

The purpose of this report is to summarise the proposed design solutions for the stormwater management for a REF submission. The proposed design has been considered with regard to the Moree Plains DCP 2013 as well as common industry practice.

The subject site is located along the southern boundary of the existing Moree Hospital property, between Victoria Terrace and Alice Street, in the middle of Moree town centre. Moree Hospital is directly adjacent to the Mehi river, running along the northern edge of the property. The property has direct access gates to Victoria Terrace and Alice Street which connect the site to Balo street to the east. Balo street also serves as B76 highway access to the whole of Moree. Ultimately this connects the town to major populations hubs including Sydney and Brisbane. An aerial image of the property is shown below:



3. PROPOSED DEVELOPMENT

The objective of the Moree Hospital Redevelopment (MHR) Project is to align the recommendations of the endorsed CSP with new contemporary patient care facilities to support the adoption of new and improved models of care. The primary focus of this Project is to provide asset replacement through consolidation of services into a new two-story Acute Services Building (ASB). The ASB will be located on the south section of the existing site along Alice Street and provide a new main access to the campus.

The Project scope to redevelop Moree Hospital, in line with the CSP, include the master planning and delivery of the following:

- Emergency care services
- Overnight inpatient beds
- Operating theatre
- Imaging services
- Birthing suites
- Pathology shell space
- Clinical support services

In addition to the above clinical services, the redevelopment will also incorporate associated works such as:

- A new hospital main entry and Front of House
- Back of House services
- Modifications to existing carparking
- Landscaping
- decommissioning & demolition of redundant existing facilities
- A new substation, and
- A new loading dock & services yard area

4.1 STORMWATER QUALITY

Considering the restrictions on site being the existing stormwater infrastructure in Victoria Terrace and Alice St, as well as the relatively flat nature of the site and sporadic rainfall patterns in Moree, the approach taken to Stormwater Quality is to provide pit inserts within the carpark pits as well as a proprietary treatment device (Jellyfish) for the north-eastern discharge point.

- Stormwater enters the Jellyfish through the inlet pipe, builds driving head, and traps floating pollutants behind the maintenance access wall and below the cartridge deck.
- The upstream diversion pit produces driving head which pushes the stormwater below the cartridge deck where a separation skirt around the cartridges isolates oil, litter and debris outside the filtration zone, allowing sand-sized particles to settle in the sump.
- The driving head causes the water to enter the filtration zone and up through the top of the cartridge into the backwash pool. Once the water has filled the backwash pool, clean water overflows where it exits via the outlet pipe
- The membrane filters provide a very large surface area to effectively remove fine sand and silt-sized particles, and a high percentage of pollutants such as nitrogen, phosphorus, metals, and hydrocarbons while ensuring long-lasting treatment
- As influent flow subsides, the filtered water in the backwash pool flows back through the high flow membrane cartridges into the lower chamber. This passive backwash extends cartridge life, keeping the membrane clean for future events
- The drain down cartridge(s) located outside the backwash pool enables water levels to balance

Surface Inlet Pits within the proposed carpark development are to be fitted with Ocean Guard Pit Inserts (or equivalent). The pit inserts sit beneath the stormwater pit grates and collect gross pollutants and larger sediments prior to treatment by other devices. Similarly, the Ocean Guards can be provided proposed at each rainwater tank connection to treat runoff from the new roofed areas prior to discharge to the site trunk pit and pipe network.



Due to the site restrictions as discussed above, we consider the approach outlined above to be appropriate for the proposed development.

4.6 LOCAL OVERLAND DRAINAGE

Local overland flow paths have been provided across the site with the proposed carpark having overland flow paths to the north and east towards Victoria Terrace. The proposed loading dock area and ambulance bay have overland flow paths directed towards Alice St. This arrangement can be seen on the concept engineering plans attached to the appendix of this report.

5. CONCLUSION

The proposed stormwater management design presented above has been prepared to comply with Moree Plains Council's DCP as well as industry best practice. The design philosophy is based on the principle of at source treatment, to reduce conveyance infrastructure and manage water quantity and quality aspects.

At a concept level the system has been designed to cater for frequent and infrequent storm events.

Based on the above, our investigation and concept designs indicate the proposed development can adequately manage and address all items surrounding stormwater runoff. Should you have any queries, please feel free to contact the undersigned on (02) 4365 1668.

K. Baran

Karina Barrett

Civil Engineer

D. Hall

Daniel Holland

Civil Engineer

REFERENCES:

Moree Plans Development Control Plan 2013

Northrop Consulting Engineers Pty Ltd (Northrop) has been retained to prepare this report based on specific instructions, scope of work and purpose pursuant to a contract with its client. It has been prepared in accordance with the usual care and thoroughness of the consulting profession for the use by Health Infrastructure (HI). The report is based on generally accepted practices and standards applicable to the scope of work at the time it was prepared. No other warranty, express or implied, is made as to the professional advice included in this report.

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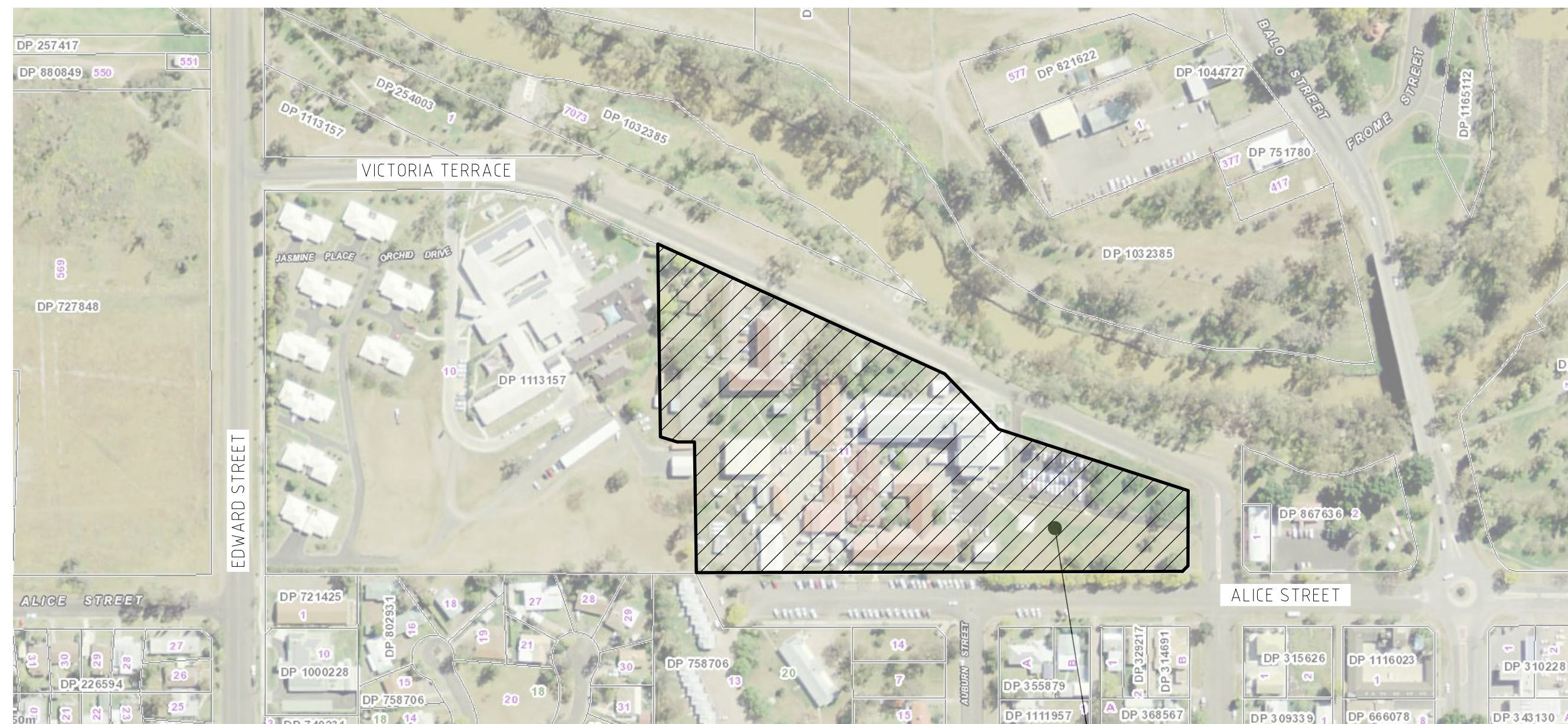
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APPENDIX A – SUPPLEMENTARY INFORMATION

- DRAINS model
- Stormwater Management Plans

35 ALICE STREET, MOREE CIVIL DETAILED DESIGN



LOCALITY PLAN

APPROXIMATE
LOCATION OF SITE



DWG No.

MHR-NOR-CE-DR-SW-C01.01R
MHR-NOR-CE-DR-SW-C01.10
MHR-NOR-CE-DR-SW-C02.01
MHR-NOR-CE-DR-SW-C02.02
MHR-NOR-CE-DR-SW-C03.01
MHR-NOR-CE-DR-SW-C03.02
MHR-NOR-CE-DR-SW-C05.01R
MHR-NOR-CE-DR-SW-C05.02

COVER SHEET - REF
SITE PLAN
CONCEPT SEDIMENT & EROSION CONTROL PLAN
SEDIMENT & EROSION CONTROL DETAILS
BULK EARTHWORKS PLAN - SHEET 1
BULK EARTHWORKS PLAN - SHEET 2
STORMWATER AND LEVELS PLAN - SHEET 1 REF
STORMWATER AND LEVELS PLAN - SHEET 2

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NSW GOVERNMENT Health Infrastructure

DESIGN DEVELOPMENT

PROJECT _____

MOREE HOSPITAL

REDEVELOPMENT

DRAWING TITLE _____

**INTERNAL CIVIL WORKS
COVER SHEET- REF**

SCALE _____ DRAWN BY _____ CHECKED _____
KT KB

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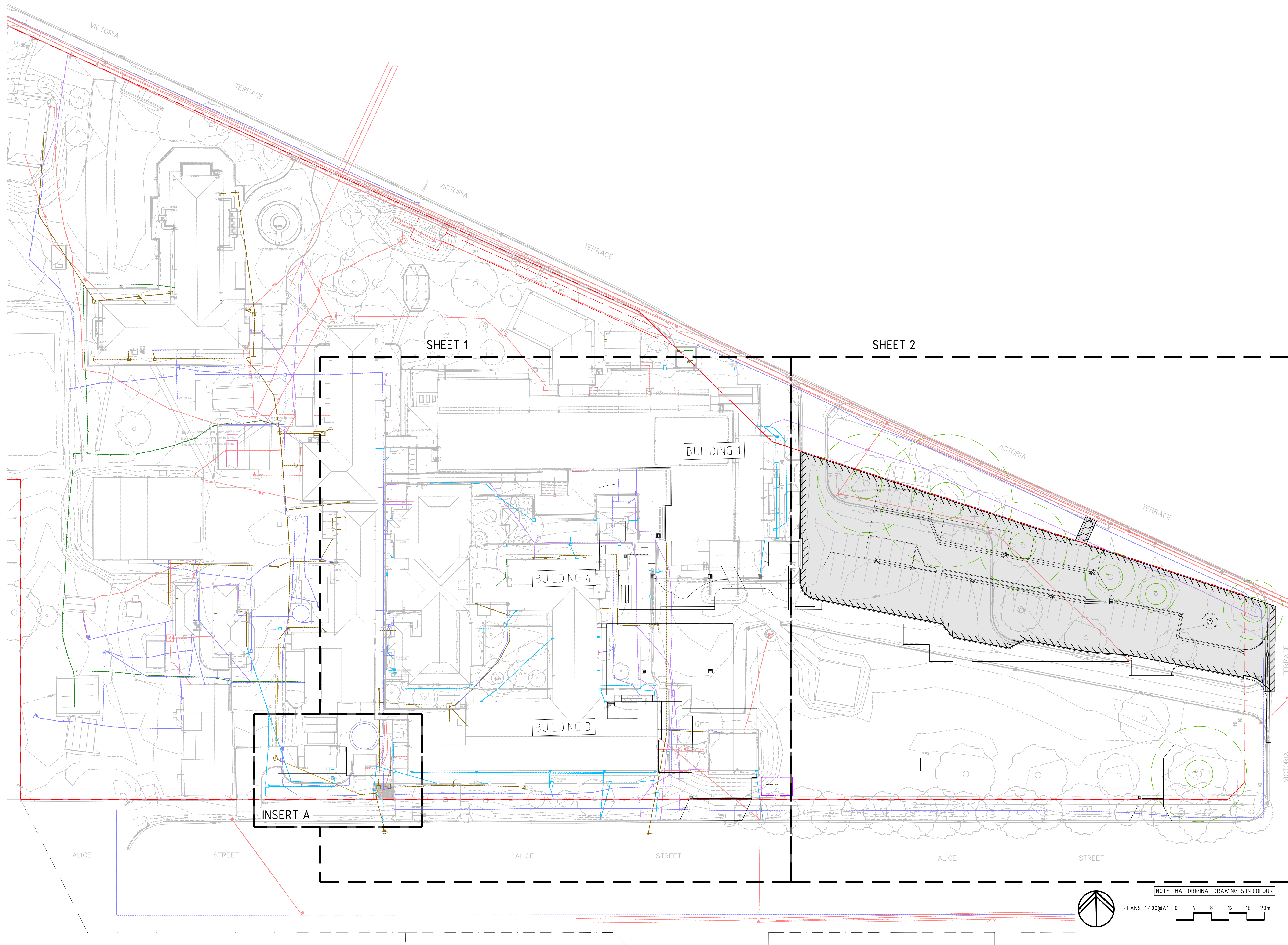
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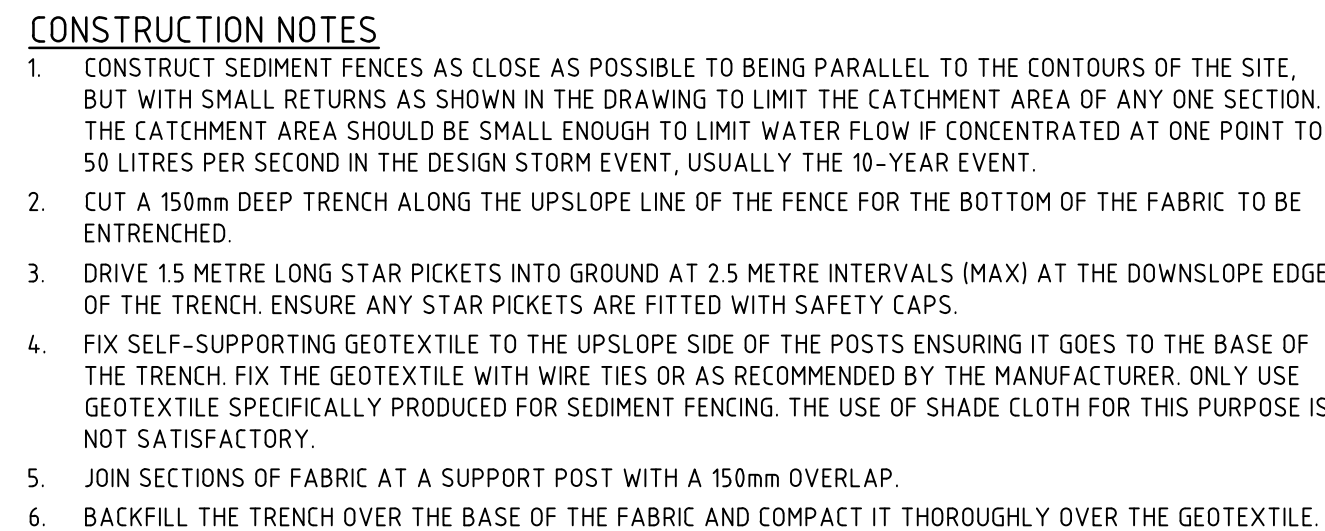
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PROJECT	
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35 Alice St, Moree NSW 2400	
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INTERNAL CIVIL WORKS SITE PLAN	
SCALE	DRAWN BY
	KT
DOCUMENT NUMBER	REVISION
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CONSTRUCTION SITE

MINIMUM WIDTH 3m

MINIMUM LENGTH 15m

PROPERTY BOUNDARY

200mm MINIMUM

300mm MINIMUM

DGB 20 ROADBASE OR 30mm AGGREGATE

EXISTING ROADWAY

RUNOFF DIRECTED TO SEDIMENT TRAP/FENCE

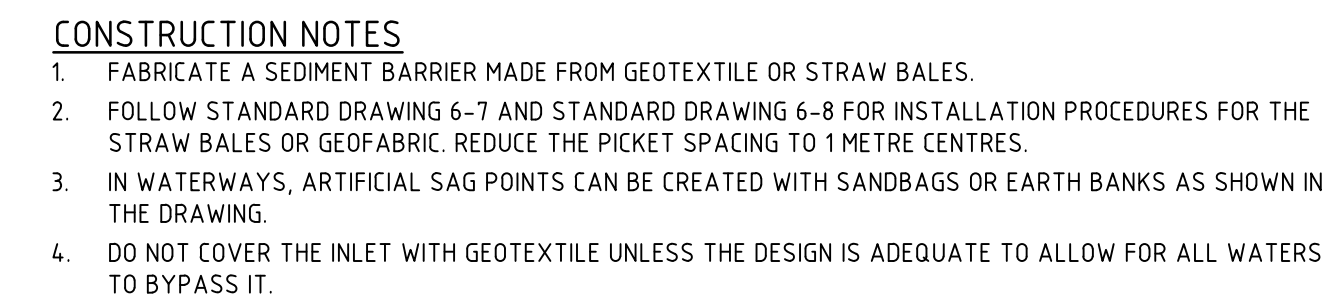
GEOTEXTILE FABRIC DESIGNED TO PREVENT INTERMIXING OF SUBGRADE AND BASE MATERIALS AND TO MAINTAIN GOOD PROPERTIES OF THE SUB-BASE LAYERS. GEOFABRIC MAY BE A WOVEN OR NEEDLE-PUNCHED PRODUCT WITH A MINIMUM CBR BURST STRENGTH (AS3706.4-90) OF 2500 N

1. STRIP THE TOPSOIL, LEVEL THE SITE AND COMPACT THE SUBGRADE.
2. COVER THE AREA WITH NEEDLE-PUNCHED GEOTEXTILE.
3. CONSTRUCT A 200mm THICK PAD OVER THE GEOTEXTILE USING ROAD BASE OR 30mm AGGREGATE.
4. ENSURE THE STRUCTURE IS AT LEAST 15 METRES LONG OR TO BUILDING ALIGNMENT AND AT LEAST 3 METRES WIDE.
5. WHERE A SEDIMENT FENCE JOINS ONTO THE STABILISED ACCESS, CONSTRUCT A HUMP IN THE STABILISED ACCESS TO DIVERT WATER TO THE SEDIMENT FENCE.

1. INSTALL FILTERS TO KERB INLETS ONLY AT SAG POINTS.
2. FABRICATE A SLEEVE MADE FROM GEOTEXTILE OR WIRE MESH LONGER THAN THE LENGTH OF THE INLET PIT AND FILL IT WITH 25mm TO 50mm GRAVEL.
3. FORM AN ELLIPTICAL CROSS-SECTION ABOUT 150mm HIGH x 400mm WIDE.
4. PLACE THE FILTER AT THE OPENING LEAVING AT LEAST A 100mm SPACE BETWEEN IT AND THE KERB INLET. MAINTAIN THE OPENING WITH SPACER BLOCKS.
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6. SANDBAGS FILLED WITH GRAVEL CAN SUBSTITUTE FOR THE MESH OR GEOTEXTILE PROVIDING THEY ARE PLACED SO THAT THEY FIRMLY ABUT EACH OTHER AND SEDIMENT-LOADED WATERS CANNOT PASS BETWEEN

The diagram illustrates the installation of a sediment fence on a slope. It shows a cross-section of the ground with a slope labeled '2:1 SLOPE (MAX.)' on both the left and right sides. A 'SEDIMENT FENCE' is shown as a vertical line across the slope. To the left of the fence is an 'EARTH BANK' and to the right is a 'STABILISE STOCKPILE SURFACE'. An arrow labeled 'FLOW' indicates the direction of water movement from left to right. A tree is shown on the right side of the diagram.

1. PLACE STOCKPILES MORE THAN 2m (PREFERABLY 5m) FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT, ELONGATED MOUNDS.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2m IN HEIGHT.
4. WHERE THEY ARE TO BE IN PLACE FOR MORE THAN 10 DAYS, STABILISE FOLLOWING THE APPROVED ESCP OR SWMP TO REDUCE THE C-FACTOR TO LESS THAN 0.10.
5. CONSTRUCT EARTH BANKS (STANDARD DRAWING 5-9) ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES (STANDARD DRAWING 6-8) 1 TO 2m DOWNSLOPE.



1. FABRICATE A SEDIMENT BARRIER MADE FROM GEOTEXTILE OR STRAW BALES.
2. FOLLOW STANDARD DRAWING 6-7 AND STANDARD DRAWING 6-8 FOR INSTALLATION PROCEDURES FOR THE STRAW BALES OR GEOFABRIC. REDUCE THE PICKET SPACING TO 1 METRE CENTRES.
3. IN WATERWAYS, ARTIFICIAL SAG POINTS CAN BE CREATED WITH SANDBAGS OR EARTH BANKS AS SHOWN IN THE DRAWING.
4. DO NOT COVER THE INLET WITH GEOTEXTILE UNLESS THE DESIGN IS ADEQUATE TO ALLOW FOR ALL WATERS TO BYPASS IT.

The image contains three technical drawings of a straw bale erosion control system:

- ELEVATION:** A side view of a straw bale structure. It shows a horizontal row of bales with vertical stakes driven through them into the ground. A label "1.2m STAR PICKET DRIVEN 600mm INTO GROUND" points to one of the stakes. Another label "ANGLE FIRST STAKE TOWARDS PREVIOUS BALE" points to the angle of the first stake. A circular symbol with the letter "A" and a minus sign is positioned above the structure.
- PLAN:** A top-down view of the straw bales. It shows a rectangular area of bales with an arrow labeled "FLOW" indicating the direction of water flow. A dimension line indicates "20m MAX (UNLESS STATED OTHERWISE ON SWMP/ESCP)". A label "STRAW BALES TIGHTLY ABUTTING TOGETHER" points to the contact between adjacent bales.
- SECTION:** A cross-sectional view showing the bale structure on a slope. The bales are shown as rectangular blocks. A label "NYLON OR WIRE BINDING" points to the material holding the bales together. A dimension line indicates "1.5m TO 2m" for the length of the bale structure. A label "DISTURBED AREA" points to the ground surface behind the bales. A label "2:1 SLOPE" indicates the slope of the ground. A label "BALES EMBEDDED 100mm INTO GROUND" points to the bottom of the bales. A circular symbol with the letter "A" and a minus sign is positioned to the right of the section.

1. CONSTRUCT THE STRAW BALE FILTER AS CLOSE AS POSSIBLE TO BEING PARALLEL TO THE CONTOURS OF THE SITE.
2. PLACE BALES LENGTHWISE IN A ROW WITH ENDS TIGHTLY ABUTTING. USE STRAW TO FILL ANY GAPS BETWEEN BALES. STRAWS ARE TO BE PLACED PARALLEL TO GROUND.
3. ENSURE THAT THE MAXIMUM HEIGHT OF THE FILTER IS ONE BALE.
4. EMBED EACH BALE IN THE GROUND 75mm TO 100mm AND ANCHOR WITH TWO 1.2 METRE STAR PICKETS OR STAKES. ANGLE THE FIRST STAR PICKET OR STAKE IN EACH BALE TOWARDS THE PREVIOUSLY LAID BALE. DRIVE THEM 600mm INTO THE GROUND AND, IF POSSIBLE, FLUSH WITH THE TOP OF THE BALES. WHERE STAR PICKETS ARE USED AND THEY PROTRUDE ABOVE THE BALES, ENSURE THEY ARE FITTED WITH SAFETY CAPS.
5. WHERE A STRAW BALE FILTER IS CONSTRUCTED DOWNSTREAM FROM A DISTURBED BATTER, ENSURE THE BALES ARE PLACED 1 TO 2 METRES DOWNSLOPE FROM THE TOE.
6. ESTABLISH A MAINTENANCE PROGRAM THAT ENSURES THE INTEGRITY OF THE BALES IS RETAINED – THEY COULD REQUIRE REPLACEMENT EACH TWO TO FOUR MONTHS.

KEY PLAN

The key plan shows a site layout with several buildings. A dashed line runs diagonally across the upper right portion of the site. A specific area, outlined in red and filled with diagonal hatching, is located in the lower right quadrant. This hatched area is adjacent to a building labeled '803'. Other buildings are labeled '801' and '802'. A north arrow is positioned in the bottom right corner of the plan.

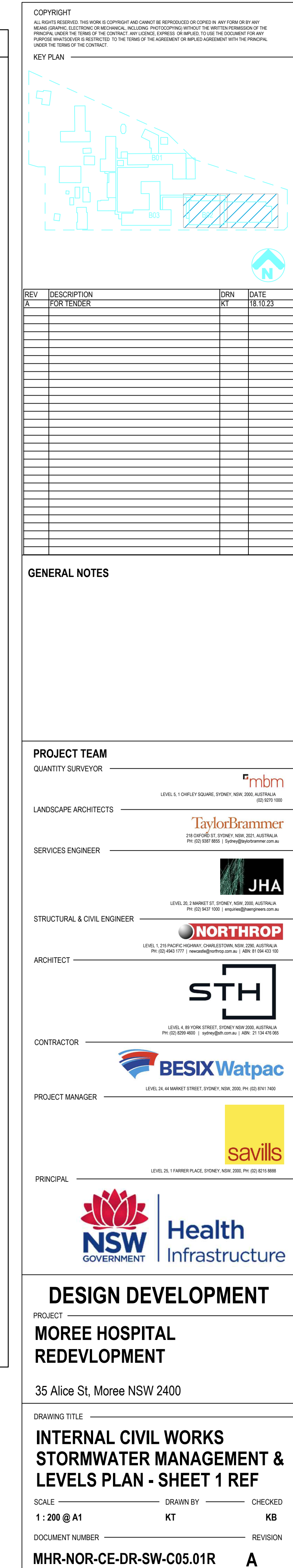
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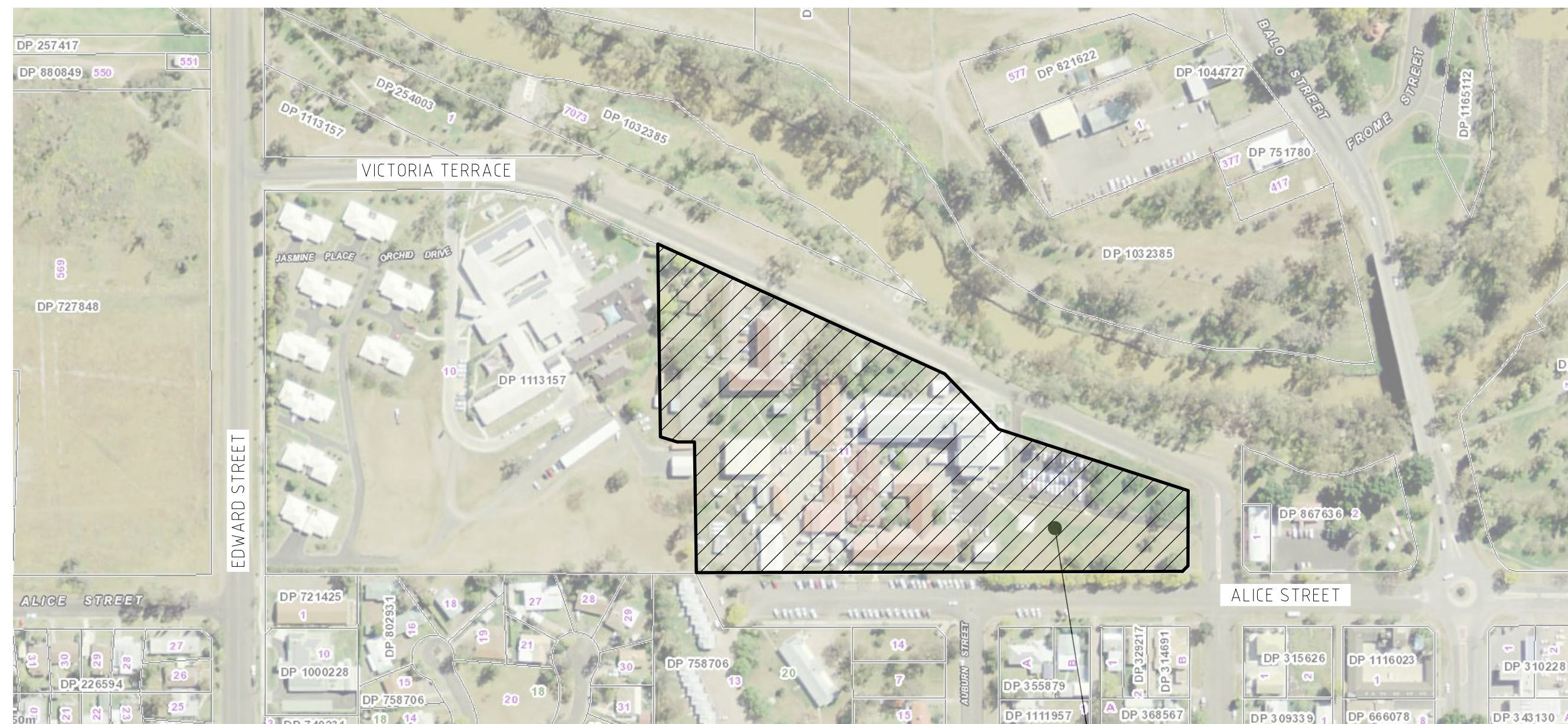
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35 ALICE STREET, MOREE CIVIL DETAILED DESIGN



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DWG No.

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BULK EARTHWORKS PLAN - SHEET 2
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STORMWATER AND LEVELS PLAN - SHEET 2

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GENERAL NOTES

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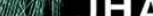
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GOVERNMENT

Health
Infrastructure

DESIGN DEVELOPMENT

PROJECT **MOREE HOSPITAL
REDEVELOPMENT**

35 Alice St, Moree NSW 2400

DRAWING TITLE

**INTERNAL CIVIL WORKS
COVER SHEET- REF**

SCALE _____ DRAWN BY _____ CHECKED _____
KT KB

DOCUMENT NUMBER _____ REVISION _____

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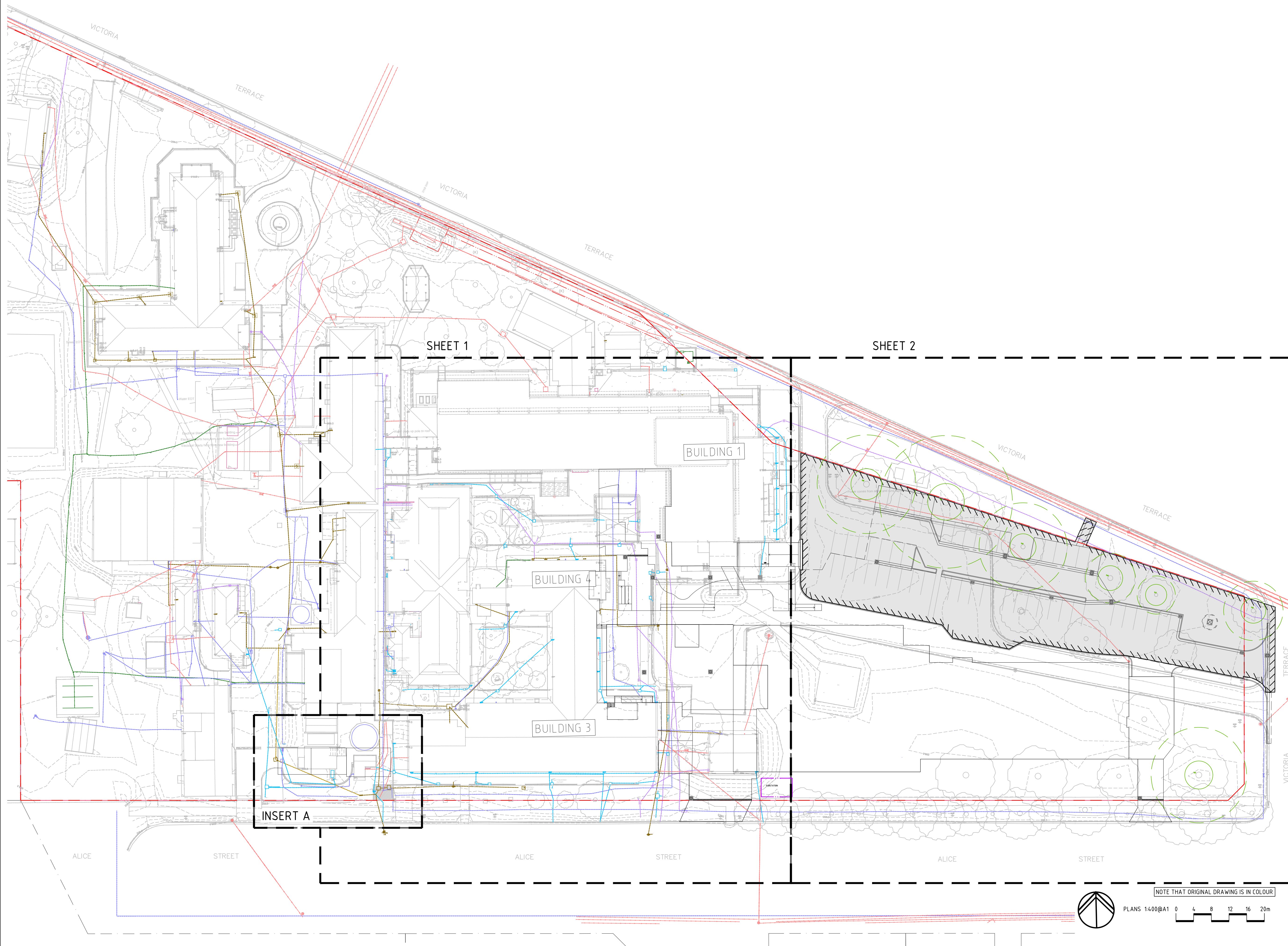
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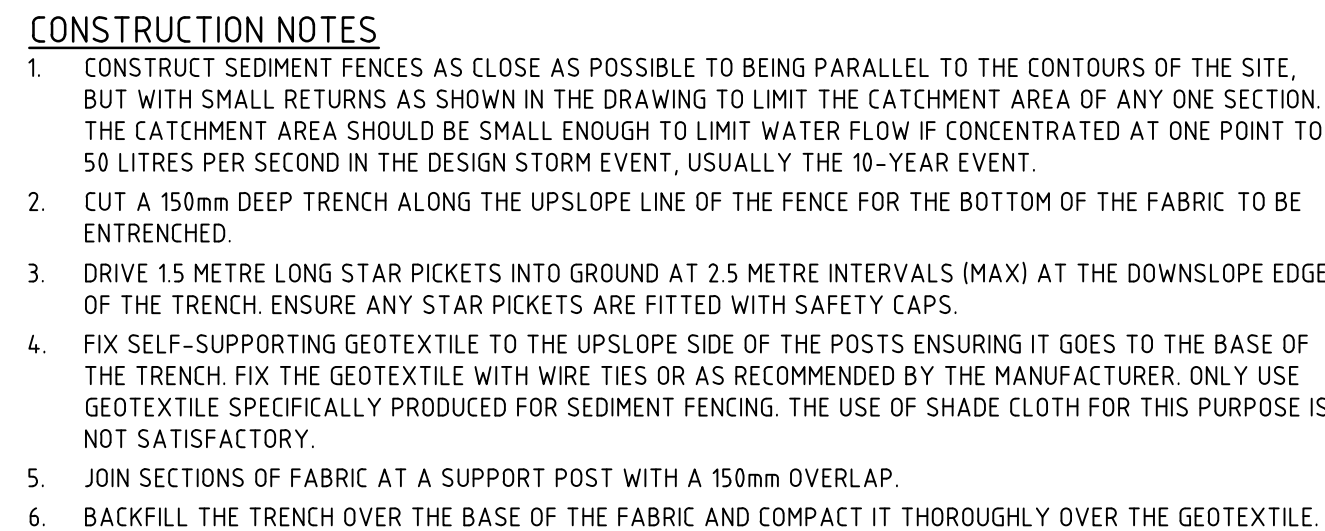
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CONSTRUCTION SITE

MINIMUM WIDTH 3m

MINIMUM LENGTH 15m

PROPERTY BOUNDARY

RUNOFF DIRECTED TO SEDIMENT TRAP/FENCE

200mm MINIMUM

300mm MINIMUM

DGB 20 ROADBASE OR 30mm AGGREGATE

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KERB-SIDE INLET

TIMBER SPACER TO SUIT

GRAVEL-FILLED WIRE MESH OR GEOTEXTILE 'SAUSAGE'

RUNOFF WATER WITH SEDIMENT

OVERFLOW

TIMBER SPACER TO SUIT

SEDIMENT

GRAVEL-FILLED WIRE MESH OR GEOTEXTILE 'SAUSAGE'

FILTERED WATER

NOTE: THIS PRACTICE ONLY TO BE USED WHERE SPECIFIED IN APPROVED SWMP/ESCP.

1. INSTALL FILTERS TO KERB INLETS ONLY AT SAG POINTS.
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STAR PICKETS

1 METRE MAX.

DROP INLET WITH GRATE

WIRE OR STEEL MESH (14 GAUGE x 150mm OPENINGS) WHERE GEOTEXTILE IS NOT SELF-SUPPORTING

WOVEN GEOTEXTILE

STAR PICKET FITTED WITH SAFETY CAP

WOVEN GEOTEXTILE

RUNOFF WATER WITH SEDIMENT

GEOTEXTILE EMBEDDED 150mm INTO GROUND

FILTERED WATER

SANDBAGS

WATERWAY

EXCAVATION

EARTH BANK

FLOW

FOR DROP INLETS AT NON-SAG POINTS, SANDBAGS, EARTH BANK OR EXCAVATION USED TO CREATE ARTIFICIAL SAG POINT

1. FABRICATE A SEDIMENT BARRIER MADE FROM GEOTEXTILE OR STRAW BALES.
2. FOLLOW STANDARD DRAWING 6-7 AND STANDARD DRAWING 6-8 FOR INSTALLATION PROCEDURES FOR THE STRAW BALES OR GEOFABRIC. REDUCE THE PICKET SPACING TO 1 METRE CENTRES.
3. IN WATERWAYS, ARTIFICIAL SAG POINTS CAN BE CREATED WITH SANDBAGS OR EARTH BANKS AS SHOWN IN THE DRAWING.
4. DO NOT COVER THE INLET WITH GEOTEXTILE UNLESS THE DESIGN IS ADEQUATE TO ALLOW FOR ALL WATERS TO BYPASS IT.

The image contains three technical drawings illustrating straw bale erosion control measures:

- ELEVATION:** A side view of a straw bale structure. It shows a series of bales stacked horizontally. A circular symbol with the letter 'A' and a minus sign is positioned above the center. A line points to the top of a bale with the text "1.2m STAR PICKET DRIVEN 600mm INTO GROUND". Another line points to the top of a bale with the text "ANGLE FIRST STAKE TOWARDS PREVIOUS BALE".
- PLAN:** A top-down view of a straw bale structure. It shows a series of bales arranged in a line. A line points to the space between bales with the text "STRAW BALES TIGHTLY ABUTTING TOGETHER". A line points to the top of a bale with the text "20m MAX. (UNLESS STATED OTHERWISE ON SWMP/ESCP)". A line points to the flow direction with the text "FLOW".
- SECTION:** A cross-section view of a straw bale structure. It shows a bale embedded into the ground. A line points to the top of the bale with the text "NYLON OR WIRE BINDING". A line points to the ground level with the text "BALES EMBEDDED 100mm INTO GROUND". A line points to the ground surface with the text "DISTURBED AREA". A line points to the slope of the ground with the text "2:1 SLOPE". A circular symbol with the letter 'A' and a minus sign is positioned to the right of the drawing.

1. CONSTRUCT THE STRAW BALE FILTER AS CLOSE AS POSSIBLE TO BEING PARALLEL TO THE CONTOURS OF THE SITE.
2. PLACE BALES LENGTHWISE IN A ROW WITH ENDS TIGHTLY ABUTTING. USE STRAW TO FILL ANY GAPS BETWEEN BALES. STRAWS ARE TO BE PLACED PARALLEL TO GROUND.
3. ENSURE THAT THE MAXIMUM HEIGHT OF THE FILTER IS ONE BALE.
4. EMBED EACH BALE IN THE GROUND 75mm TO 100mm AND ANCHOR WITH TWO 1.2 METRE STAR PICKETS OR STAKES. ANGLE THE FIRST STAR PICKET OR STAKE IN EACH BALE TOWARDS THE PREVIOUSLY LAID BALE. DRIVE THEM 600mm INTO THE GROUND AND, IF POSSIBLE, FLUSH WITH THE TOP OF THE BALES. WHERE STAR PICKETS ARE USED AND THEY PROTRUDE ABOVE THE BALES, ENSURE THEY ARE FITTED WITH SAFETY CAPS.
5. WHERE A STRAW BALE FILTER IS CONSTRUCTED DOWNSLOPE FROM A DISTURBED BATTER, ENSURE THE BALES ARE PLACED 1 TO 2 METRES DOWNSLOPE FROM THE TOE.
6. ESTABLISH A MAINTENANCE PROGRAM THAT ENSURES THE INTEGRITY OF THE BALES IS RETAINED – THEY COULD REQUIRE REPLACEMENT EACH TWO TO FOUR MONTHS.

KEY PLAN

The key plan map shows a hatched rectangular area representing the project site. This site is located to the east of a larger building complex. The building complex has several sections labeled '0', '801', and '803'. A dashed line runs diagonally across the map, separating the project site from the building complex. A north arrow is located in the bottom right corner of the map.

[illegible]

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DRAWING TITLE _____	
INTERNAL CIVIL WORKS SEDIMENT & EROSION CONTROL DETAILS	
SCALE _____	DRAWN BY _____ CHECKED _____
	KT KB
DOCUMENT NUMBER _____	REVISION _____
MHR-NOR-CE-DR-SW-C02.02	A



