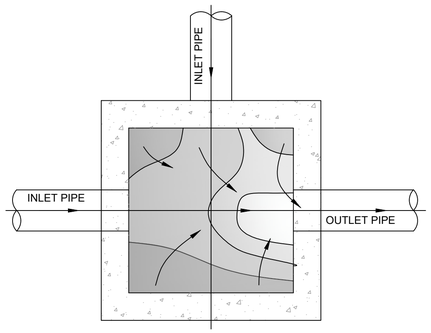


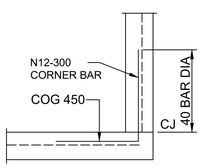
TYPICAL TRIMMER BAR DETAIL

SCALE 1:20

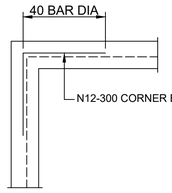
NOTE:
TRIMMER BARS:
1. TO BE CONSTRUCTED AT ALL PENETRATIONS IN VEHICLE CONCRETE PAVEMENTS INCLUDING BUT NOT LIMITED TO:
   - ALL SERVICE PITS
   - ALL DRAINAGE STRUCTURES
   - ALL VALVE BOXES
   - ALL IN-GROUND FIRE HYDRANTS
   - ALL PROTRUDING CORNERS OF STRUCTURES OR SLABS
   - ALL COLUMNS PENETRATING CONCRETE PAVEMENT
2. CONSTRUCT 2-N16 TRIMMER BARS (1200LONG, TOP AND BOTTOM) AT ALL MISMATCHED OR DISCONTINUOUS JOINTS. TYPICAL



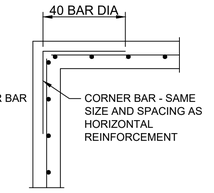




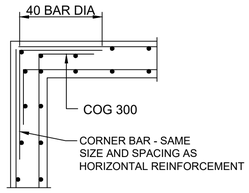
ELEVATION AT BASE



PLAN CORNER BARS



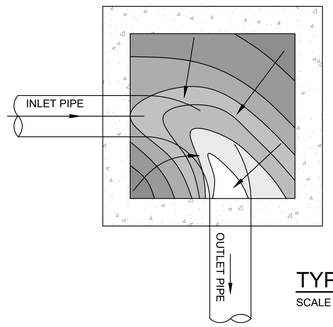
PLAN SINGLE LAYER



PLAN DOUBLE LAYER

PIT CORNER DETAILS MESH REINFORCEMENT

SCALE 1:20



NOTES:
1. MASS CONCRETE BENCHING WITHIN PITS MUST BE FORMED SO AS TO CONVEY WATER FROM INLET(S) TO OUTLET.
2. BENCHING SHOULD BE ACHIEVE MINIMUM CROSS FALLS WITHIN PITS AS REQUIRED BY ENSTRUCT'S PIT DETAILS AND AUSTRALIAN STANDARDS.
3. NO WATER IS TO STAND IN PITS WHEN BENCHING IS COMPLETE.

TYPICAL PIT BENCHING DETAILS

SCALE 1:20

SCALE 1:10
0 100 200 300 400 500mm

SCALE 1:20
0 200 400 600 800 1000mm

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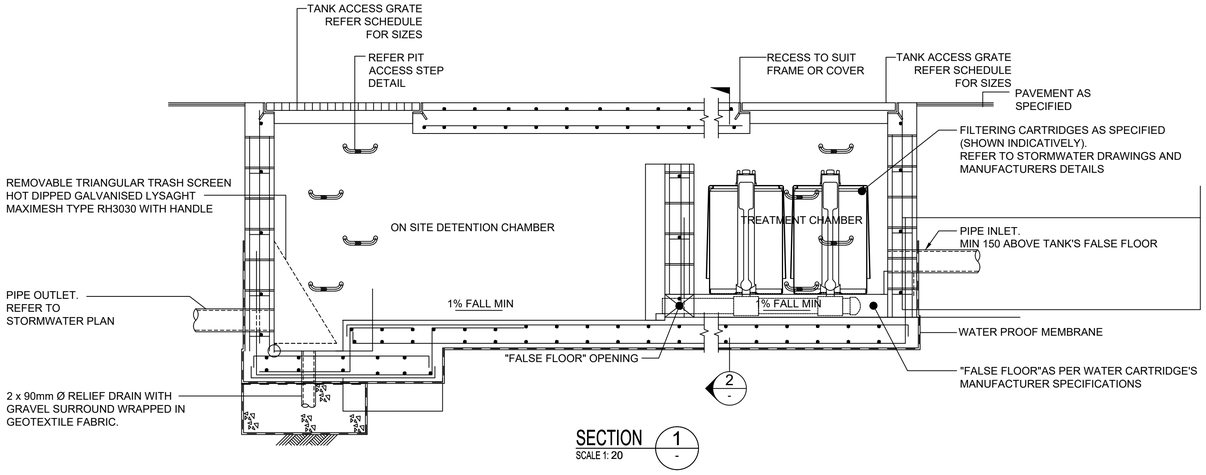
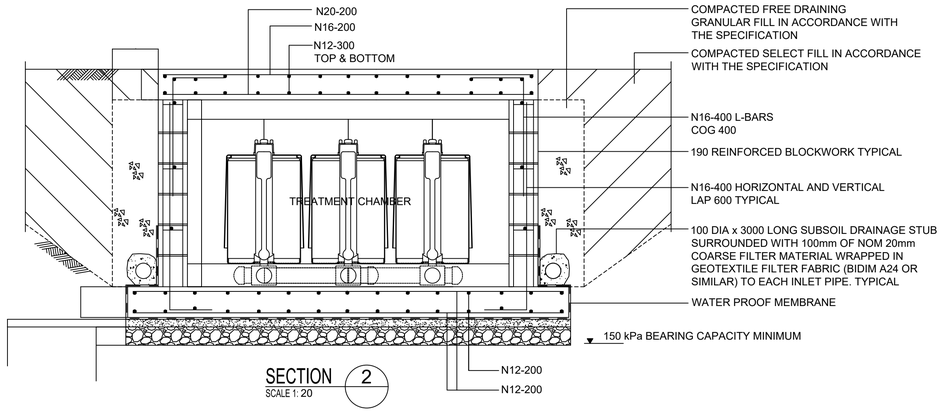


SECTION 1
SCALE 1: 20



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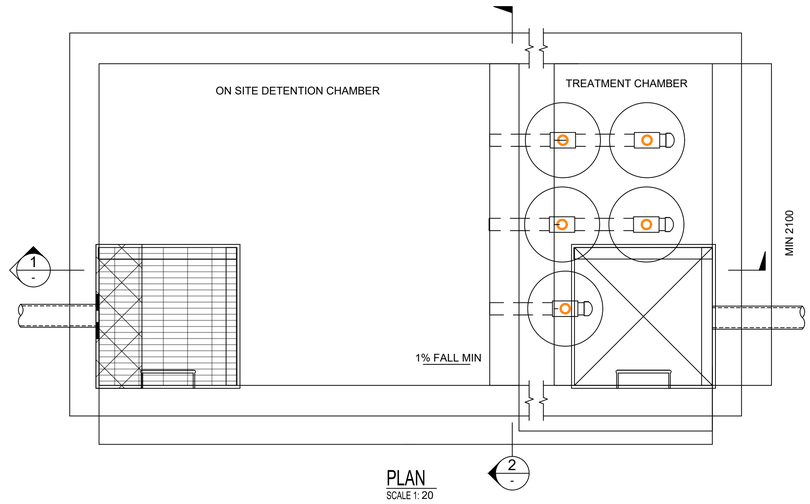
SCALE 1: 20



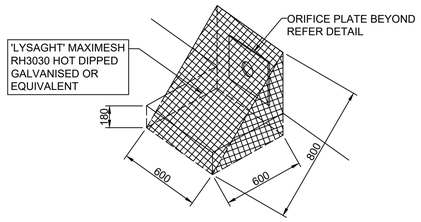
PLAN
SCALE 1: 20

2

OSD TANK 1	OSD TANK 2
AVERAGE HEIGHT "H" = 2.15m	AVERAGE HEIGHT "H" = 1.40m
WIDTH "W" = 12.5m	WIDTH "W" = 10m
TOTAL LENGTH "L1" = 16m	TOTAL LENGTH "L1" = 8m
TREATMENT LENGTH x WIDTH = 2.4m x 2.4m	TREATMENT LENGTH "L2" = 2m
WEIR HEIGHT Wh = 920mm	WEIR HEIGHT Wh = 920mm
TREATMENT VOLUME = 4.5m^3	TREATMENT VOLUME = 15.6m^3
TOTAL VOLUME = 430m^3	TOTAL VOLUME = 112m^3
WATER QUALITY CARTRIDGES	WATER QUALITY CARTRIDGES
CARTRIDGES SIPHON HEIGHT = 0.690m	CARTRIDGES SIPHON HEIGHT = 0.690m
CARTRIDGES PHYSICAL HEIGHT = 0.840m	CARTRIDGES PHYSICAL HEIGHT = 0.840m
CARTRIDGES AMOUNT = 10 UNITS	CARTRIDGES AMOUNT = 15 UNITS

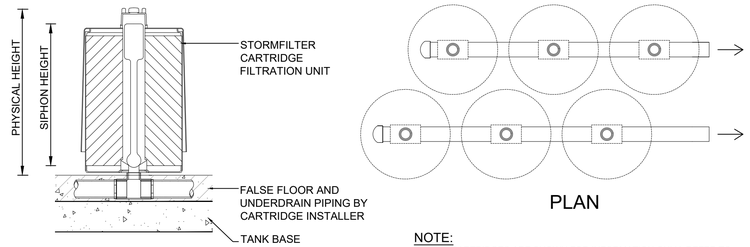
TYPICAL UNDERGROUND ON SITE DETENTION TANK WITH WATER QUALITY CHAMBER

SCALE 1:20



TRASH SCREEN DETAIL

NTS



SECTION

PLAN

TYPICAL CARTRIDGE DETAIL

SCALE 1:50

NOTE:
- CARTRIDGES ARE SHOWN FOR INFORMATION ONLY. REFER TO MANUFACTURER'S SPECIFICATIONS FOR TECHNICAL DETAILS AND SPECIFICATIONS.
- ALL WATER QUALITY DEVICES REQUIRE MAINTENANCE. REFER TO MANUFACTURER'S MAINTENANCE SPECIFICATIONS AND SCHEDULES.

SCALE 1:20
0 200 400 600 800 1000mm

SCALE 1:50
0 1 2 3 m

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STORMWATER ONSITE DETENTION TANK DETAILS

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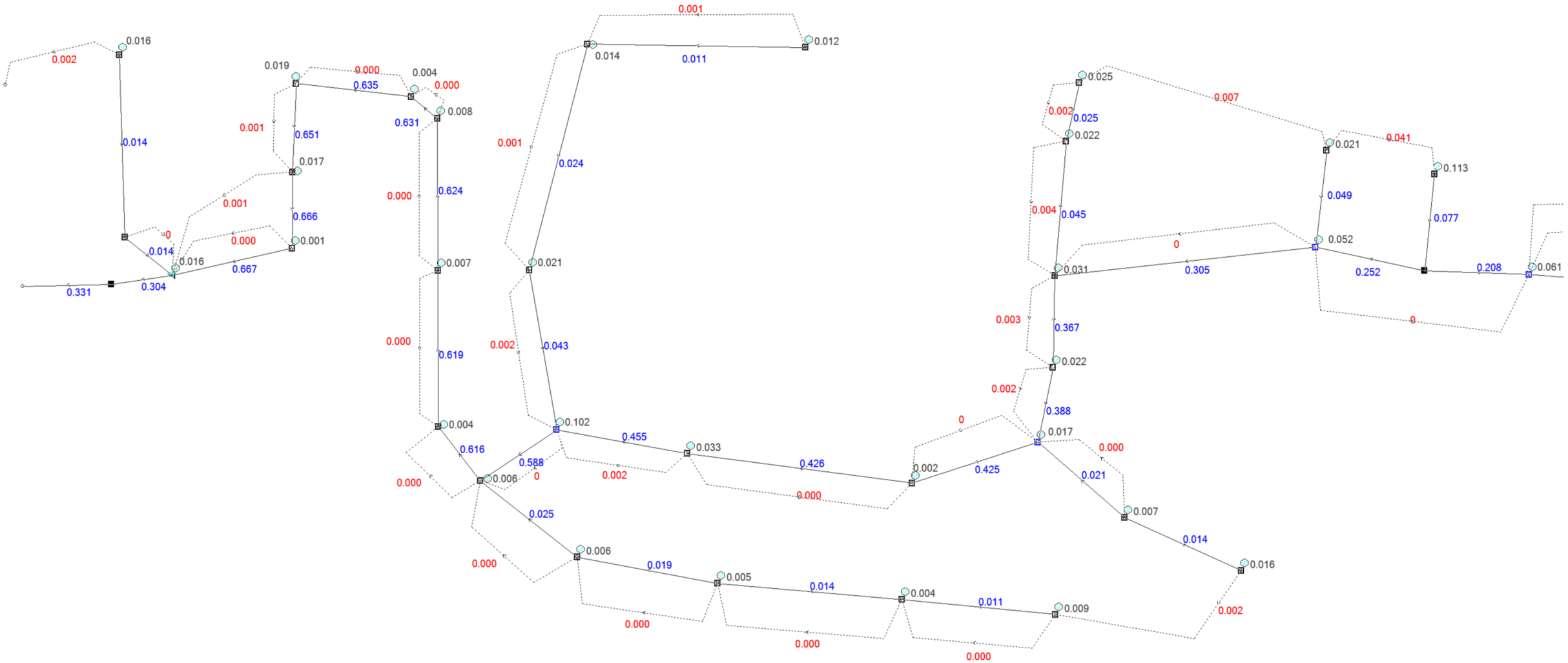
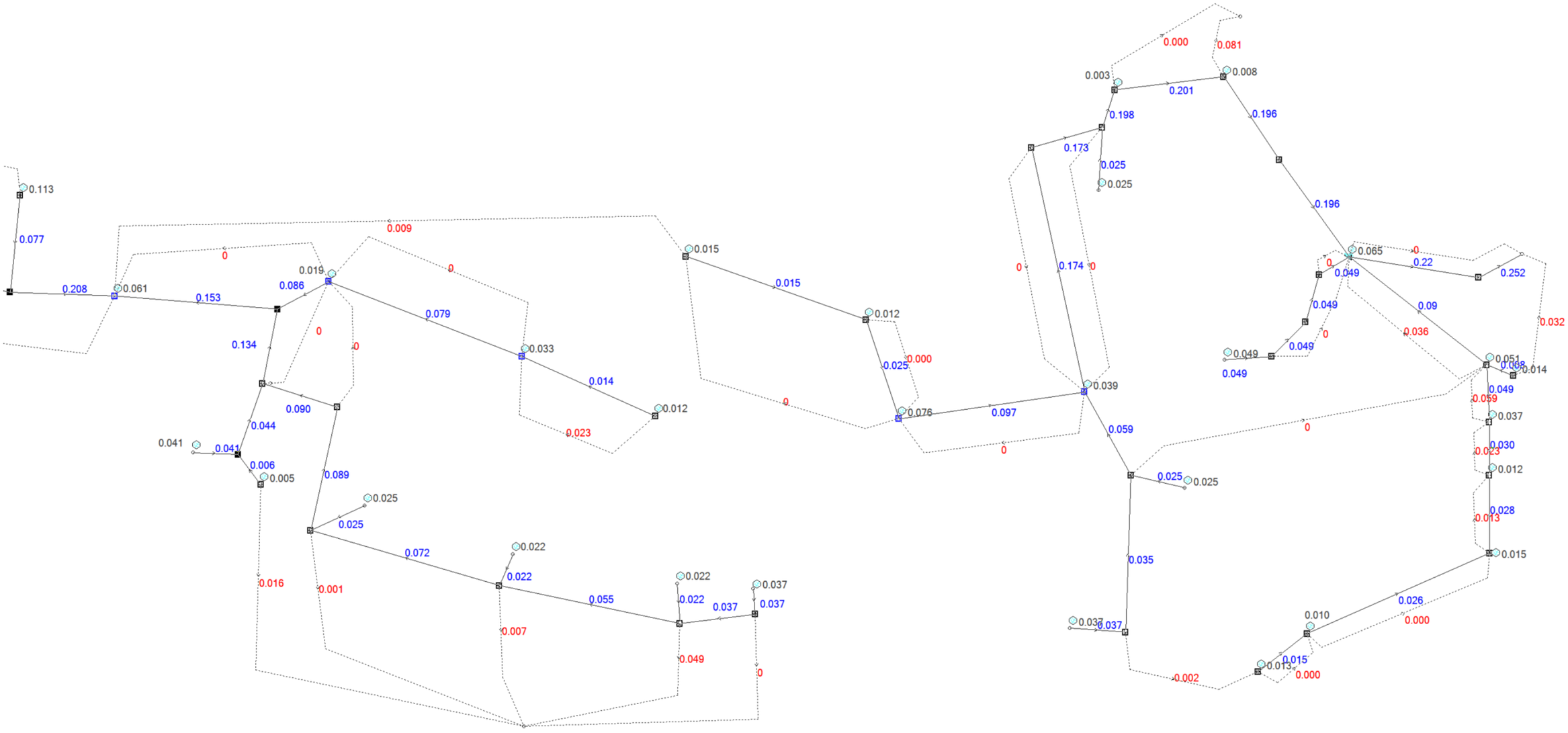
APPENDIX B

DRAINS MODEL (1% AEP STORM MODEL RUN)



Run Log for DRAINS v2024.11.9103.14755 - 250122 - BHS Site DRAINS - MZV.drn run at 11:32:51 on 26/1/2025.

Upwelling occurred at: K2, L1, GD5, J7, H3, A30
Freeboard was less than 0.15m at K3, G1, N1, K1, K4, J13, A10, A12, A13, A15, N3, A24, H2, H1, A26, A27, A28, A29, A31
Flows were safe in all overflow routes.



C_PRE-DEV
Area = 4.205 ha
EIA = 0%, Tc = 6.0 min
RIA = 0%, Tc = 2.0 min
PA = 100%, Tc = 19.0 min

Peak Flow = 1.015 cu.m/s
Peak Impervious Flow = 0.000 cu.m/s
Peak Pervious Flow = 1.015 cu.m/s

1.01

0.251

OSD BYPASS
Area = 0.767 ha
EIA = 10%, Tc = 6.0 min
RIA = 0%, Tc = 2.0 min
PA = 90%, Tc = 10.0 min

Peak Flow = 0.251 cu.m/s
Peak Impervious Flow = 0.031 cu.m/s
Peak Pervious Flow = 0.228 cu.m/s

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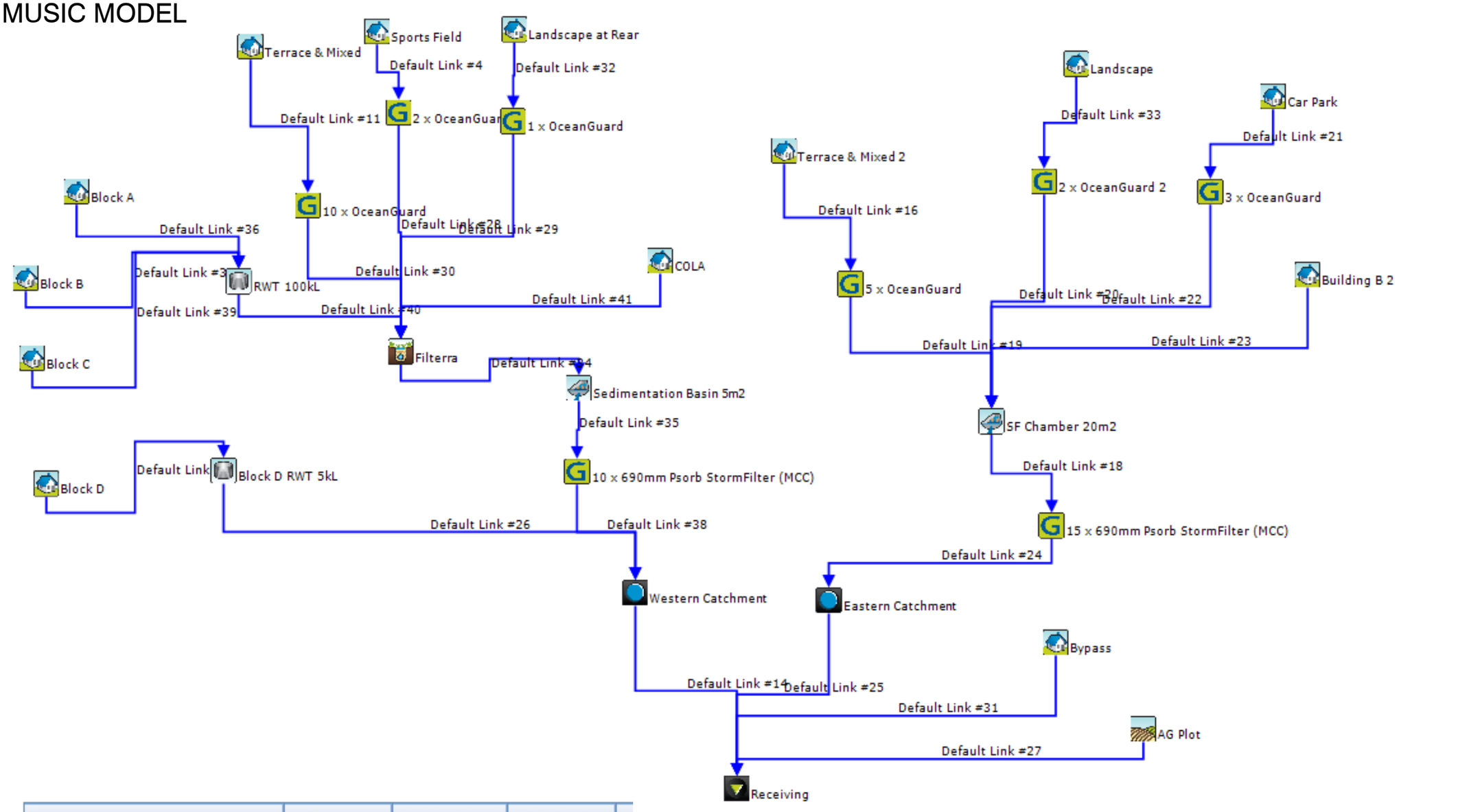
APPENDIX C

MUSIC MODEL



	Sources	Residual Load	% Reduction
Flow (ML/yr)	9.278	7.52	18.95
Total Suspended Solids (kg/yr)	1240	76.39	93.84
Total Phosphorus (kg/yr)	2.88	0.3585	87.55
Total Nitrogen (kg/yr)	22.39	5.801	74.09
Gross Pollutants (kg/yr)	297.5	3.765	98.73