

Tweed Valley Hospital Development

Addendum 1 to Design Report

Civil & Structural

Issued for: State Significant Development Application – Response to Submissions

130559-BON-CIV-RPT-006

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1. Introduction

The following has been prepared in response to the comments by NSW Department of Planning and Environment (DPE), Tweed Shire Council and various other State and Federal Agencies, as part of the Response to Submissions for the proposed new Tweed Valley Hospital Development. It is intended that the following is read in conjunction with the Civil and Structural Design Report prepared and submitted as part of the Concept Proposal and Stage 1 Early and Enabling Works, submitted under SSD 9575. A separate Civil and Structural Design Report will be prepared for the Stage 2 Main works.

1.1. Additional Documentation

The following relevant additional documentation has been referenced in this document:

- Civil and Structural Design Report by Bonacci, dated 19 October 2018.

2. Response to Submissions

2.1. Department of Industry (DoI) Water and Natural Access Regulator

Department of Industry (DoI) have made the following recommendation:

Water Management Plans (including construction environmental management plans) should be developed in consultation with DoI – Water and Natural Resources Access Regulator. The EIS should demonstrate that adequate licences are available and can be obtained to account for the take of groundwater should the project intercept groundwater.

The proposed design does not propose any excavations below the water table (except for piling). The water table was identified in the Geotechnical Investigations undertaken by Morrison Geotechnical. The Geotechnical Report identifies that the water table is approximately at RL 11.0. At no point will the future building have finish floor levels below RL11.0, construction of which would require lowering the water table or dewatering.

During piling, it is proposed to use a continuous flying auger (CFA). This method of pile construction manages any incursions of the water table wholly within the pile bore without taking water from the aquifer.

2.2. NSW Environmental Protection Authority (EPA)

EPA have made the following recommendations:

Sediment Control

Managing Urban Stormwater Soils and Construction, 4th Edition published by Landcom (the so-called 'Blue Book') provides guidance material for achieving effective sediment control on construction sites. The proponent should implement all such feasible and reasonable measures as may be necessary to prevent water pollution in the course of developing the site.

The EPA emphasises the importance of:

- *not commencing demolition, site preparation, bulk earthworks, construction and construction related activities until appropriate and effective sediment controls are in place, and*
- *daily inspection of sediment controls which is fundamental to ensuring timely maintenance and repair of those controls.*

The requirement to implement all such feasible and reasonable measures as may be necessary to prevent water pollution in the course of developing the site is noted. Any construction related activities will not be commenced without the appropriate sediment control measures in place in accordance with the NSW Landcom Blue Book. Ongoing management of sediment controls will be installed and managed in accordance with the NSW Landcom Blue Book.

The following measures have been identified in Section 4.5 of the Stage 1 EIS Appendix X Civil and Structural Design Report as a minimum:

- As preliminary works, basins will be constructed along the northern portions of the site. It is proposed to utilise the new basins as sedimentation basins by providing a minimum of 6457 cubic metres to the overall disturbed site assuming that any upstream catchment is excluded through provision of diversion stormwater drainage lines (bypassing the site during the

construction stage) to control stormwater quality overall as per Soil and Construction Volume 1, March 2004 by Landcom

- Catch drains and similar infrastructure to manage the runoff within the site and direct it to the appropriate basin
- A sediment fence/catch drain (or diversion bund) around the site
- Temporary access to site with shaker pad
- Indicative stockpile areas with sediment fence around it during construction. The stockpile must be located out of water flow paths (and be protected by earth banks/drains as required).

Further information can be found at Section 4.5 and Appendix A of the Civil and Structural Design Report.

2.3. Department of Planning and Environment (DPE)

DPE have made the following recommendations:

Cut and Fill and Retaining Walls

It noted that fill is proposed along the western section of the site as part of the Stage 1 works. The cut and fill details within Drawing number C011 Rev P4 is unclear and does not provide complete details of the proposed fill depth. However, it appears that up to 8m fill is proposed on the western side. It is anticipated that this fill is required to support the service road and the proposed car parking areas identified in the concept proposal. This should be clarified.

*The extent of cut and fill should be over laid on the survey plan and the areas of cut / fill should be hatched identifying the resultant levels after the landform modification.
The Response to submissions should also identify whether retaining walls or any form of batters are anticipated to be built in the future (or part of the Stage 1 works) to support the filled areas, especially on the western section, so that the extent of the proposed works (both for Stage and Concept Proposal) are clear. Should retaining walls be proposed as part of the Stage 1 works to support the filled areas in the western section of the site, then the details of the visual impacts of the retaining walls on the surrounding properties should be provided.
The Stage 1 works include benching of the site with a number of retaining walls. RLs of the top of the walls and sections through the site identifying the height of each of these retaining walls should be provided. Please clarify whether these retaining walls are required to accommodate the car parking areas in the future.*

The design has progressed since lodgement of the Stage 1 EIS. Updated drawings can be found at Appendix A of this Submissions Report which addresses the items above. In summary:

- On the revised Drawing C011, a legend is provided showing the levels of cut and fill over the existing survey levels. The total cut volume has been reduced from 139,812m³ to 108,950m³ and the total fill volume has been reduced from 118,653m³ to 63,963m³, resulting in a net cut surplus of 44,987m³. As described in drawing C011 in Appendix A below, the excavated material is to be retained on site. The excavated material will be temporarily stockpiled within the landscaped areas with appropriately managed dust, soil and water management controls as described below.

- Sections of the site are provided on drawings C020, 021, 022 and 023. The sections show the general site grading to better visualise the proposed site levels.
- Typical retaining wall sections and details are shown on drawings C055 and 056. The sections are for retaining structures up to 3.40metres in height. The progression of the design aims to minimise the use of retaining structures and it is not proposed to have any retaining walls over 3.40metres in height.

Air quality

Stage 1 works

The Air Quality assessment and the source of potential impacts needs to include a comprehensive assessment of:

- *rock crushing activities on the site;*
- *dust impacts due to substantial amounts of cut and fill operations;*
- *haulage of 21,159m³ excess fill off-site; and*
- *associated stockpile management.*

The following supporting information would be needed:

- *the location of the rock crusher;*
- *approximate volume of rocks to be crushed based on the cut and fill volume;*
- *specific mitigation measures considering air quality impacts in the locality;*
- *the extent of haul roads required;*
- *stabilization of stockpiles and haul roads (with any dust suppression techniques involving water also to be linked to water management and erosion and sediment control sections);*
- *approximate area of open excavation and the management of this area in terms of dust generation; and*
- *additional management measures when adverse meteorological conditions aggravate*

Additional geotechnical investigations have been carried out on site to better understand the geological profile of the site. In summary, the investigations confirmed that the site profile is highly varied with intermittent bands of shale rock. The quantity of rock being excavated is much less than assumed following the initial investigation.

Noting the above recommendations, prior to Construction, the Contractor will develop a Dust Management Plan as a sub-plan of the Construction Environmental Management Plan (CEMP).

Preliminary assessment concludes:

- Due to the high variability of the location and quantity of shale rock, or more importantly hard shale rock, it is difficult to predict the quantity of rock needing to be crushed, if any. The quantity of rock being crushed, if any, will be determined during excavation.
- Air quality and specifically dust control measures proposed include the use of a water cart and where applicable if soil is stockpiled longer term, spray grass to stabilise the soil mounds including temporary stockpiles.
- Haul roads will generally follow the future road network shown in Appendix A drawings. Mitigation will be outlined in the Dust Management Plan, however includes the use of a water cart, dampening the soil to reduce the quantity of dust production.
- Soil and Water management will be in accordance with the NSW Landcom Bluebook. Water management will also aim to use rainwater and reuse water where possible.
- If the contractor utilises the services of a rock crushing plant, the plant will be located away from sensitive receivers (residential, commercial and educational facilities).
- Adverse meteorological conditions producing dust issues will be controlled with the use of water cart and spray seeding the site where possible to stabilise the soil and reduce dust and sedimentation runoff.

Rock crushing:

The type and size of rock crushers are yet to be determined. The rock on site varies significantly depending on the relative location, from very weather rock to fresh high strength rock. This, in addition to finalising the subgrade levels (RL's) make it difficult to predict the quantity of rock to be crushed. The management plan will include:

- Irrespective of the size and numbers, rock crushers will have a water attachment for dust suppression at the source. The water is sprayed at the face of the crusher before, during and after the crushing.
- Crushers will be located as far as practicable from Cudgen Road and immediate neighbours (i.e., on the north-west area of the site).
- All crushed rock suitable for re-use will be recycled on site as fill, sediment control, pavements, hardstands, construction exits and pipe bedding materials.
- Where possible, the oversize material from hard rock projects is also reused for vehicle entry shake downs and erosion control.

Dust Management:

- Watercarts/water trucks will be in permanent use on site during excavation and civil works.
- Temporary stockpiles that are not required for imminent use will be stabilised with spray grass or appropriate fabric.
- Continuous monitoring of weather forecast to stop dust generating activities in case that high winds are expected.
- Before extended breaks (e.g., Easter, Christmas), areas will be treated with spray grass.

- Only those areas where immediate structures are to be build will be stripped. Areas will be stripped at the latest possible date to comply with the program.
- Construction haul roads and temporary carparking will maximise the use of permanent infrastructure. These roads/carparks will have a sacrificial seal to minimise dust generation.

Other Matters

Sediment Basins

The EIS indicates that the sediment basins are to be constructed on the site as preliminary works (not part of this application). However, the Review of Environmental Factors (REF) indicates that the location and volume of the sediment basins approved as part of the REF are indicates that the location and volume of the sediment basins approved as part of the REF are not the same as the sediment basin diagrams that are provided the “Stage 1 drawings” in the EIS.

Should the required sediment basin diagrams not match those determined by the REF process, then these should be included in the Stage 1 works and the plans should be amended to include the basins.

The design has been and continues to be refined since lodgement of the Stage 1 EIS and updated drawings can be found at Appendix A of the Submissions Report which addresses the items above.

2.4. Tweed Shire Council

Tweed Shire Council have provided the following recommendations:

General Engineering Matters

- *more detail is needed on the sedimentation pond design and the lawful point of discharge for the development.*
- *(Item tt) Details of the sediment basins and sizing calculations (drawings C0006 and C0007) are missing from the Civil and Structural Design Report (Appendix X) and should be provided.*

Drawings C005 to C009 have been updated and are provided at Appendix A of the Submissions Report.

- *(Item vv) The proposal has adopted the 200L/s/ha permissible site discharge requirement from Development Design Specification D5 – Stormwater Drainage Design section D5.16. This control is generally only applied to constrained sites where the downstream stormwater infrastructure is under capacity or there is a risk of local stormwater flooding. No objection to adopting the 200L/s/ha target is raised however, in this case, Council Officers would support simply limiting post-development discharge to pre-development levels (note only).*

The concept design documented in the EIS submission demonstrated that the most stringent requirements from Council's specification (Development Design Specification D5 – Stormwater Drainage Design section D5.16) can be met. Bonacci will adopt Council's advice and limit post-development discharge to pre-development levels during the detail design stage.

- *(Item ww) Council would like to request copies of the applicant's computer stormwater modelling (DRAINS and MUSIC) for verification of the concept design*

DRAINS and MUSIC model details can be found in Appendix B and Appendix C of the Civil and Structural Design Report Submitted as part of the Stage 1 EIS. Both models have been refined as the site design progressed and printouts of the results can be found in Appendix B and C below.

To control the existing sediment runoff resulting from the former agricultural use, four basins will be constructed as part of preliminary works. These sediment basins will function as sedimentation basins prior to Stage 1 works and will be augmented by the construction of a fifth sedimentation basin and associated infrastructure during Stage 1 works. At the completion of Stage 2 (construction of the hospital building and associated infrastructure, not part of this application), the four basins will be converted to bioretention/on site detention basins and augmented where needed to limit post development stormwater discharge to the existing pre-development discharge rates and the water quality will satisfy Tweed Shire Council requirements.

- *(Item xx) Further detail is required of how Stormwater is to be physically discharged from the site. No details downstream of the proposed basins has been provided.*
- *(Item yy) It is unclear if Stormwater discharge to the neighbouring private land can be considered a 'lawful point of discharge'. Discussion and justification of the site's Lawful Point of Discharge should be added to the Stormwater management plan (or similar document).*

Currently, two catch drains exist, one along the western boundary and one immediately south of the northern environmental area containing a waterbody identified as an intermittent water course or a wetland. Both of these catch drains drain stormwater runoff into the existing environmental area and not into the informal council drain along the western boundary.

It is important to note that a natural waterbody such as an intermittent water course or a wetland forming part of the northern portion of the site and includes the neighbouring site is considered a "Lawful Point of Discharge". The existing management of stormwater for the site has in the past and continues to function without adverse effects downstream.

The proposed design contains four points of discharge from four on site detention basins. The stormwater will be discharged via headwalls and will be controlled to mimic natural flow characteristics. Energy dissipation and scour protection will be provided downstream from the headwall to minimise impact of water.

The headwalls are located well away from the property boundaries and the receiving waters and discharge within the development Lot. The clean water being discharged, will make its way north and onto the environmental area and ultimately to the wetland. The wetland area is noted as a dashed blue line on topographic maps. On topographic maps, this dashed blue line indicates the presence of an intermittent water course.

- *(Item zz) Further assessment of the proposed Stormwater management is required from a volumetric perspective to confirm that the post-development flow regime mimics pre-development (i.e. water balance)*

The site is currently served by two catch drains that ultimately discharge stormwater to the receiving wetland in an uncontrolled manner. As part of preliminary works, four basins will be constructed to capture existing flows and any sediment they carry. In the subsequent stage 1 works, a fifth (temporary) sediment basin will be constructed.

The site will ultimately be divided into four catchments. Each catchment will drain to one of the four basins which subsequently will discharge stormwater in a controlled manner. The current stormwater design achieves and surpasses the requirement for water balance. For the stormwater analysis, the site discharge rates have been limited to 200l/s/ha (constrained site) pro rata between the four future on site detention basins and their corresponding catchments. Updated drawings including the concept stormwater network can be found at Appendix A of the Submissions Report, while DRAINS and MUSIC model details can be found in Appendix B and Appendix C below. Both models have been refined as the site design progressed.

- *(Item aaa) Further detail of the proposed upgrade of Cudgen Road frontage of the site, including storm water infrastructure, is required. This can be made the subject of a future application under section 138 of the Roads Act 1993.*

Works with the road reserve being Cudgen Road auxiliary lane works, Turnock Street Roundabout works, and Tweed Coast Road intersection works now form part of this application. Details of the three-intersection works can be found in Appendix A below. Tweed Coast Road Intersection works are the 300 Series drawings, Cudgen Road Auxiliary Lane works are the 400 Series drawings and Turnock Street Roundabout works are the 500 Series drawings.

Internal Works

- *(Item bbb) The geotechnical report by Morrison Geotechnic dated September 2018 indicates that the site may require blasting. Concerns are raised regarding noise and vibration on neighbouring properties and should be addressed.*

Additional geotechnical investigations have been carried out on site to better understand the geological profile of the site. In summary, the investigation confirmed that the site profile is highly varied with intermittent bands of shale rock. The quantity of rock being excavated is much less than assumed following the initial investigation. As a result, blasting is not recommended as a form of excavation of rock and is not proposed to occur at any time during the construction process.

- *(Item ccc) The Civil structural report by Bonacci Group (NSW) Pty Ltd specifies that the excavated rock is proposed to be crushed on site. Concerns are raised regarding noise for neighbouring properties and should be addressed*

Additional geotechnical investigations have been carried out on site to better understand the geological profile of the site. In summary, the investigations confirmed that the site profile is highly varied with intermittent bands of shale rock. The quantity of rock being excavated is much less than assumed following the initial investigation. If a contractor utilised the services of a rock crushing plant, the plant will be located away from sensitive receivers (residential, commercial and educational facilities).

- *The Civil structural report by Bonacci Group (NSW) Pty Ltd specifies that the proposed Stormwater drainage system will be designed to mimic natural flows to minimise future impact to the endangered ecological community in the receiving wetland. Concerns are raised that there are no details on the proposed discharge characteristics and supporting*

confirmation from a qualified ecologist to indicate that there will be no impact on the existing environmental wetland area downstream.

It is proposed to discharge Stormwater via headwalls and to mimic natural flow characteristics. The volume of water being discharged by each basin will be controlled by installing an orifice in each basin discharge pit. Energy dissipation and scour protection will be provided downstream from the headwall to minimise impact of water. The water being discharged from the basin headwalls will pass via an energy dissipater (rip rap) and other structures that will be installed to slow the velocity of the water and to disperse it.

Collaboration has occurred during the design process with the Ecology Consultants to confirm the proposed discharge methods minimise any potential future impacts to the Environmental Area.

- *The Water Sources report by Bonacci Group (NSW) Pty Ltd specifies that to comply with Councils permissible site discharge requirements approximately 6000m³ of onsite detention will be required. Concerns are raised that discharge from the onsite detention will concentrate stormwater flow and impact on downstream properties, this requires review.*

The volume of discharge will be controlled from each of the four basins to mimic existing discharge flows for the site.

It is proposed to discharge stormwater from the basins via headwalls. Energy dissipation and scour protection will be provided downstream from the headwall to minimise impact of water. The water being discharged from the basin headwalls will pass via an energy dissipater (rip rap) and other structures that will be installed to slow the velocity of the water and to disperse it to mimic natural flows.

- *The Water Sources report by Bonacci Group (NSW) Pty Ltd specifies that the site is transversed by an intermittent watercourse (defined as a wetland area) at the north east portion of the site. It is unclear if stormwater discharge to the neighbouring private land can be considered a lawful point of discharge as it is a wetland rather than a natural water course. NSW Health Infrastructure seek further clarification regarding if in fact this is a lawful point of discharge.*

Currently, two catch drains exist, one along the western boundary and one immediately south of the northern environmental area containing a waterbody identified as an intermittent water course or a wetland. Both of these catch drains drain stormwater runoff into the existing environmental area and not into the informal council drain along the western boundary.

It is important to note that a natural waterbody such as an intermittent water course or a wetland forming part of the northern portion of the site and includes the neighbouring site is considered a "Lawful Point of Discharge". The existing management of stormwater for the site has in the past and continues to function without adverse effects downstream.

The proposed design contains four points of discharge from four on site detention basins. The stormwater will be discharged via headwalls and will be controlled to mimic natural flow characteristics. Energy dissipation and scour protection will be provided downstream from the headwall to minimise impact of water. For details refer to drawing C030 founded in Appendix A.

Other Miscellaneous

Groundwater and Dewatering

- *A Dewatering Management Plan shall be prepared by a suitably qualified environmental consultant where groundwater will or is likely to be intercepted and/or where the discharge of any waters from sediment control basins is proposed.*

The proposed design does not propose any excavations below the water table (except for piling). The water table was identified in the Geotechnical Investigations undertaken by Morrison Geotechnical. The Geotechnical Report identifies that the water table is approximately at RL 11.0. At no point will the future building have finish floor levels below RL11.0, construction of which would require lowering the water table or dewatering.

During piling, it is proposed to use a continuous flying auger (CFA). This method of pile construction manages any incursions of the water table wholly within the pile bore without taking water from the aquifer.

As a result, a Dewatering Management Plan is not required as no dewatering and discharge of water resulting from a dewatering process is proposed.

- *The plan shall include but is not limited to: specific details regarding water quality, treatment and monitoring regime, a site plan indicating the position of all treatment tanks and basins on the site including the reserve area to be used for such purpose in the event of the need for additional treatment facilities, predicted flow rates, and management of acid sulfate soil.*

No dewatering is proposed.

- *The detailed groundwater quality assessment shall include results from a NATA accredited laboratory on the following parameters: pH, electrical conductivity, dissolved oxygen, temperature, dissolved iron, suspended solids, turbidity, chloride, sulfate, chloride:sulfate ratio, dissolved aluminium, and where required TPH, BTEX, PAH, and lead.*

No dewatering is proposed.

- *Particular consideration shall be given to achieving the necessary detention of waters to enable effective treatment to be carried out prior to discharge in order to achieve the agreed discharge criteria particularly in respect to the management of pH, iron, aluminium and odours. This requirement may cause the need for careful evaluation of existing treatment technologies and consideration of the proposed method of excavation.*

No dewatering is proposed.

- *The report shall detail the proposed treatment system(s) including its capabilities, how many treatment tanks or basins will be required to satisfy discharge criteria, and include*

a separate section on dewatering contingencies in the event of adverse impacts to the receiving waters.

No dewatering is proposed.

- *Contact should be made with Council's Stormwater Maintenance Engineer regarding Council's Stormwater system capacity and current condition where discharge to Stormwater is proposed.*

No dewatering is proposed.

3. Appendix A – Civil, Stormwater and Piling Drawings

TWEED VALLEY HOSPITAL DEVELOPMENT

STAGE 1 - EARLY AND ENABLING WORKS

<u>DRAWING No.</u>	<u>DESCRIPTION</u>
20 10748 C001	DRAWING REGISTER AND CONSTRUCTION NOTES
20 10748 C005	SOIL AND WATER MANAGEMENT PLAN
20 10748 C006	SOIL AND WATER MANAGEMENT DETAILS
20 10748 C007	SOIL AND WATER MANAGEMENT CALCULATIONS - SHEET 1 OF 2
20 10748 C008	SOIL AND WATER MANAGEMENT CALCULATIONS - SHEET 2 OF 2
20 10748 C009	SOIL AND WATER MANAGEMENT CATCHMENT PLAN
20 10748 C011	GENERAL EARTHWORKS PLAN
20 10748 C020	BULK EARTH WORKS SECTIONS SHEET 1
20 10748 C021	BULK EARTH WORKS SECTIONS SHEET 2
20 10748 C022	BULK EARTH WORKS SECTIONS SHEET 3
20 10748 C023	BULK EARTH WORKS SECTIONS SHEET 4
20 10748 C030	CONCEPT STORMWATER MANAGEMENT PLAN
20 10748 C055	RETAINING WALL DETAILS SHEET 1
20 10748 C056	RETAINING WALL DETAILS SHEET 2
20 10748 C060	STORMWATER DRAINAGE DETAILS

GENERAL NOTES

- 01 THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ARCHITECTURAL AND OTHER CONSULTANTS
DRAWINGS AND SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS OR SKETCHES AS
MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ANY DISCREPANCY SHALL BE REFERRED TO
THE SUPERINTENDENT BEFORE PROCEEDING WITH WORK.
- 02 MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE SPECIFICATION, CURRENT SAA
CODES, BUILDING REGULATIONS AND THE REQUIREMENTS OF ANY OTHER RELEVANT STATUTORY
AUTHORITIES.
- 03 THESE DRAWINGS MUST NOT BE SCALED. ALL DIMENSIONS ARE IN METERS. ALL SET OUT DIMENSIONS
AND LEVELS, INCLUDING THOSE SHOWN ON THESE DRAWINGS SHALL BE IN ACCORDANCE WITH THE
ARCHITECT'S DRAWINGS AND VERIFIED ON SITE.
- 04 ALL SETOUT AND DIMENSIONS OF THE STRUCTURE INCLUDING KERBS AND RETAINING WALLS, AND
BULK EARTHWORKS MUST BE TAKEN FROM THE ARCHITECT'S DRAWINGS. SETOUT OF THE
STORMWATER PITS BY OTHERS. CONTRACTOR TO CONFIRM SETOUT OF SERVICE TRENCHING
INCLUDING SUBSOIL ON SITE.
- 05 THE CONTRACTOR SHALL COMPLY WITH ALL REGULATIONS OF AUTHORITIES HAVING JURISDICTION
OVER THE WORKS. REFER TO GEOTECHNICAL REPORT BY MORRISON GEOTECHNIC PTY LTD,
REFERENCE: GE18/144, DATED AUGUST 2018.
- 06 ALL DIMENSIONS AND REDUCED LEVELS MUST BE VERIFIED ON SITE BEFORE THE COMMENCEMENT OF
ANY WORK.
- 07 THE APPROVAL OF A SUBSTITUTION SHALL BE SOUGHT FROM THE SUPERINTENDENT BUT IS NOT AN
AUTHORISATION OF A COST VARIATION. THE SUPERINTENDENT MUST APPROVE ANY COST
VARIATION INVOLVED BEFORE ANY WORK STARTS.
- 08 ALL LEVELS SHOWN ARE TO THE AUSTRALIAN HEIGHT DATUM.
- 09 SERVICE INFORMATION SHOWN IS APPROXIMATE ONLY. PRIOR TO COMMENCEMENT OF ANY WORKS,
THE CONTRACTOR SHALL LOCATE ALL UNDERGROUND SERVICES AND COMPLY WITH ALL
REQUIREMENTS OF THOSE AUTHORITIES.
- 10 EXISTING SURFACE CONTOURS, WHERE SHOWN, ARE INTERPOLATED AND MAY NOT BE ACCURATE.
- 11 UNLESS NOTED OTHERWISE, ALL VEGETATION SHALL BE STRIPPED TO A MINIMUM DEPTH OF 150mm
UNDER ALL PROPOSED PAVEMENT AND BUILDING AREAS.
- 12 MAKE SMOOTH CONNECTION WITH ALL EXISTING WORKS.

SITWORKS NOTES

- S1 PRIOR TO THE PLACEMENT OF ANY PAVEMENTS, BUILDINGS OR DRAINS THE EXPOSED SUBGRADE SHALL BE COMPACTED TO A MINIMUM OF 98% STANDARD COMPACTION IN ACCORDANCE WITH TEST 'E11' OF A.S. 1289 FOR TO THE TOP 300mm. ANY SOFT SPOTS SHALL BE REMOVED AND REPLACED WITH GRANULAR FILL TO THE ENGINEERS APPROVAL AND COMPACTED IN ACCORDANCE WITH THE COMPACTION REQUIREMENTS SET OUT BELOW. ON HIGHLY REACTIVE CLAY AREAS SITE EXCAVATED MATERIAL MAY BE USED WITH THE PRIOR AUTHORISATION OF THE ENGINEER.
- S2 ALL FILL AND PAVEMENT MATERIALS SHALL BE COMPACTED IN ACCORDANCE WITH GEOTECHNICAL REPORT BY PARSONS GEOTECHNIC PTY LTD REFERENCE: GEB/114. DATED AUGUST 2018 MOISTURE CONTENT TO BE MAINTAINED AT +/- 2% OMC. MINIMUM COMPACTION REQUIREMENTS ARE DETAILED BELOW FOR (ALL REQUIREMENTS ARE TO BE VERIFIED BY A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER):
- | | |
|---|----------|
| • LANDSCAPED AREAS | 95% STD. |
| • FILL UNDER ANY FOOTINGS AND FLOOR SLABS FOR ANY STRUCTURE TO SUBGRADE LEVEL;
- FINE CRUSHED ROCK | 98% STD. |
| - SELECTED FILL WITHOUT CONSPICUOUS CLAY CONTENT | 98% STD. |
| • BUILDING BASECOURSE | 98% MOD |
| • FILL UNDER ROAD PAVEMENTS;
- TO WITHIN 500mm OF FINISHED SUBGRADE LEVEL | 98% STD. |
| - UP TO FINISHED SUBGRADE LEVEL | 98% STD. |
| • ROAD PAVEMENT MATERIALS;
- SUB BASE | 98% MOD. |
| - BASE COURSE | 98% MOD. |
- THE MAXIMUM COMPACTION IS TO BE NO GREATER THAN 4% ON TOP OF THE ABOVE MENTIONED VALUES.
- S3 GRADE EVENLY BETWEEN FINISHED SURFACE SPOT LEVELS. FINISHED SURFACE CONTOURS ARE SHOWN FOR CLARITY. WHERE FINISHED SURFACE LEVELS ARE NOT SHOWN, THE SURFACE SHALL BE GRADED SMOOTHLY SO THAT IT WILL DRAIN AND MATCH ADJACENT SURFACES OR STRUCTURES.
- S4 ALL DIMENSIONS GIVEN ARE TO FACE OF KERB, CENTER OF PIPE OR EXTERIOR FACE OF BUILDING UNLESS NOTED OTHERWISE.
- S5 ANY STRUCTURES, PAVEMENTS OR SURFACES DAMAGED, DIRTIED OR MADE UNSERVICEABLE DUE TO CONSTRUCTION WORK SHALL BE REINSTATED TO THE SATISFACTION OF THE ENGINEER.
- S6 ANY FILL REQUIRED SHALL BE APPROVED BY THE ENGINEER / GEOTECHNICAL CONSULTANT
- S7 CONTRACTOR IS TO ENSURE THAT ALL EXCAVATIONS ARE MAINTAINED IN A DRY CONDITION WITH NO WATER ALLOWED TO REMAIN IN THE EXCAVATIONS.
- S8 ALL FINISHES AND COLOURS TO BE IN ACCORDANCE WITH ARCHITECTURAL SPECIFICATIONS.
- S9 REFER TO STRUCTURAL DRAWINGS FOR CONCRETE, REINFORCEMENT AND RETAINING WALL DETAILS.
- S10 GENERALLY FOR TRENCHING WORKS THE CONTRACTOR MUST:
- A) COMPLY WITH THE GENERAL PROVISIONS OF PART 31 "MANAGING RISKS TO HEALTH AND SAFETY" OF NSW WORK AND HEALTH AND SAFETY REGULATION 2011
- B) COMPLY PART 6.3 DIVISION 3 "EXCAVATION WORK" OF NSW WORK HEALTH AND SAFETY REGULATION NSW 2011
- S11 PRIOR TO THE EXCAVATION OF ANY TRENCH DEEPER THAN 1.5 METRES THE CONTRACTOR MUST:
- A) NOTIFY THE OCCUPATIONAL HEALTH AND SAFETY AUTHORITY ON THE APPROPRIATE FORM.

STORMWATER DRAINAGE NOTES

- | | |
|------|--|
| SW1 | UNLESS NOTED OTHERWISE BY HYDRAULIC ENGINEERS DRAWINGS, ALL DOWNPIPES & GRATED INLETS SHALL BE CONNECTED TO PITS OR MAIN STORMWATER DRAINS WITH 150 DIA. UPVC PIPES LAID AT A MINIMUM GRADE OF 1 IN 100. FOR SYPHONIC ROOF DRAINAGE SYSTEMS ALL DOWNPIPES CONNECTION DRAIN SIZES TO BE CONNECTED INTO MAIN STORMWATER DRAINS SHALL BE IN ACCORDANCE WITH HYDRAULIC ENGINEERS DRAWINGS. |
| SW2 | ALL MAIN STORMWATER DRAINS SHALL BE CONSTRUCTED USING MATERIALS AS SPECIFIED ON THE DRAWINGS IN ACCORDANCE WITH THE APPROPRIATE A.S. IF NOT SPECIFIED THEN CLASS 2 RRJ RCP SHALL BE USED FOR DIAMETERS > 225mm. SEWER CLASS SEH UPVC IN ACCORDANCE WITH AS1260 SHALL BE USED FOR Ø225mm OR SMALLER. |
| SW3 | ALL PIPEWORK TO BE INSTALLED IN ACCORDANCE WITH AS3725 FOR RCP AND AS2032 FOR PVC. ALL BEDDING TO BE TYPE H2 UNLESS NOTED OTHERWISE. |
| SW4 | FOR ALL PITS > 12m DEEP, STEP IRONS SHALL BE INSTALLED. |
| SW5 | PRECAST PITS MAY BE USED EXTERNAL TO THE BUILDING SUBJECT TO APPROVAL BY BONACCI GROUP. |
| SW6 | ENLARGERS, CONNECTIONS AND JUNCTIONS TO BE PREFABRICATED FITTINGS WHERE PIPES ARE LESS THAN 300 DIA. |
| SW7 | WHERE SUBSOIL DRAINS PASS UNDER FLOOR SLABS AND VEHICULAR PAVEMENTS, UNSLOTTED UPVC SEWER GRADE PIPE IS TO BE USED. |
| SW8 | GRATES AND COVERS SHALL CONFORM WITH AS 3996 AND AS 1428.1 FOR ACCESS REQUIREMENTS. |
| SW9 | CARE IS TO BE TAKEN WITH LEVELS OF STORMWATER LINES. GRADES ARE NOT TO BE REDUCED WITHOUT APPROVAL. |
| SW10 | AT ALL TIMES DURING CONSTRUCTION OF STORMWATER PITS, ADEQUATE SAFETY PROCEDURES SHALL BE TAKEN TO ENSURE AGAINST THE POSSIBILITY OF PERSONNEL FALLING DOWN PITS. |
| SW11 | ALL EXISTING STORMWATER DRAINAGE LINES AND PITS THAT ARE TO REMAIN ARE TO BE INSPECTED AND CLEANED. DURING THIS PROCESS ANY PART OF THE STORMWATER DRAINAGE SYSTEM THAT WARRANTS REPAIR SHALL BE REPORTED TO THE SUPERINTENDENT/ENGINEER FOR FURTHER DIRECTIONS. |

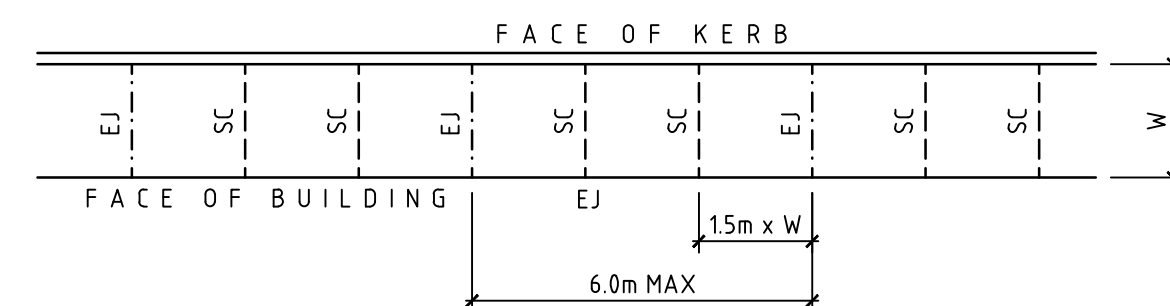
KERBING NOTES

- | | |
|----|---|
| K1 | ALL CONCRETE TO HAVE A MINIMUM COMPRESSIVE STRENGTH OF 32 MPa U.N.O. |
| K2 | ALL KERBS, GUTTERS, DISH DRAINS AND CROSSINGS TO BE CONSTRUCTED ON 75mm GRANULAR BASECOURSE COMPACTED TO A MINIMUM 98% MAXIMUM DRY DENSITY IN ACCORDANCE WITH AS1289 S.2.1. |
| K3 | 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 MAX 12m CENTRES EXCEPT FOR INTEGRAL KERBS WHERE THE EXPANSION JOINTS ARE TO MATCH THE JOINT LOCATIONS IN THE SLAB. |
| K4 | WEAKENED PLANE JOINTS TO BE MIN 3mm WIDE AND LOCATED AT 3m CENTRES EXCEPT FOR INTEGRAL KERBS WHERE THE WEAKENED PLANE JOINTS ARE TO MATCH THE JOINT LOCATIONS IN THE SLAB. |
| K5 | BROOMED FINISH TO ALL RAMPED AND VEHICULAR CROSSINGS. ALL OTHER KERBING OR DISH DRAINS TO BE STEEL FLOAT FINISHED. |
| K6 | IN THE REPLACEMENT OF KERBS--
- EXISTING ROAD PAVEMENT IS TO BE SAWCUT 900mm U.N.O. FROM THE LIP OF GUTTER, UPON COMPLETION OF THE NEW KERB AND GUTTER, NEW BASECOURSE AND SURFACE TO BE LAID 600mm WIDE U.N.O.
- EXISTING KERBS ARE TO BE COMPLETELY REMOVED WHERE NEW KERBS ARE SHOWN. |

JOINTING NOTES

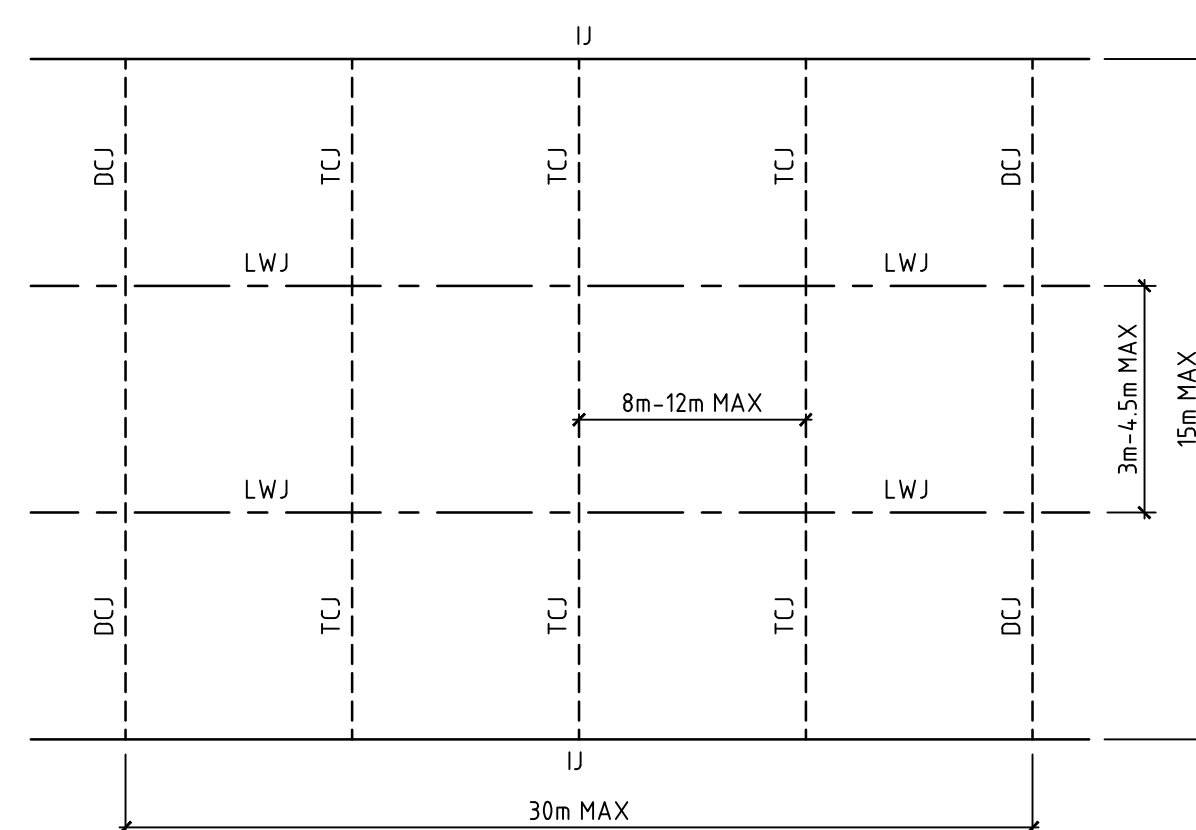
PEDESTRIAN FOOTPATH JOINTS

- | | |
|----|---|
| J1 | EXPANSION JOINTS (EJ) ARE TO BE LOCATED WHERE POSSIBLE AT TANGENT POINTS OF CURVES AND ELSEWHERE AT 6m CENTRES. |
| J2 | SAWCUT JOINTS (SCJ) ARE TO BE LOCATED AT A MAX 15m x WIDTH OF PAVEMENT. THE TIMING OF THE SAWCUT 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. |
| J3 | WHERE POSSIBLE JOINTS SHOULD BE LOCATED TO MATCH KERBING AND / OR ADJACENT PAVEMENT JOINTS. |
| J4 | PROVIDE 10mm WIDE FULL DEPTH EXPANSION JOINTS (EJ) BETWEEN BUILDINGS AND ALL CONCRETE OR UNIT PAVERS |
| J5 | ALL PEDESTRIAN FOOTPATH JOINTINGS AS FOLLOWS (U.N.O.). |




VEHICULAR PAVEMENT JOINTS

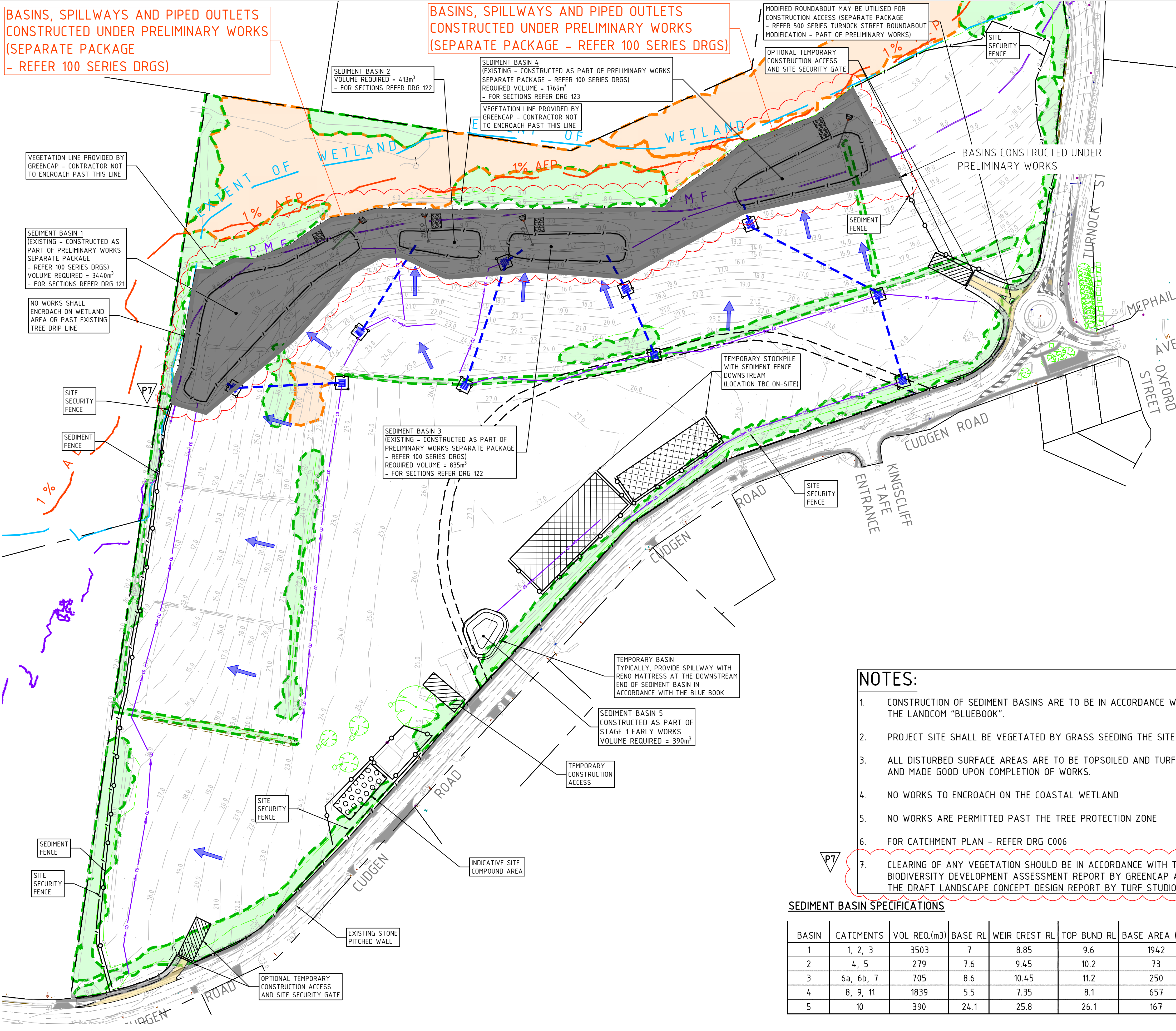
- | | |
|-----|--|
| J6 | ALL VEHICULAR PAVEMENTS TO BE JOINTED AS SHOWN ON DRAWINGS. |
| J7 | LONGITUDINAL WARPING JOINTS (LWJ) SHOULD GENERALLY BE LOCATED AT A MAXIMUM OF 3m TO 4.5m MAX CENTERS. ALL LWJ'S SHOULD BE TIED UP TO A MAXIMUM TOTAL WIDTH OF 30m. |
| J8 | TRANSVERSE CONTRACTION JOINTS (TCJ) SHOULD GENERALLY BE LOCATED AT A MAXIMUM OF 8m TO 12m MAX CENTERS. TCJ'S CAN BE SPACED AT SUITABLE INTERVALS UP TO A RECOMMENDED MAXIMUM LENGTH OF 15m. |
| J9 | TRANSVERSE DOWELLED CONSTRUCTION JOINTS (DCJ) TO BE PROVIDED FOR PLANNED INTERRUPTIONS SUCH AS AT THE END OF EACH DAY'S OPERATIONS (POUR BREAK), AT BLOCK OUTS FOR BRIDGES AND INTERSECTIONS OR FOR UNEXPECTED DELAYS WHEN THE SUSPENSION OF OPERATIONS IS LIKELY TO CREATE A JOINT. |
| J10 | ISOLATION JOINTS WITH SUB-GRADE BEAM (IJ) TO BE PROVIDED AT INTERSECTIONS OR AT THE JUNCTION OF A POUR BREAK. |
| J11 | ALL VEHICULAR PAVEMENTS TO BE JOINTED IN ACCORDANCE WITH AUSTRORoads AGPT02-12 GUIDE TO PAVEMENT TECHNOLOGY PART 2 STRUCTURAL PAVEMENT DESIGN AND SUPPLEMENT AP-136-06 PAVEMENT DESIGN FOR LIGHT TRAFFIC |
| J12 | VEHICULAR PAVEMENT JOINTING AS FOLLOWS (U.N.O.) |



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	<i>P5</i>	<i>DA ISSUE</i>	<i>16.01.19</i>	<i>DB</i>	-				
<i>P4</i>	<i>ISSUED FOR EARLY AND ENABLING WORKS</i>		<i>16.10.19</i>	<i>PN</i>	-				
<i>P3</i>	<i>ISSUED FOR EARLY WORKS DA</i>		<i>04.10.19</i>	<i>PN</i>	-				
<i>P2</i>	<i>ISSUED FOR EARLY WORKS DA</i>		<i>06.09.19</i>	<i>PA</i>	-				
<i>P1</i>	<i>ISSUED FOR EARLY WORKS DA</i>		<i>03.09.19</i>	<i>PA</i>	-				
Rev	Description	Date	By	App	Rev	Description	Date	By	App



Project Name	TWEED VALLEY HOSPITAL DEVELOPMENT, CUDGEN STAGE 1 EARLY WORKS		DEVELOPMENT APPLICATION		
	Designed	CS	Project Director Approved	Date	North
Drawing Title	Drawn	PA			
	Scale	–			
	Date	03.09.18			
	Sheet	A1			



LEGEND

- SITE BOUNDARY
- SEDIMENT FENCE
- SECURITY FENCE
- SITE GATE
- TEMPORARY CONSTRUCTION ACCESS
- TEMPORARY STOCKPILE (LOCATION TBC ON-SITE)
- NEW ROAD PAVEMENT (SEPARATE PACKAGE) - REFER 400 AND 500 SERIES FOR DOCUMENTATION
- STORMWATER PIPE
- STORMWATER PIT
- GEOTEXTILE PIT FILTER
- CATCH DRAIN
- OVERLAND FLOW

NATIVE VEGETATION ZONE (BY GREENCAP)

EXOTIC VEGETATION ZONE (BY GREENCAP)

EXTENT OF WETLAND

1% AEP

PMF

EXISTING SEWER

EXISTING OVERHEAD LINES

EXISTING TELSTRA

EXISTING STORMWATER

EXISTING WATER

SOIL AND WATER MANAGEMENT NOTES

- IT HAS BEEN ASSUMED THAT HOARDINGS/SILT FENCING WILL BE PROVIDED TO THE STAGE BOUNDARY SUFFICIENT TO PREVENT SEDIMENT RUNOFF FROM LEAVING SITE (EXCEPT IN THE CASE OF ENTRY/EXIT LOCATIONS WHERE TEMPORARY CONSTRUCTION ENTRY/EXIT SEDIMENT TRAP ARE PROVIDED). IF THIS IS NOT THE CASE, PROVIDE SEDIMENT FENCE TO STANDARD DETAIL BELOW AS REQUIRED TO PREVENT SEDIMENT FROM LEAVING SITE, DIRECT RUNOFF TO SEDIMENT BASIN.
- ALL SEDIMENT CONTROL MEASURES TO BE INSTALLED IN ACCORDANCE WITH LANDCOM MANAGING URBAN STORMWATER "BLUE BOOK".
- SEDIMENT CONTROL FOR LANDSCAPED WORKS DOWNSTREAM OF THE BUILDING TO INCLUDE A SILT FENCE AND SANDBAGS AS REQUIRED. INSTALL BUND TO DIVERT UPSTREAM CATCHMENT AWAY FROM DISTURBED SOIL AREA. TO BE MANAGED AT A RATE OF xxx L/S PER HA BY THE CONTRACTOR ON SITE.

SEDIMENT CONTROL CONDITIONS

- SEDIMENT FENCES WILL BE INSTALLED AS SHOWN AND ELSEWHERE AT THE DISCRETION OF THE SITE MANAGER TO CONTAIN COARSER SEDIMENT FRACTIONS INCLUDING AGGREGATED FINES) AS NEAR AS POSSIBLE TO THEIR SOURCE.
- SEDIMENT REMOVED FROM ANY TRAPPING DEVICE WILL BE RELOCATED WHERE FURTHER POLLUTION TO DOWNSLOPE LANDS & WATERWAYS CANNOT OCCUR.
- STOCKPILES WILL BE PLACED WHERE SHOWN ON DRAWING OR ELSEWHERE AT THE DISCRETION OF THE SITE MANAGER AND NOT WITHIN 5m OF HAZARD AREAS INCLUDING LIKELY AREAS OF HIGH VELOCITY FLOWS SUCH AS WATERWAYS, PAVED AREAS & DRIVEWAYS.
- WATER WILL BE PREVENTED FROM DIRECTLY ENTERING THE PERMANENT DRAINAGE SYSTEM WITH INLET FILTERS (SEE DETAILS) UNLESS IT IS SEDIMENT FREE.
- TEMPORARY SEDIMENT TRAPS WILL BE RETAINED UNTIL AFTER THE LANDS THEY ARE PROTECTING ARE COMPLETELY REHABILITATED.
- CONTRACTOR TO DESIGN/SIZE/CONSTRUCT TEMPORARY SEDIMENT BASIN, WATER SHOULD BE ALLOWED TO SETTLE BEFORE DISCHARGE. CONTRACTOR MUST VERIFY THAT WATER QUALITY MEETS AUTHORITIES REQUIREMENTS PRIOR TO DISCHARGE. ACCUMULATED SEDIMENT SHOULD THEN BE REMOVED & DISPOSED OF IN ACCORDANCE WITH ENVIRONMENTAL MANAGEMENT PROCEDURES.

SITE INSPECTION & MAINTENANCE CONDITIONS

- THE SITE MANAGER WILL INSPECT THE SITE AT LEAST WEEKLY AND WILL:
- ENSURE THAT DRAINS OPERATE PROPERLY & TO EFFECT ANY NECESSARY REPAIRS
 - REMOVE SPILLED SAND OR OTHER MATERIALS FROM HAZARD AREAS, INCLUDING LANDS CLOSER THAN 5m FROM AREAS OF LIKELY CONCENTRATED OR HIGH VELOCITY FLOWS ESPECIALLY WATERWAYS & PAVED AREAS.
 - REMOVE TRAPPED SEDIMENT WHENEVER LESS THAN DESIGN CAPACITY REMAINS WITHIN THE STRUCTURE
 - ENSURE REHABILITATED LANDS HAVE EFFECTIVELY REDUCED THE EROSION HAZARD AND TO INITIATE UPGRADING OR REPAIR AS APPROPRIATE.
 - CONSTRUCT ADDITIONAL EROSION AND/OR SEDIMENT CONTROL WORKS AS MIGHT BECOME NECESSARY TO ENSURE THE DESIRED PROTECTION IS GIVEN TO DOWNSLOPE LANDS AND WATERWAYS.
 - MAINTAIN EROSION & SEDIMENT CONTROL MEASURES IN A FULLY FUNCTIONING CONDITION UNTIL ALL EARTHWORK ACTIVITIES ARE COMPLETED AND THE SITE IS REHABILITATED.
 - REMOVE TEMPORARY SOIL CONSERVATION STRUCTURES AS THE LAST ACTIVITY IN THE REHABILITATION PROGRAM.

AS PART OF THE STATUTORY 'DILIGENCE OF CARE' RESPONSIBILITIES, THE SITE MANAGER WILL KEEP A LOGBOOK MAKING ENTRIES AT LEAST WEEKLY, IMMEDIATELY BEFORE FORECAST RAIN AND AFTER RAINFALL. ENTRIES WILL INCLUDE:

- THE VOLUME & INTENSITY OF ANY RAINFALL EVENTS
- THE CONDITION OF ANY SOIL & WATER MANAGEMENT WORKS
- THE CONDITION OF VEGETATION & ANY NEED TO IRRIGATE
- THE NEED FOR DUST PREVENTION STRATEGIES
- ANY REMEDIAL WORKS TO BE UNDERTAKEN

THE BOOK WILL BE KEPT ONSITE & MADE AVAILABLE TO ANY AUTHORISED PERSON ON REQUEST. IT WILL BE GIVEN TO THE PROJECT MANAGER AT THE CONCLUSION OF WORKS.

NOTES:

- CONSTRUCTION OF SEDIMENT BASINS ARE TO BE IN ACCORDANCE WITH THE LANDCOM "BLUEBOOK".
- PROJECT SITE SHALL BE VEGETATED BY GRASS SEEDING THE SITE.
- ALL DISTURBED SURFACE AREAS ARE TO BE TOPSOILED AND TURFED AND MADE GOOD UPON COMPLETION OF WORKS.
- NO WORKS TO ENCROACH ON THE COASTAL WETLAND
- NO WORKS ARE PERMITTED PAST THE TREE PROTECTION ZONE
- FOR CATCHMENT PLAN - REFER DRG C006
- CLEARING OF ANY VEGETATION SHOULD BE IN ACCORDANCE WITH THE BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT BY GREENCAP AND THE DRAFT LANDSCAPE CONCEPT DESIGN REPORT BY TURF STUDIO.

SEDIMENT BASIN SPECIFICATIONS

BASIN	CATCHMENTS	VOL REQ.(m3)	BASE RL	WEIR CREST RL	TOP BUND RL	BASE AREA (m2)
1	1, 2, 3	3503	7	8.85	9.6	1942
2	4, 5	279	7.6	9.45	10.2	73
3	6a, 6b, 7	705	8.6	10.45	11.2	250
4	8, 9, 11	1839	5.5	7.35	8.1	657
5	10	390	24.1	25.8	26.1	167

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P5	ISSUED FOR EARLY AND ENABLING WORKS	11.01.19	CS	-			
P4	ISSUED FOR EARLY AND ENABLING WORKS	16.10.18	PN	-			
P3	ISSUED FOR EARLY WORKS DA	04.10.18	PN	-			
P2	ISSUED FOR EARLY WORKS DA	06.10.18	PA	-			
P1	ISSUED FOR EARLY WORKS DA	03.09.18	PA	-			
Rev	Description	Date	By	App	Rev	Description	Date
					P7	RESPONSE TO SUBMISSIONS	22.01.19
					P6	DA ISSUE	16.01.18

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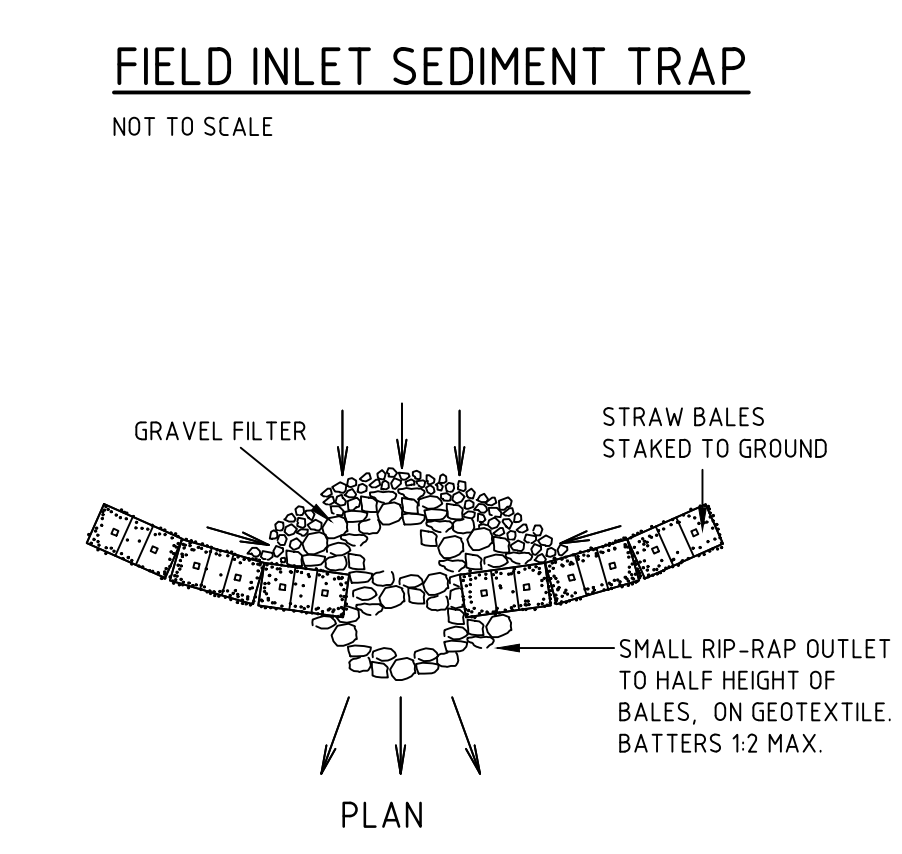
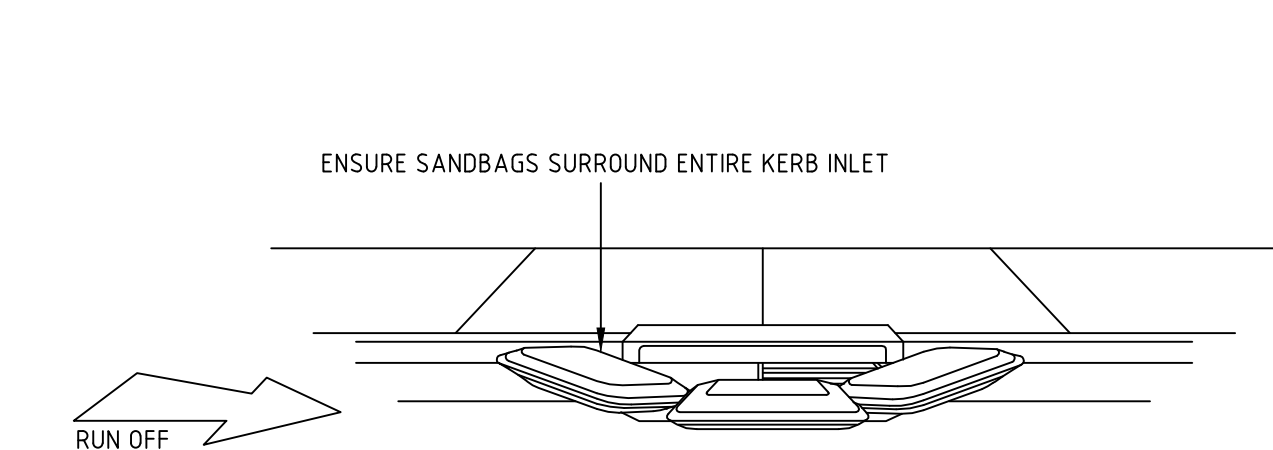
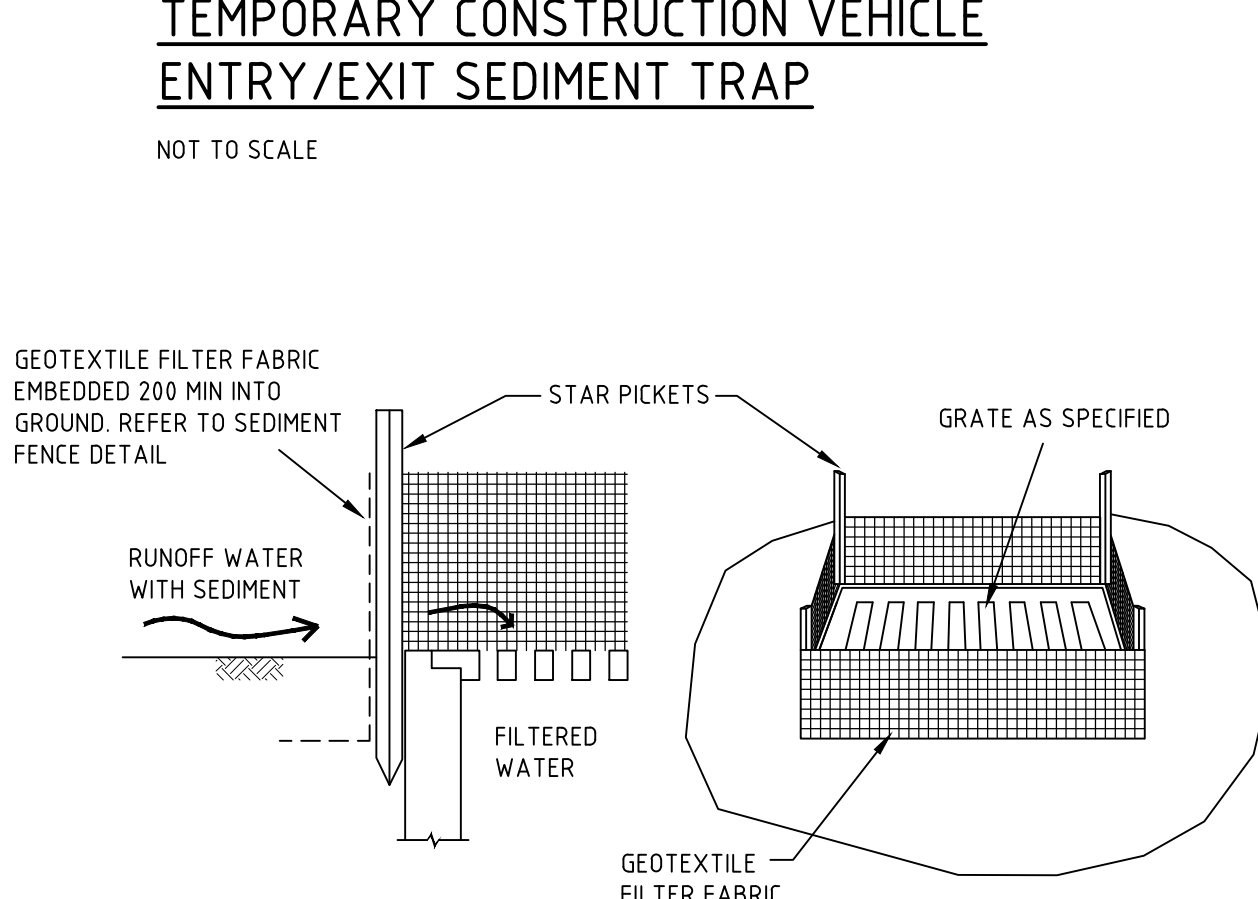
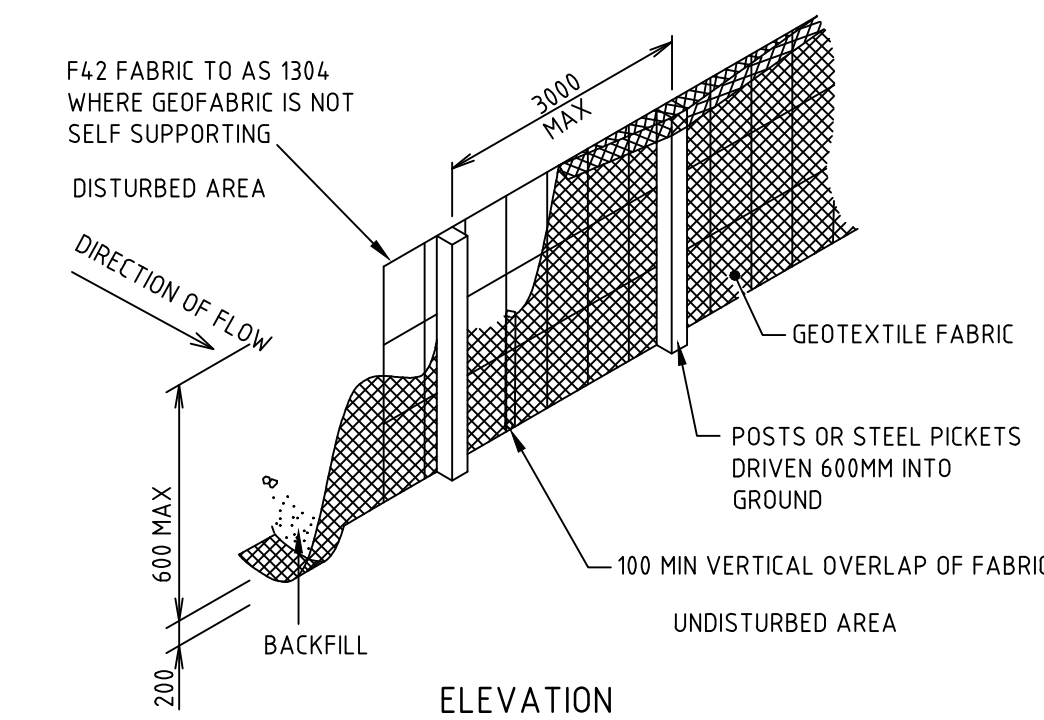
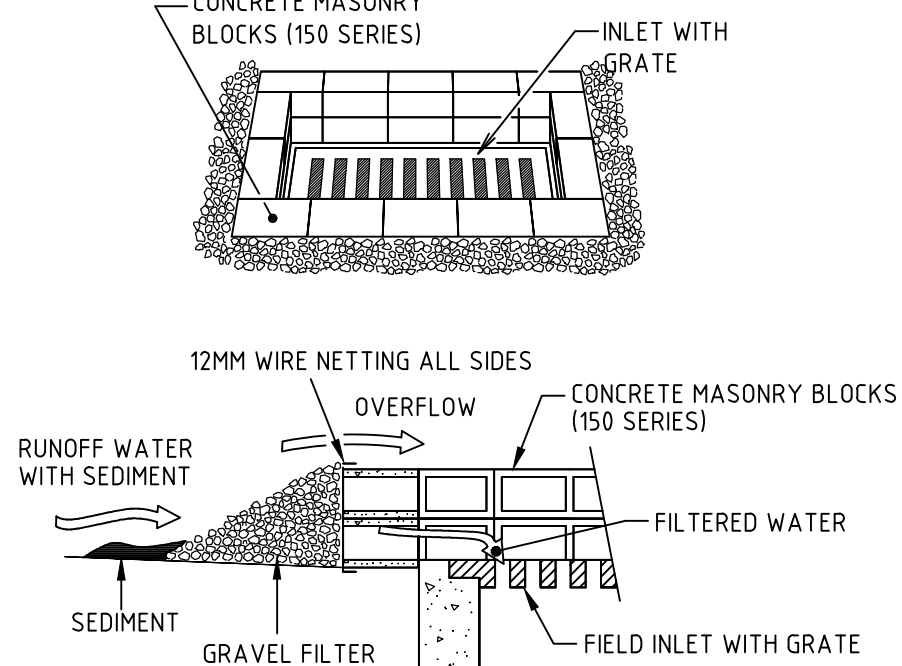
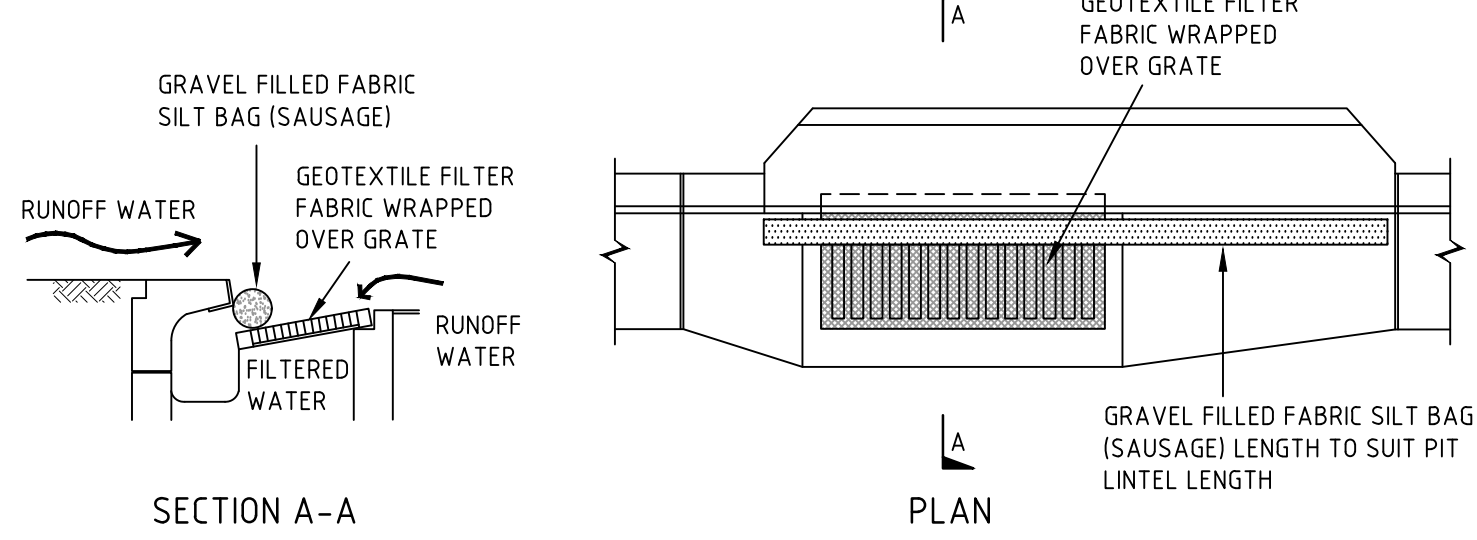
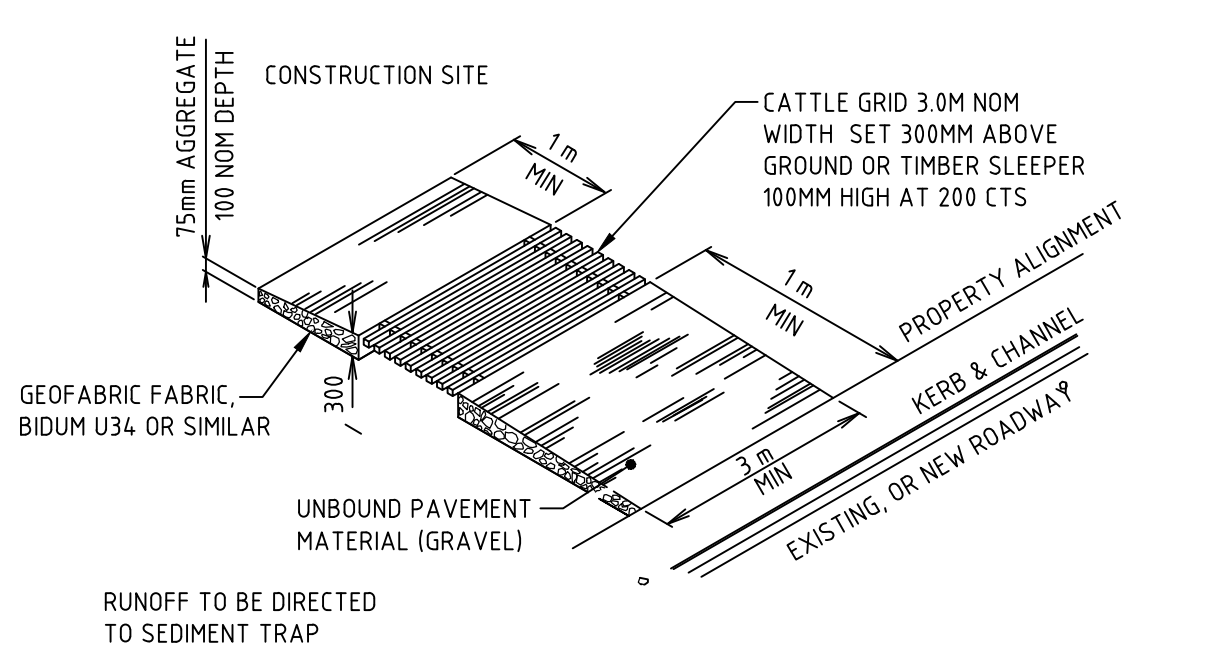
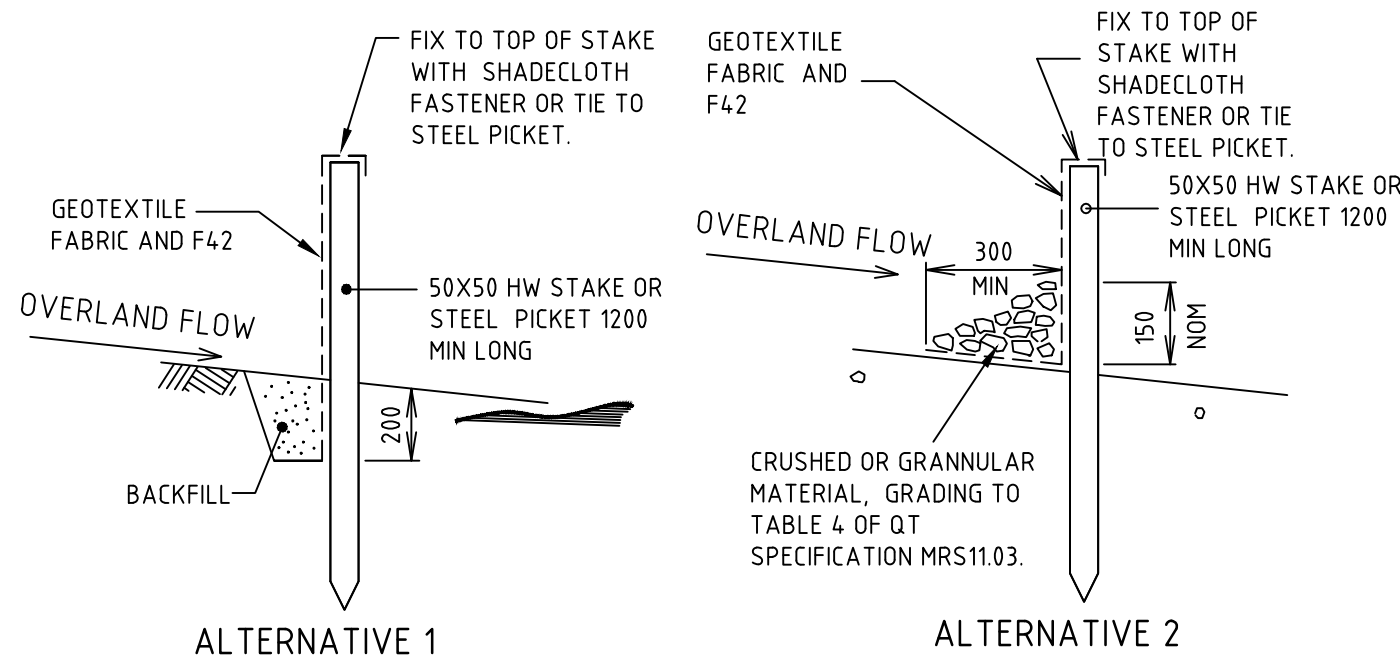
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Project Name
**TWEED VALLEY HOSPITAL
DEVELOPMENT, CUDGEN
STAGE 1 EARLY WORKS**

Drawing Title
**SOIL AND WATER
MANAGEMENT PLAN**

DEVELOPMENT APPLICATION

Designed	PA	Project Director Approved	Date	North
Drawn	PA			
Scale	1:250	Project Ref	Drawing No	Rev
Date	03.09.18	20 10748 01	C005	P7
Sheet	A1			

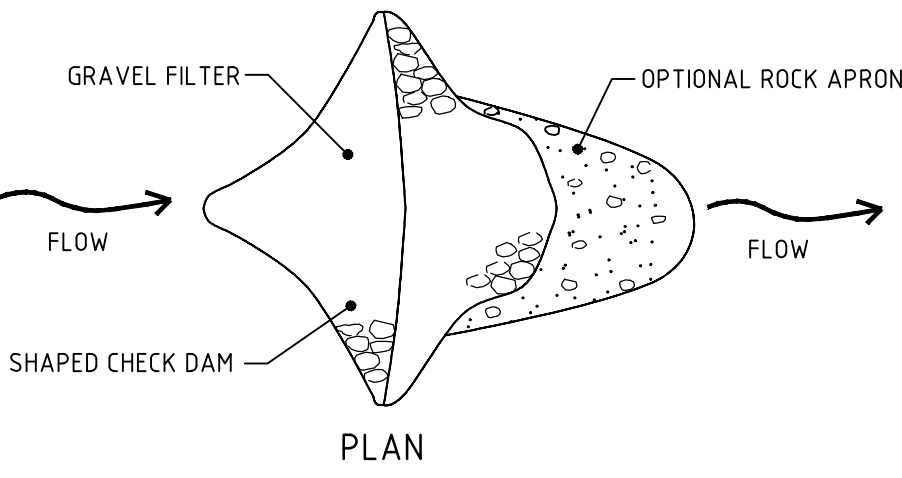
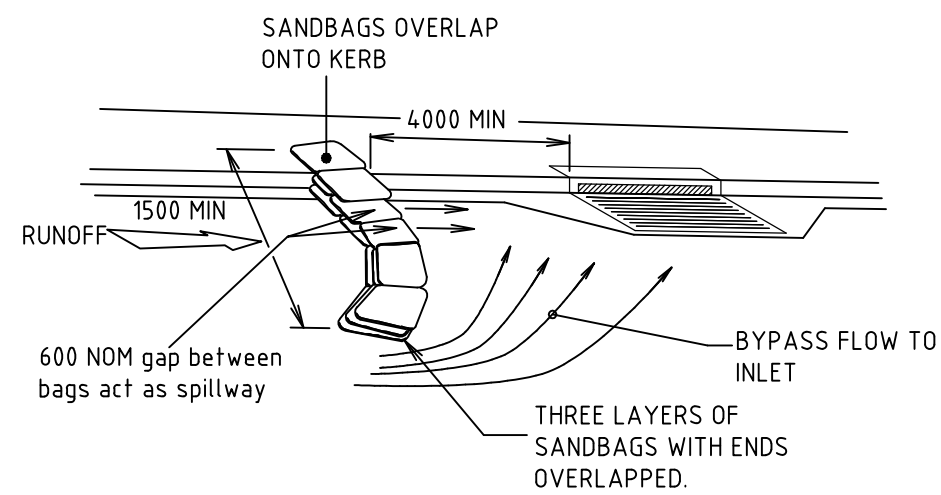
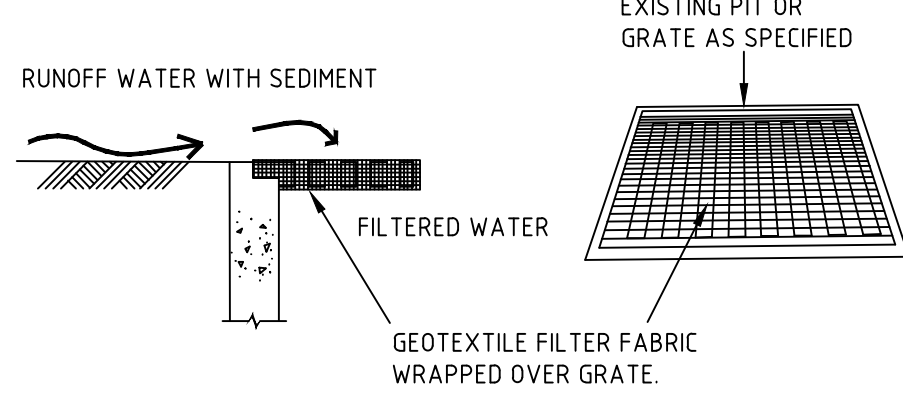
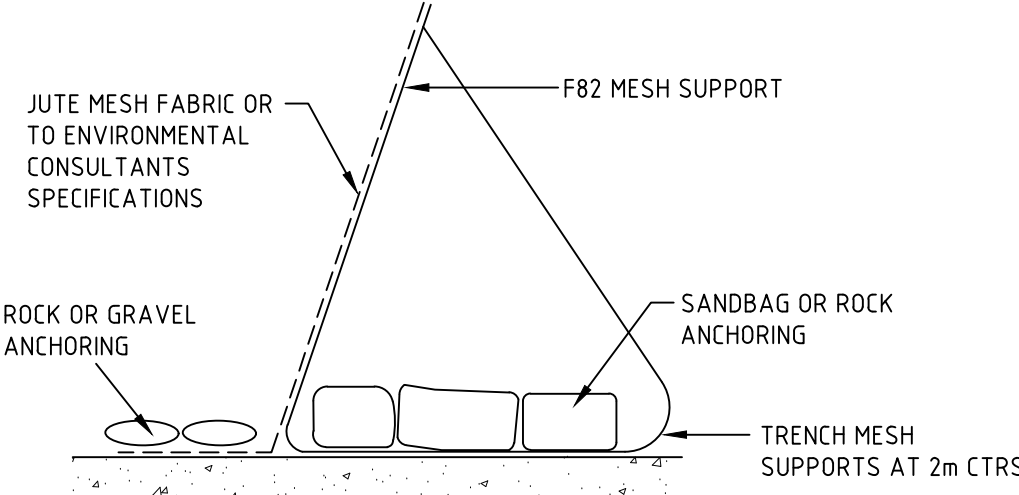


SEDIMENT FENCE
NOT TO SCALE

GEOTEXTILE PIT FILTER 1
NOT TO SCALE

SANDBAG KERB INLET SEDIMENT TRAP
NOT TO SCALE

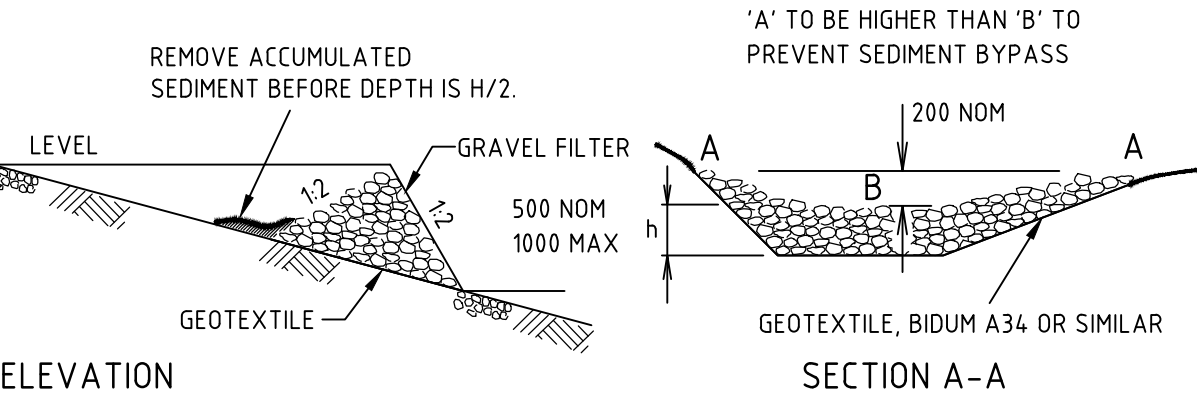
STRAW BALE AND STONE TRAP SEDIMENT CONTROL (CONCENTRATE FLOW)
NOT TO SCALE



ALTERNATIVE SEDIMENT FENCE
NOT TO SCALE

GEOTEXTILE PIT FILTER 2
NOT TO SCALE

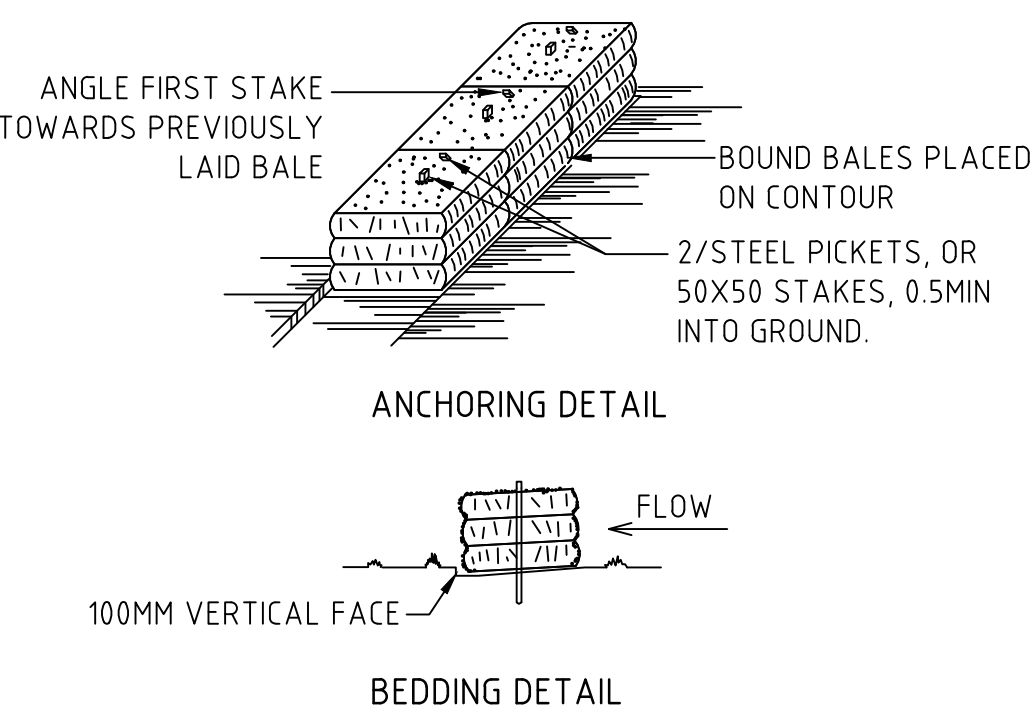
ON GRADE KERB INLET SEDIMENT TRAP
NOT TO SCALE



CATCH DRAIN
NOT TO SCALE

CHECK DAMS FLOW CONTROL
NOT TO SCALE

- ALTERNATIVE SEDIMENT FENCE NOTES**
- INSTALL THIS TYPE OF SEDIMENT FENCE WHEN USE OF SUPPORT POSTS IS NOT DESIRABLE OR NOT POSSIBLE. SUCH CONDITIONS MIGHT APPLY, FOR EXAMPLE, WHERE APPROVAL IS GRANTED FROM THE APPROPRIATE AUTHORITIES TO PLACE THESE FENCES IN HIGHLY SENSITIVE ESTUARINE AREAS.
 - USE BENT TRENCH MESH TO SUPPORT THE F82 WELDED MESH FACING AS SHOWN ON THE DRAWING ABOVE. ATTACH THE JUTE MESH TO THE WELDED MESH FACING USING UV-RESISTANT CABLE TIES.
 - STABILISE THE WHOLE STRUCTURE WITH SANDBAG OR ROCK ANCHORING OVER THE TRENCH MESH AND THE LEADING EDGE OF THE JUTE MESH. THE ANCHORING SHOULD BE SUFFICIENTLY LARGE TO ENSURE STABILITY OF THE STRUCTURE IN THE DESIGN STORM EVENT, USUALLY THE 10 YEAR EVENT.



STRAW BALE BANK SEDIMENT CONTROL
NOT TO SCALE

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Project Name	TWEED VALLEY HOSPITAL DEVELOPMENT, CUDGEN STAGE 1 EARLY WORKS		
Drawing Title	SOIL AND WATER MANAGEMENT DETAILS		

DEVELOPMENT APPLICATION			
Designed	PA	Project Director Approved	Date
Drawn	PA		
Scale	-	Project Ref	Drawing No
Date	03.09.18	20 10748 01	C006
Sheet	A1		P2

Note: These "Detailed Calculation" spreadsheets relate only to high erosion hazard lands as identified in figure 4.6 or where the designer chooses to use the RUSLE to size sediment basins. The "Standard Calculation" spreadsheets should be used on low erosion hazard lands as identified by figure 4.6 and where the designer chooses not to run the RUSLE in calculations.

Site Name: TWEED VALLEY HOSPITAL

Site Location: TWEED VALLEY HOSPITAL CUDGEN ROAD KINGSCLIFF

Precinct: HEALTH

Site area	Site						Remarks
	1	2	3	4	5	6a	
Total catchment area (ha)	1.9	3.12	2.17	0.34	0.21	0.86	
Disturbed catchment area (ha)	1.9	3.12	2.17	0.34	0.21	0.86	

% sand (fraction 0.02 to 2.00 mm)							Soil texture should be assessed through mechanical dispersion only. Dispersing agents (e.g. Calgon) should not be used
% silt (fraction 0.002 to 0.02 mm)							
% clay (fraction finer than 0.002 mm)							
Dispersion percentage							
% of whole soil dispersible							
Soil Texture Group							
							E.g. enter 10 for dispersion of 10%
							See Section 6.3.3(e)
							See Section 6.3.3(c), (d) and (e)

[illegible]

Rainfall erosivity (<i>R</i> -factor)	5750	5750	5750	5750	5750	5750	Automatic calculation from above data RUSLE data can be obtained from Appendixes A, B and C
Soil erodibility (<i>K</i> -factor)	0.015	0.015	0.015	0.015	0.015	0.015	
Slope length (m)	173	103	106	55	52	85	
Slope gradient (%)	6.36	13.9	4.9	25	7.1	18.8	
Length/gradient (<i>LS</i> -factor)	2.38	5.42	1.36	6.8	1.31	7.29	
Erosion control practice (<i>P</i> -factor)	1.3	1.3	1.3	1.3	1.3	1.3	
Ground cover (<i>C</i> -factor)	1	1	1	1	1	1	

Soil loss (t/ha/yr)	267	608	152	762	147	817	
Soil Loss Class	3	5	2	6	1	6	See Section 4.4.2(b)
Soil loss (m ³ /ha/yr)	205	467	117	587	113	629	
Sediment basin storage volume, m ³	66	248	43	34	4	92	See Sections 6.3.4(f) and 6.3.5 (e)

Revised Catchment Calc 1.1 CAM 190110.xls

1

Basin volume = settling zone volume + sediment storage zone volume

The settling zone volume for *Type F* and *Type D* soils is calculated to provide capacity to contain all runoff expected from up to the y-percentile rainfall event. The volume of the basin's settling zone (V) can be determined as a function of the basin's surface area and depth to allow for particles to settle and can be determined by the following equation:

$$V = 10 \times C_v \times A \times R_{x\text{-day, } y\text{-}\%ile} \text{ (m}^3\text{)}$$

where:

10 = a unit conversion factor

C_v = the volumetric runoff coefficient defined as that portion of rainfall that runs off as stormwater over the x-day period

$R_{x\text{-day}, y\text{-}\%ile}$ = is the x-day total rainfall depth (mm) that is not exceeded in y percent of rainfall events. (See Sections 6.3.4(d), (e), (f), (g) and (h)).

A = total catchment area (ha)

In the detailed calculation on Soil Loss Classes 1 to 4 lands, the sediment storage zone can be taken as 50 percent of the settling zone capacity. Alternately designers can design the zone to store the 2-month soil loss as calculated by the RUSLE (Section 6.3.4(i)(ii)). However, on Soil Loss Classes 5, 6 and 7 lands, the zone must contain the 2-month soil loss as calculated by the RUSLE (Section 6.3.4(i)(iii)).

Place an "X" in the box below to show the sediment storage zone design parameters used here:

	50% of settling zone capacity,
X	2 months soil loss calculated by RUSLE

Site	C _v	R _{x-day, y-%ile}	Total catchment area (ha)	Settling zone volume (m ³)	Sediment storage volume (m ³)	Total basin volume (m ³)
1	0.70	62.5	1.9	831.25	66	897.25
2	0.70	62.5	3.12	1365	248	1613
3	0.70	62.5	2.17	949.375	43	992.375
4	0.70	62.5	0.34	148.75	34	182.75
5	0.70	62.5	0.21	91.875	4	95.875
6a	0.70	62.5	0.86	376.25	92	468.25

Revised Catchment Calc 1.1 CAM 190110.xls

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SWMP Commentary, Detailed Calculations

Note: These "Detailed Calculation" spreadsheets relate only to high erosion hazard lands as identified in figure 4.6 or where the designer chooses to use the RUSLE to size sediment basins. The "Standard Calculation" spreadsheets should be used on low erosion hazard lands as identified by figure 4.6 and where the designer chooses not to run the RUSLE in calculations.

1. Site Data Sheet

Site Name: TWEED VALLEY HOSPITAL

Site Location: TWEED VALLEY HOSPITAL CUDGEN ROAD KINGSCLIFF

Precinct: HEALTH

Description of Site:

Site area	Site						Remarks
	6b	7	8	9	10	11	
Total catchment area (ha)	0.19	0.34	1.46	0.83	0.88	1.06	
Disturbed catchment area (ha)	0.19	0.34	1.46	0.83	0.88	1.06	

Soil analysis

% sand (fraction 0.02 to 2.00 mm)							Soil texture should be assessed through mechanical dispersion only. Dispersing agents (e.g. Calgon) should not be used
% silt (fraction 0.002 to 0.02 mm)							
% clay (fraction finer than 0.002 mm)							
Dispersion percentage							E.g. enter 10 for dispersion of 10%
% of whole soil dispersible							See Section 6.3.3(e)
Soil Texture Group							See Section 6.3.3(c), (d) and (e)

Rainfall data

Design rainfall depth (days)	5	5	5	5	5	5	See Sections 6.3.4 (d) and (e)
Design rainfall depth (percentile)	85	85	85	85	85	85	See Sections 6.3.4 (f) and (g)
x-day, y-percentile rainfall event	62.5	62.5	62.5	62.5	62.5	62.5	See Section 6.3.4 (h)
Rainfall intensity: 2-year, 6-hour storm	15.9	15.9	15.9	15.9	15.9	15.9	See IFD chart for the site

RUSLE Factors

Rainfall erosivity (R -factor)	5750	5750	5750	5750	5750	5750	Automatic calculation from above data
Soil erodibility (K -factor)	0.015	0.015	0.015	0.015	0.015	0.15	RUSLE data can be obtained from Appendixes A, B and C
Slope length (m)	64	98	76	124	82	188	
Slope gradient (%)	1.5	2.9	19.7	5.3	1.95	3.4	
Length/gradient (LS -factor)	0.25	0.71	7.1	1.6	0.41	1.3	
Erosion control practice (P -factor)	1.3	1.3	1.3	1.3	1.3	1.3	
Ground cover (C -factor)	1	1	1	1	1	1	

Calculations

Soil loss (t/ha/yr)	28	80	796	179	46	1458	
Soil Loss Class	1	1	6	2	1	6	See Section 4.4.2(b)
Soil loss (m ³ /ha/yr)	22	61	612	138	35	1121	
Sediment basin storage volume, m ³	1	4	152	19	5	202	See Sections 6.3.4(i) and 6.3.5 (e)

Revised Catchment Calc 1.2 CAM 190110.xlsx

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SWMP Commentary, Detailed Calculations

4. Volume of Sediment Basins, Type D and Type F Soils

Basin volume = settling zone volume + sediment storage zone volume

Settling Zone Volume

The settling zone volume for Type F and Type D soils is calculated to provide capacity to contain all runoff expected from up to the y-percentile rainfall event. The volume of the basin's settling zone (V) can be determined as a function of the basin's surface area and depth to allow for particles to settle and can be determined by the following equation:

V = 10 x C_v x A x R_{x-day, y-%ile} (m³)

where:

10 = a unit conversion factor

C_v = the volumetric runoff coefficient defined as that portion of rainfall that runs off as stormwater over the x-day period

R_{x-day, y-%ile} = is the x-day total rainfall depth (mm) that is not exceeded in y percent of rainfall events. (See Sections 6.3.4(d), (e), (f), (g) and (h)).

A = total catchment area (ha)

Sediment Storage Zone Volume

In the detailed calculation on Soil Loss Classes 1 to 4 lands, the sediment storage zone can be taken as 50 percent of the settling zone capacity. Alternately designers can design the zone to store the 2-month soil loss as calculated by the RUSLE (Section 6.3.4(i)(ii)). However, on Soil Loss Classes 5, 6 and 7 lands, the zone must contain the 2-month soil loss as calculated by the RUSLE (Section 6.3.4(i)(iii)).

Place an "X" in the box below to show the sediment storage zone design parameters used here:

	50% of settling zone capacity,
X	2 months soil loss calculated by RUSLE

Total Basin Volume

Site	C _v	R _{x-day, y-%ile}	Total catchment area (ha)	Settling zone volume (m ³)	Sediment storage volume (m ³)	Total basin volume (m ³)
6b	0.70	62.5	0.19	83.125	1	84.125
7	0.70	62.5	0.34	148.75	4	152.75
8	0.70	62.5	1.46	638.75	152	790.75
9	0.70	62.5	0.83	363.64375	19	382.64375
10	0.70	62.5	0.88	385	5	390
11	0.70	62.5	1.06	463.75	202	665.75

Revised Catchment Calc 1.2 CAM 190110.xlsx

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Rev Description Date By App

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Project Name
TWEED VALLEY HOSPITAL
DEVELOPMENT, CUDGEN
STAGE 1 EARLY WORKS

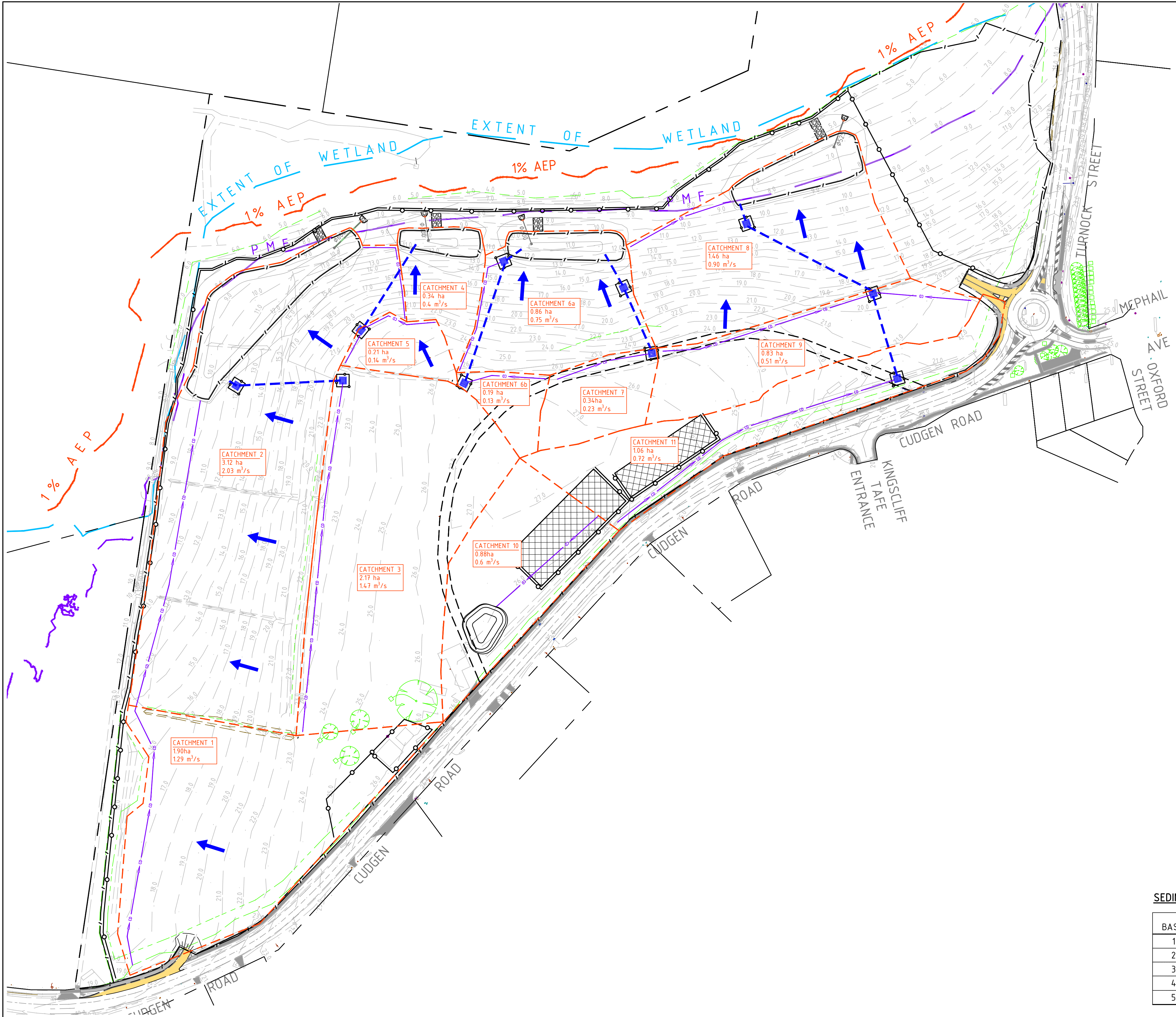
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SOIL AND WATER MANAGEMENT
CALCULATIONS
- SHEET 2 OF 2

DEVELOPMENT APPLICATION

Designed SK
Drawn CS
Scale 1:1000
Date 11.01.19
Sheet A1

Project Director Approved
Project Ref 20 10748 01
Drawing No C008
Rev P2

Date
North



- LEGEND**
- SITE BOUNDARY
 - SEDIMENT FENCE
 - SECURITY FENCE
 - SITE GATE
 - TEMPORARY STOCKPILE (LOCATION TBC ON-SITE)
 - NEW ROAD PAVEMENT (SEPARATE PACKAGE) - REFER 400 AND 500 SERIES FOR DOCUMENTATION
 - STORMWATER PIPE
 - STORMWATER PIT
 - GEOTEXTILE PIT FILTER
 - CATCH DRAIN
 - OVERLAND FLOW
 - EXTENT OF WETLAND
 - 1% AEP
 - PMF

SEDIMENT BASIN SPECIFICATIONS

BASIN	CATCHMENTS	VOL REQ.(m3)	BASE RL	WEIR CREST RL	TOP BUND RL	BASE AREA (m2)
1	1, 2, 3	3503	7	8.85	9.6	1942
2	4, 5	279	7.6	9.45	10.2	73
3	6a, 6b, 7	705	8.6	10.45	11.2	250
4	8, 9, 11	1839	5.5	7.35	8.1	657
5	10	390	24.1	25.8	26.1	167

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Project Name
**TWEED VALLEY HOSPITAL
DEVELOPMENT, CUDGEN
STAGE 1 EARLY WORKS**

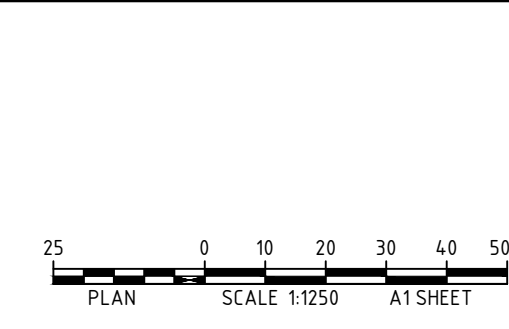
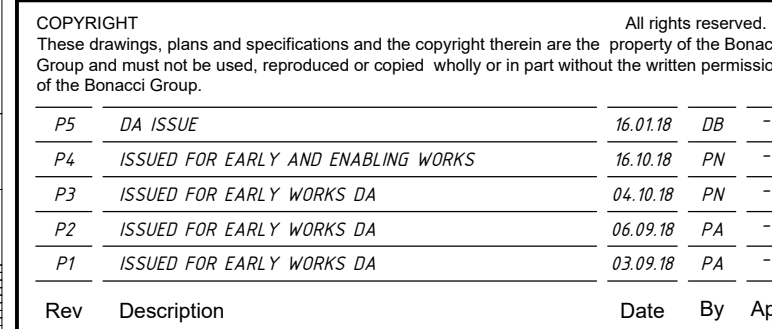
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**SOIL AND WATER
CATCHMANET PLAN**

DEVELOPMENT APPLICATION




















Designed PA	Project Director Approved	Date	North
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Scale 1:1250	Project Ref	Drawing No	Rev
Date 03.09.18	20 10748 01	C009	P2
Sheet A1			



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Project Name	TWEED VALLEY HOSPITAL PRELIMINARY CIVIL WORKS
Drawing Title	BULK EARTH WORKS PLAN

EARTHWORKS DEPTH RANGE				
Lower_value	Upper_value			Colour
-10000	to	-4	2	
-4	to	-3.5	2	
-3.5	to	-3	2	
-3	to	-2.5	2	
-2.5	to	-2	2	
-2	to	-1.5	2	
-1.5	to	-1	2	
-1	to	-.5	2	
-.5	to	0	2	
0	to	0.5	2	
0.5	to	1	2	
1	to	1.5	2	
1.5	to	2	2	
2	to	2.5	2	
2.5	to	3	2	
3	to	3.5	2	
3.5	to	4	2	
4	to	4.5	2	
4.5	to	50000	2	

NOTE	
1.	VOLUMES ARE APPROXIMATE ONLY, WHICH ARE IN PLACE AND DO NOT INCORPORATE BULKING FACTORS AND OVER EXCAVATION
2.	LEVELS PROVIDED ARE PRELIMINARY AND MIGHT CHANGE AS DESIGN PROGRESSES.
3.	GROUND WATER SEEPAGE MAY OCCUR IN EXCAVATED AREAS. DE-WATERING MAY BE REQUIRED IN THIS INSTANCE.
4.	RE USE OF THE EXCAVATED ROCK FOR ROAD BASE AND OTHER PURPOSES

BASINS

CUT VOLUME = 15,136m³

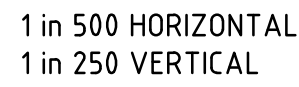
FILL VOLUME = 5054m³

NET (CUT) = -10,083m³

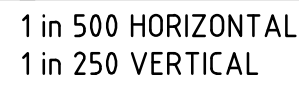
<p>REMAINDER OF WORKS</p> <p>CUT VOLUME = 93814m³</p> <p>FILL VOLUME = 58909m³</p> <p>NET (CUT) = 34,905m³</p>

CUT VOLUME = 108,950m³
FILL VOLUME = 63,963m³
NET (CUT) = 44,987m³

FOR PLAN SECTION LOCATION DRAWING REFER
TO DRAWING: C011



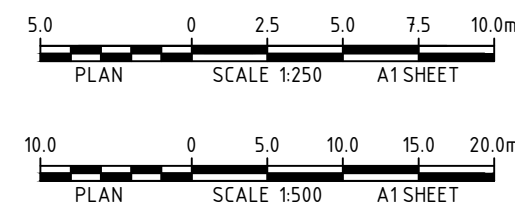
SC01 LONGITUDINAL SECTION




SC02 LONGITUDINAL SECTION

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Rev	Description	Date	By	App

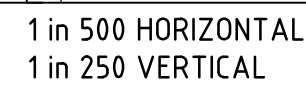
Rev	Description	Date	By	App



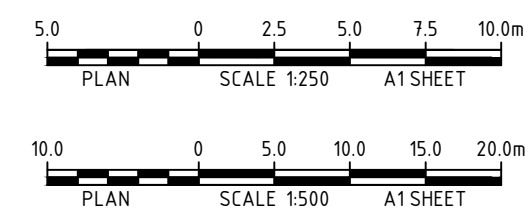
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Drawing Title	BULK EARTH WORKS SECTIONS SHEET 1


Designed	C.G.S.	Project Director Approved		Date	North
Drawn	C.G.S.				
Scale	1:1000				
Date	16.01.19				
Sheet	A1	Project Ref	Drawing No	Rev	
		20 10748 01	C020	P1	

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DESIGN GRADELINE									
HORIZONTAL GEOMETRY									
DATUM -8.3									
CHAINAGES	EXISTING SURFACE	EARTHWORKS	SC04						
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25.000	25.851	24.832							
50.000	26.405	24.942							
75.000	26.890	25.510							
100.000	26.479	22.950							
125.000	25.715	22.950							
150.000	24.047	18.450							
175.000	22.930	22.950							
200.000	21.275	22.950							
225.000	16.842	17.952							
250.000	13.082	9.429							
275.000	10.228	7.000							
300.000	7.967	9.391							
325.000									
338.314									

[illegible]

Project Name	TWEED VALLEY HOSPITAL PRELIMINARY CIVIL WORKS		CONSTRUCTION		
	Designed	C.G.S.	Project Director Approved	Date	North 
Drawing Title	Drawn	C.G.S.			
	Scale	1:1000			
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	Sheet	A1	Project Ref	Drawing No	Rev
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