



Great Western Highway Upgrade: Revised Proposal Area - Medlow Bath to Blackheath

Addendum Erosion and sediment
management report

Transport for New South Wales

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1 Introduction

1.1 About the proposal

Transport for NSW (Transport) is proposing to widen the Great Western Highway, between Rowan Lane, Katoomba and Tennyson Road, Blackheath from one to two lanes in each direction (the proposal). The proposal is part of the Great Western Highway Upgrade Program which aims to provide a safer, more efficient connection between the Central West region of New South Wales (NSW), the Blue Mountains and Sydney.

The proposal consists of two sections:

- Katoomba to Medlow Bath – about 3.5 kilometres of highway between Rowan Lane at Katoomba and Bellevue Crescent at Medlow Bath
- Medlow Bath to Blackheath – about 1.8 kilometres of highway between Station Street, Medlow Bath and Tennyson Road, Blackheath.

Transport prepared a review of environmental factors (REF) to assess the potential environmental impacts of the proposal.

Following exhibition of the REF, the proposal design has been refined (referred to as ‘the revised design’) in response to stakeholder feedback and further design development to either realise social benefits earlier or to allow construction efficiencies.

Figure 1 indicates the locations where design changes are proposed in the revised design compared to the design outlined in the REF.

The design changes in the revised design include:

- Extending the new separate eastbound carriageway and the upgrade of the westbound carriageway to connect back to the existing Great Western Highway just to the east of Tennyson Road.
- Continuing the active transport trail in the Medlow Bath to Blackheath section to Valley View Road, Blackheath. The active transport trail would also serve as maintenance access to utilities, water quality basins and the national park (for approved access only).
- High voltage electricity, optical fibre and water main relocations between Medlow Bath and Blackheath have been extended and connected back to existing utility networks at Blackheath.

The revised design would require an extension to the REF proposal area at the western end of the Medlow Bath to Blackheath section only. The revised proposal area has been developed as the footprint required for the construction of the revised design.

This addendum to the Erosion and Sediment Management Plan for the revised design has been prepared to assess the potential construction-related soil and surface water-related impacts of the revised proposal. It will support the submissions report including assessment of design changes being prepared by Transport.

Refer to the original Erosion and Sediment Management Plan for the full scope of the original REF proposal area.

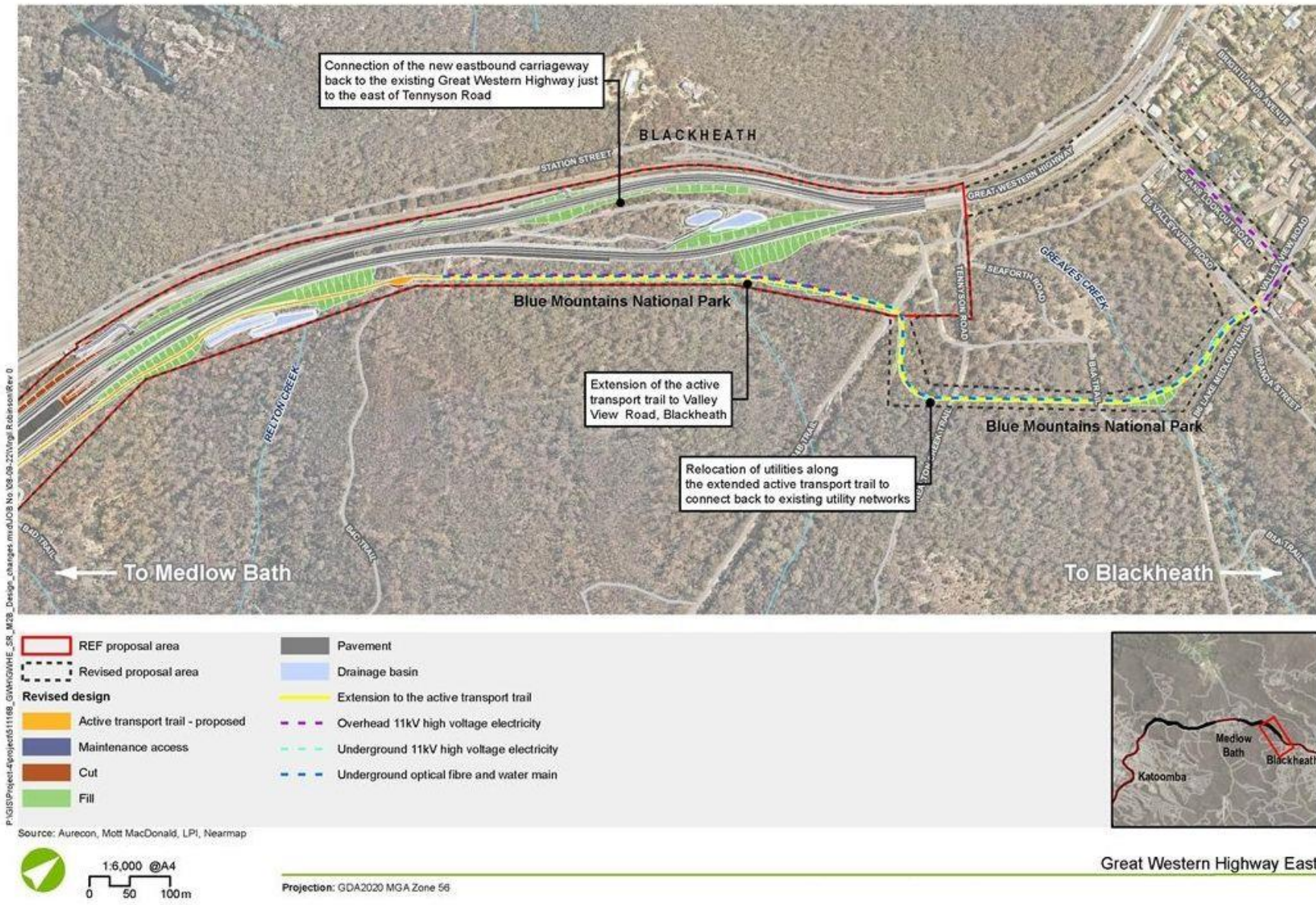


Figure 1-1: Location of design changes post REF exhibition. Only those areas subject to design changes are covered in this addendum.

1.2 Purpose and scope of this report

This addendum ESMR has been prepared for Aurecon by Strategic Environmental and Engineering Consulting (SEEC).

This report has been prepared for the revised proposal area from Medlow Bath to Blackheath to accompany the original ESMR (Great Western Highway: Katoomba to Blackheath Erosion and sediment management report) that was prepared for the full length of the proposal.

The purpose of this report is to determine how the construction of the revised proposal might impact on soils and surface water, and to determine appropriate mitigation or management measures where impacts are identified. It considers the areas and works directly associated with the revised proposal area as well as the implications of these works on the original operational road design and associated erosion and sediment control measures for the entire Medlow Bath to Blackheath proposal. As such this addendum ESMR assesses the impacts for the entire Medlow Bath to Blackheath section. This report only considers potential soil and water impacts during construction; it does not address potential impacts of the operational phase.

This addendum ESMR has been prepared following the procedure described in Section 4.1 of Transport PN143P Erosion and Sedimentation Management Procedure.

The expanded purpose of this document as described in Transport Procedure PN143P is:

- To develop concept designs for major erosion and sedimentation control measures. Major control measures will include:
 - Up-gradient stormwater diversion to ensure clean water does not enter the construction site.
 - Temporary cross drainage to transfer clean water through and/or around the site through all construction phases,
 - Sedimentation basins, as required, designed in accordance with the sizing criteria in DECC (2008) (Blue Book Volume 2D) (e.g. 80th/85th percentile 5-day rainfall event capture for non-sensitive/sensitive receiving environments – consideration may be given to designing larger sedimentation basins to manage runoff to particularly sensitive receiving environments or for particularly high risk activities).
- To assess constraints (risks) to the installation and operation of major controls through all construction phases.
- To eliminate risks where possible.
- To design preliminary compensatory measures where risks cannot be eliminated.
- To report the findings in an addendum Erosion and Sedimentation Management Report (addendum ESMR).

1.3 Structure of this report

This report includes the following sections:

- Section 1 provides an introduction outlining the proposal background and purpose of this report.
- Section 2 provides background regarding document preparation against Transport procedural guidelines.
- Section 3 provides an assessment of the potential constraints and opportunities relevant to construction-phase soil and surface water management and erosion and sediment control.
- Section 4 identifies design considerations for construction-phase erosion and sediment control measures.
- Section 5 provides an assessment of potential impacts, and summarises a series of recommendations to manage or mitigate potential impacts relating to construction-phase erosion and sediment control.

Section 5 is accompanied by an addendum Concept Erosion and Sediment Control Plan (addendum Concept ESCP) which is included as Appendix A. The addendum Concept ESCP shows conceptually the setup of key erosion and sediment control measures.

2 Documentation and Review

2.1 Addendum Concept ESCP

An addendum Concept ESCP prepared by SEEC accompanies this addendum ESMR and is included in Appendix A. It shows the setup of key erosion and sediment control measures for construction around the revised proposal area.

2.2 Review of existing design

As part of preparing this addendum ESMR, SEEC conducted a review of:

- The concept design of the revised proposal area prepared by Aurecon (2022) and the revised design from Medlow Bath to Blackheath, to determine if any inherent design issues might impact on soil and surface water and effective implementation of erosion and sediment controls.
- The revised proposal boundaries (revised construction footprint – area of impact), to ensure that adequate consideration was given to structures such as sedimentation basins when determining land availability.
- Concept traffic and construction staging, to determine how these aspects might influence the constructability of structures such as sediment basins, and the management of clean offsite water and dirty onsite water at each stage.
- How access from the existing road network might impact on erosion and sediment control.
- The land available during construction to determine if space constraints are likely to impact on the effective implementation and establishment of erosion and sediment controls.
- Site topography, soils, the receiving environment and local setting, to determine how these aspects influence or are impacted by the proposal, and how they might affect the effective implementation of erosion and sediment controls.

Constraints identified in this process have been taken into account in preparing the addendum Concept ESCP (Appendix A) and comments regarding this are included in Section 5 of this report.

2.3 Site inspection

A site inspection was conducted by Alyssa Thomson from SEEC in February 2021 to identify and confirm soil, surface water and topographical conditions and how they might influence erosion and sediment control during construction.

2.4 Preliminary Erosion and Sedimentation Assessment (PESA)

Transport procedure PN 143P (RTA, 2008) requires all proposals be subject to a Preliminary Erosion and Sedimentation Assessment (PESA), following the procedure in Attachment 1a of that document. The PESA uses “triggers” that, if exceeded, classify a proposal as high risk.

For this revised proposal area, four out of four triggers are exceeded, as detailed in Table 2-1, below. As such, the proposal is considered high risk, which triggers the requirement to engage a Soil Conservation Consultant and to prepare an addendum ESMR.

Table 2-1: PESA for the proposal

Triggers	Yes/No	Comments to support decision
1. Does the complexity or size of the project result in it being inherently high risk as ongoing installation and maintenance of controls will require extensive coordinated resources?	Yes	The revised proposal involves major earthworks with multiple traffic switches on a major highway.
2. Assess the erosion hazard of each catchment to be disturbed for the proposed project using Attachment 1b (of RTA, 2008). Are any of the proposed construction areas defined as “High Erosion Hazard”?	Yes	R-factor is 1930 (See Section 3.1) and slopes in numerous catchments exceed 16%. As such, numerous catchments are defined as “High Erosion Hazard”.
3. Are there known site constraints that limit the implementation of appropriate erosion and sedimentation control measures?	Yes	Space might not be available for sediment basins. Ecological, heritage and clearing constraints might limit the potential for construction of sediment basins.
4. Are there identified sensitive receiving environments that will receive stormwater discharge from the construction project?	Yes	Blue Mountains National Park and Blackheath Special Catchment Area

2.5 Design standards and guidelines

Erosion and sediment controls in this addendum ESMR (and the accompanying addendum Concept ESCPs) have been designed in accordance with:

- The NSW Government publication “Managing Urban Stormwater – Soils and Construction”, Volume 1, 4th Edition (Landcom, 2004) – “the Blue Book Volume 1”,
- “Managing Urban Stormwater – Soils and Construction”, Volume 2D, Main Road Construction (DECC, 2008) – “the Blue Book Volume 2D”, and

In addition, Transport’s Design Guide has also been used to inform the design of erosion and sediment controls in this addendum ESMR and the accompanying addendum Concept ESCPs in Appendix A.

3 Assessment of constraints

3.1 Climate

Bureau of Meteorology (BoM) rainfall statistics for nearby Katoomba (station 063039 Farnells Road, Katoomba) are contained in Table 3.1.

Table 3-1 Monthly rainfall for Katoomba (BoM station 063039, accessed August 2022)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Rainfall (mm)	162.2	179.6	175.9	121.0	99.3	117.1	85.3	78.6	71.1	92.0	110.1	121.6	1407.6
Mean no of days with rain >1mm	11.4	11.2	11.3	8.5	7.5	8.0	7.3	7.2	7.4	8.4	9.6	10.3	108.1

The Bureau of Meteorology reports the 2-year, 6-hour rainfall event as 9.25mm/hr for the proposal area. This translates to a Revised Universal Soil Loss Equation (RUSLE) R-Factor of 1930. This is a low-moderate value. This value contrasts with R-factor mapping in Appendix B of Landcom (2004), where the R-factor for this area is mapped at around 3000. Given that the Bureau of Meteorology data is more recent and is geographically specific to the site, an R-factor of 1930 has been adopted for all erosion hazard calculations (refer to Section 3.11).

The risk of high rainfall is considered to be a significant constraint for construction-phase erosion and sediment control on this proposal.

3.2 Topography

Site topography across the revised proposal area is variable. Natural slope gradients range from around 10% on the ridgelines near the existing operational roadway to around 30%. Steep slopes (i.e. greater than 20%) significantly increase the risk of erosion on disturbed ground, and often necessitate significant earthworks (cut and fill) for a major road project.

Topography is considered to be a significant constraint for this proposal and will impact on the feasibility for constructing structures such as sediment basins, which are difficult to construct on steep hillsides.

The recommendations in Section 5 and the erosion and sediment controls shown on the accompanying addendum Concept ESCP (Appendix A) include proposed management and mitigation measures for topography-related constraints.

3.3 Soils – general

Soil Landscape Mapping for the Katoomba 1:100,000 mapsheet (King, 1994), accessed via the NSW Government eSpade portal, reveals that the revised proposal area lies entirely on the Medlow Bath Soil Landscape. Figure 3-1 shows the soil landscapes (sourced from NSW Government eSpade portal) with the extent of the revised construction footprint and surrounding areas. Soil observations by SEEC during the site inspection confirmed the accuracy of the soil landscape mapping.

Table 3-2 contains a summary of soil landscape descriptions, key features and potential constraints that might influence erosion and sediment control during construction.

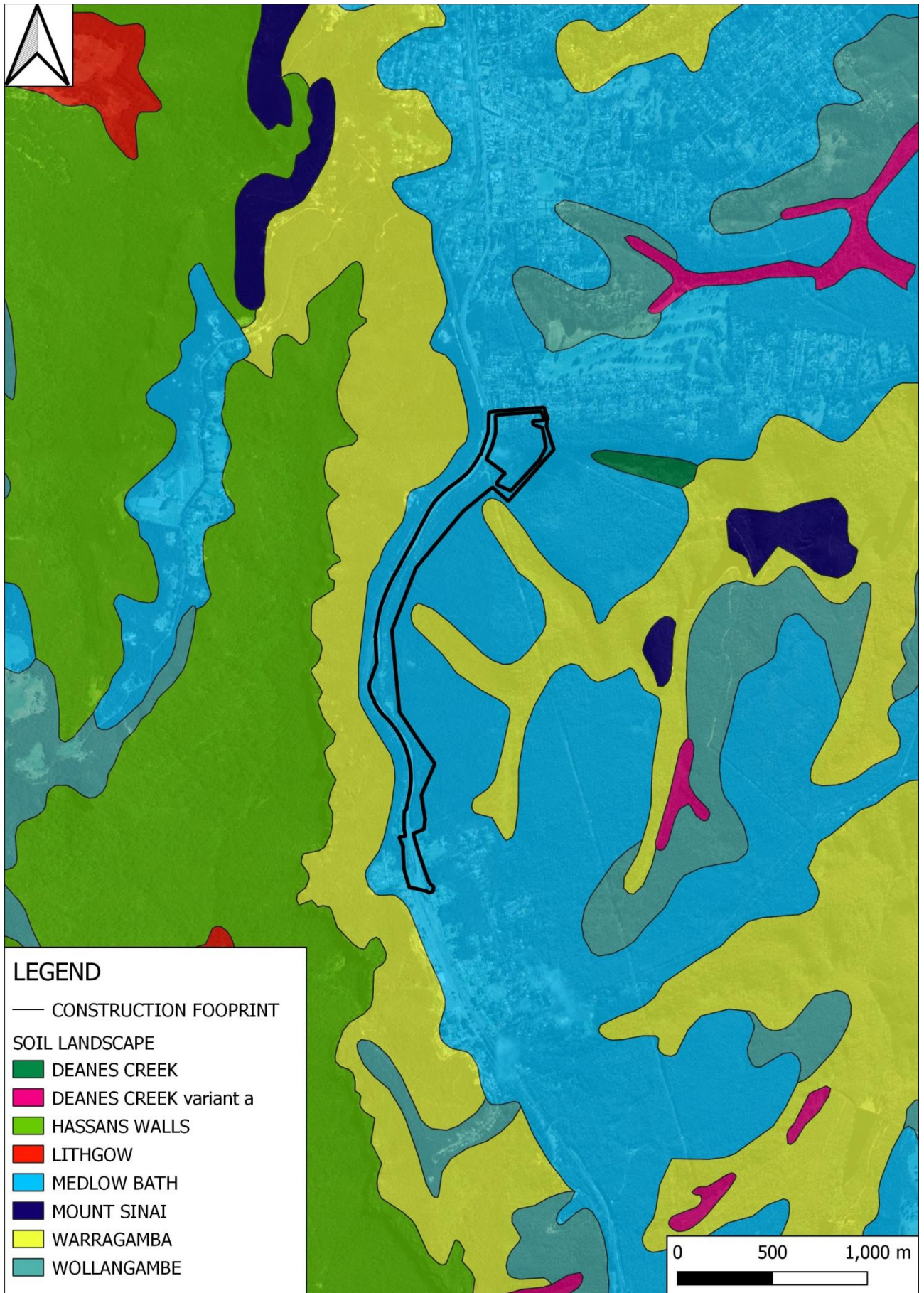


Figure 3-1 Soil landscape mapping (NSW Government eSpade portal, 2022, using data from King, 1994) with the concept revised proposal area (revised construction footprint shown).

Table 3-2 Soil landscape summary (from King, 1994, and Landcom, 2004).

Soil landscape name	Soil landscape description	Dominant K-factor	Key landscape constraints for erosion and sediment control
Medlow Bath	Narrow crests, ridgelines, plateau surfaces and moderately inclined sideslopes on Narrabeen Group sandstones. Soils are mainly moderately deep Earthy Sands and Yellow Earths.	0.035	<ul style="list-style-type: none"> ■ Stony, acidic soils ■ Highly erodible soils ■ Low fertility and potential aluminium toxicity ■ Low waterholding capacity ■ High permeability soils

A K factor of 0.035 is recommended for erosion hazard calculations on the Medlow Bath Soil Landscape, based on data reported in King (1994) and Landcom (2004).

The naturally acidity of the soils limits nutrient availability, reduces the risk of weeds and tends to favour the endemic native vegetation. However, soil acidity can also be a significant constraint for revegetation following construction unless properly ameliorated.

The recommendations in Section 5 include proposed management and mitigation measures for soils-related constraints.

3.4 Acid sulfate soils

Acid Sulfate Soil Risk Mapping (DLWC, 1997) did not identify the revised proposal area as having a risk of acid sulfate soils (confirmed via the NSW Government eSpade portal, 2021). Site observations did not identify any landscape indicators that suggest acid sulfate soils might be present within the proposal boundaries.

3.5 Surface water

3.5.1 Catchments and receiving waters

This revised proposal area lies near the upper catchment boundary of the Grose Valley catchment, draining into the headwaters of either Adams Creek, Relton Creek or Greaves Creek (or first-order tributaries that feed into these creek systems). These creeks eventually join the Grose River, part of the Hawkesbury Nepean River system. No watercourses are crossed in the revised proposal area.

The revised proposal generally follows the alignment of the existing Great Western Highway, adjacent to the Main Western Railway Line. These two features are located close to the natural ridgeline that acts as the watershed of the Grose Valley to the north and east. The operational roadway of the revised proposal area traverses the existing Great Western Highway on the upper catchment slopes. The active transport trail is located further downslope on the mid-slopes of the catchment/s.

There are no lands within the revised proposal area that are noted as being protected under the Coastal Management SEPP. However, the revised proposal area lies in close proximity to the Blue Mountains National Park and all surface water that runs off or is discharged from the revised proposal area would flow into the Blue Mountains National Park.

The revised proposal lies within Sydney's Drinking Water Catchment (SDWC) including a 'Special Area' of significance (Blackheath 'Special Area', an inner catchment for drinking water). The revised proposal area also intersects the upper catchment areas of Greaves Creek and Relton Creek which drain to Lake Medlow (located on Adams Creek) and Lake Greaves (located on Greaves Creek). Lake Medlow and Lake Greaves supply water to the middle and upper Blue Mountains.

3.5.2 Existing drainage

Existing roadside drainage is a mixture of formal, concreted kerbs, concrete swale drains, and natural swale drains. Several small culverts pass under the existing highway pavement to allow cross-drainage. The areas surrounding the active transport trails are currently undeveloped and are well-vegetated and have natural drainage conditions.

3.5.3 Run-on of clean offsite water

The operational roadway of the revised proposal area is positioned close to a ridgeline that acts as a watershed for two catchments. However, most sections are still impacted by minor run-on from upslope catchment areas to some degree. The active transport trail lies further downslope and a significant portion of the revised proposal area is affected by the potential for clean offsite run-on from surrounding upslope lands.

Wherever possible, permanent drainage structures should be installed as early as possible to facilitate effective separation of clean offsite and dirty onsite water during construction. However, given that the revised proposal alignment crosses over or overlies the existing highway alignment in numerous locations, works will need to be staged to allow for traffic flow during construction. This will impact on the early installation of drainage structures and will most likely necessitate the installation of temporary drainage structures in a number of locations to facilitate effective drainage control during construction. The locations where this occurs are noted on the addendum Concept ESCPs in Appendix A.

The recommendations in Section 5 include management and mitigation options for drainage-related constraints.

3.5.4 Sydney drinking water catchment

The revised proposal lies within Sydney's Drinking Water Catchment (SDWC) including a 'Special Area' of significance (Blackheath 'Special Area', an inner catchment for drinking water). WaterNSW requires that all lands within the SDWC must achieve a Neutral or Beneficial Effect (NorBE) on water quality under *SEPP SDWC (2011)*, and that the Blackheath 'Special Area' achieves ecological integrity (*Water NSW Act, 2014*) which is more stringent than NorBE itself. The locations of where the 'Special Area' occurs is noted on the addendum Concept ESCPs in Appendix A.

The NSW Blue Book (Landcom, 2004 and DECC, 2008) are recognised as Current Recommended Practices by WaterNSW. When the guidelines and principles in that document are implemented on construction projects, that is deemed to be a neutral effect on water quality – i.e. a deemed-to-comply solution to demonstrate NorBE. As discussed in Section 2.5 of this report, the Blue Book has been used as a defining standard for erosion and sediment control for this proposal.

Where the revised proposal traverses areas identified as 'Special Areas,' an enhanced level of erosion control has been applied to ensure an appropriate level of protection that exceeds the Current Recommended Practice as defined by the Blue Book. This includes minimising the disturbance footprint, implementing specialised management strategies when significant rain is forecast, minimising changes to the natural runoff/flow conditions and maintaining or restoring a natural vegetative stage to as much of the landscape as possible. The recommendations and management measures for achieving this are noted in Section 5 and on the addendum Concept ESCPs in Appendix A.

3.6 Flooding

Flooding can impact on the ability to install and/or operate erosion and sediment controls. The Blue Book (Landcom, 2004) suggests that special erosion and sediment control measures should apply to any works below the 2-year average recurrence interval (ARI) flood level. This includes:

- Sediment controls should be placed above the 2-year ARI flood level (e.g. basins, sediment fences etc).
- Requirements to stabilise lands using temporary ground cover whenever rain is falling or imminent.
- Scheduling works for lower-risk times of year, based on historical rainfall figures.

Given the location of the revised proposal on or near a ridgeline, flooding is not expected to be a significant constraint for erosion and sediment control.

3.7 Biodiversity

Biodiversity impacts and clearing are to be minimised on this proposal, as noted in Aurecon (2021).

This requirement can present a significant constraint for water quality management because it can limit the locations for structures such as sediment basins.

The addendum Concept ESCP in Appendix A shows the conceptual positioning of construction-phase erosion and sediment controls. In locating these controls, local biodiversity and clearing limits have been considered, with the aim being to minimise the space required.

Recommendations and management measures are noted in Section 5 and on the addendum Concept ESCPs in Appendix A.

3.8 Existing services

Existing services and utilities are a significant constraint for the revised proposal area, as both underground and overhead services occur within the revised proposal area boundary. The locations of existing and proposed utilities have been considered when siting erosion and sediment controls on the addendum Concept ESCP in Appendix A, with any relevant comments included in Section 5.

Underbores for temporary drainage structures or services might be required to facilitate staging of the construction. Localised erosion and sediment controls would be required for each underbore because excavation and soil disturbance would be required. However, such controls are typically minor and are not expected to present a significant challenge for erosion and sediment control. As a result, no further assessment is required in this report.

3.9 Land availability

Land availability is a common constraint for road projects during construction, especially for:

- Establishing stockpiles; and
- Constructing sediment basins.

Limited space in a narrow construction corridor can be compounded by topographical and ecological/biodiversity constraints, which can limit the siting of sediment basins. This has been identified as a constraint at a number of locations, which are detailed in Section 5 of this addendum ESMR.

The accompanying addendum Concept ESCP (Appendix A) identifies the proposed locations for sediment basins and clean offsite and dirty onsite water drains, along with recommendations for alternative management where alternatives might be required. In positioning structures such as sediment basins, the requirement to minimise disturbance to existing vegetation has been considered.

3.10 Design and construction constraints

3.10.1 Proposed drainage

As part of preparing this addendum ESMR and following the process in PN143P, the outlet locations for the proposed drainage have been assessed to determine:

- The feasibility of new stormwater pits and pipes to convey dirty onsite water to sediment basins during construction; and
- The feasibility for new cross-alignment culverts to be installed early so they can convey clean offsite water across the work area.

The results of this assessment have been fed back into the design process and modifications made wherever feasible. Where alternative design was not possible and residual risk remains for construction-phase erosion and sediment control this has been noted in Section 5 and on the addendum Concept ESCPs in Appendix A.

3.10.2 Piling

Piling will be required during construction for retaining walls. Piling rigs would be required for these works and might necessitate establishing piling platforms for the safe working of the rig. Based on the ground conditions observed, it is unlikely that the establishment of any piling platforms would potentially encroach into a waterway.

3.10.3 Sediment tracking onto surrounding roads

The revised proposal area includes construction interactions with existing live traffic on the Great Western Highway and on local roads. As such, there is a risk of sediment tracking onto existing sealed live roadways from construction areas. The Great Western Highway is a busy and winding roadway, so excessive sediment tracking from construction gates could present a significant safety hazard.

Refer to Section 5 for an assessment of the potential to manage sediment tracking during construction, along with recommendations for any identified constraints.

3.11 Erosion hazard

An evaluation of the erosion hazard was made using the approach in Chapter 4 of the Blue Book (Landcom, 2004). Given the slope gradients that occur along the proposal alignment, the proposal is considered as “high risk” and therefore calculations are required to assess each catchment. This process involves calculating the predicted annual average soil loss using the Revised Universal Soil Loss Equation (RUSLE) as follows:

$$A = R \times K \times LS \times P \times C$$

Table 3-3 details the above equation and the values used in assessing erosion hazard.

Table 3-3 RUSLE definitions and adopted values.

Parameter	Definition	Gentle slopes	Moderate slopes	Steep slopes
A	Total calculated soil loss (t/ha/yr)	246 t/ha/yr	346 t/ha/yr	1,019 t/ha/yr
R	Rainfall erosivity factor (refer to Section 3.1)	1930	1930	1930
K	Soil erodibility factor (Refer to Section 3.3)	0.035	0.035	0.035
LS	Typical slope length and gradient factor*	10% and 80m (LS of 2.81)	20% and 80m (LS of 7.32)	30% and 80m (LS of 11.60)
P	Conservation practice factor	Maximum of 1.3 assumed	Maximum of 1.3 assumed	Maximum of 1.3 assumed
C	Ground cover factor	Maximum of 1.0 assumed	Maximum of 1.0 assumed	Maximum of 1.0 assumed
Erosion hazard (from Landcom, 2004)		Low-moderate	High	Very high
Catchment size trigger for sediment basins		0.82 ha	0.32 ha	0.25 ha**

* Note that the slope lengths and gradients in this assessment are typical values only. Each catchment was individually assessed using the prevailing topographic conditions and the design slopes (on batters) to determine the most appropriate LS-factor.

** As noted in Clause 6.3.2 of Landcom (2004), the minimum catchment size that warrants construction of a sediment basin is 2,500m².

Included in Table 3-3 is an assessment of the construction catchment size that would trigger the need for constructing a sediment basin for a theoretical catchment with the nominated slope conditions, in compliance with Landcom (2004) and DECC (2008).

Refer to the addendum Concept ESCP in Appendix A for an assessment of the assumed construction catchments to determine which catchments trigger the requirement for a sediment basin. Where a sediment basin is triggered but cannot reasonably be provided, alternatives would need to be proposed. This is discussed further in Section 5.

4 Design standard for erosion and sediment control

4.1 Sediment basins

In accordance with the Blue Book Volumes 1 and 2D (Landcom, 2004 and DECC, 2008), sediment basins are required where the erosion hazard in any disturbed catchment exceeds the threshold of 150 m³/year (equivalent to around 200 tonnes per year). Table 3-3 contains a general assessment of the catchment size required to exceed this threshold, based on typical catchment conditions. In preparing the addendum Concept ESCP in Appendix A, an assessment of each individual catchment area to be disturbed for the revised proposal area was conducted to determine which catchments require a sediment basin during construction.

Construction-phase sediment basins have been sized based on the following criteria (Landcom, 2004):

- Design rainfall depth: 45.4 mm (5-day, 85th percentile for Katoomba) for all areas;
- Basins designed for Type F/D (fine or dispersible) sediment;
- Volumetric runoff coefficient (Cv): 0.58 (Hydrologic Group C, assuming some rock exposure and compacted subgrades) for all areas.

The size of the basin(s) will vary depending on catchment size and conditions. Conceptual sizing of basins is included in the addendum Concept ESCPs in Appendix A.

As much as possible construction stage sediment basins will be positioned within the permanent water quality control basins. Therefore, these permanent basins will need to be constructed as early works including the permanent outlet structures. However, the filtration devices within the bioretention basin areas are not to be installed until the end of construction, once all surfaces within the relevant catchment areas are complete and stabilised/landscaped.

Note there are several topographical, spatial, soil and drainage constraints to constructing sediment basins, so alternative measures will be implemented instead in locations where basins are theoretically required but cannot be constructed. This is discussed further in Section 5 (specifically in Table 5.3 and Table 5.4) and is noted on the addendum Concept ESCPs in Appendix A.

Outlet structures are to be provided from all sediment basins to spread out flows, encourage dissipation and minimise erosion. The permanent sediment basin spillways and dissipations structures (where applicable) should ideally be constructed early to help achieve this.

Given that the sediment basins shown on the addendum Concept ESCPs in Appendix A all sit within the proposal area boundary, separate fencing is not likely to be necessary (because construction sites are not publicly accessible). However, the safety aspects of each sediment basin would need to be assessed on a case-by-case basis at the time of construction.

4.2 Dirty onsite and clean offsite water separation

The revised proposal design includes drainage to divert clean offsite water from upslope away from completed cut and fill batters. As much as is practicable, these drains would be installed early to aid efficient construction and minimise the risk of erosion. This is detailed on the addendum Concept ESCPs (Appendix A). However, complex staging of the construction and earthworks would be required to allow for traffic flow because the revised proposal area alignment overlies or intersects the existing Great Western Highway alignment for much of its length.

As such, temporary drainage will be required in some locations to ensure that:

- Clean offsite water is bypassed through or around work areas and away from sediment control structures; and

- Dirty onsite water is diverted to sediment control structures such as sediment basins.

Conceptual locations for temporary drainage are detailed on the addendum Concept ESCPs (Appendix A).

As much as possible, cross-formation culverts should be installed or extended early to assist with separating dirty onsite and clean offsite water during construction. In some locations temporary cross-drainage will be required to achieve adequate separation due to the prevailing topography and design of the road. Those locations are marked on the addendum Concept ESCP (Appendix A).

All temporary and permanent drainage devices implemented during construction will need to be stabilised and have suitable dissipation devices installed to minimise erosion as much as possible, spread out flows and encourage infiltration. Check dams may also be required within drains and any other concentrated flow areas to slow flows and minimise erosion. Recommendations and management measures for achieving this are noted in Section 5 and on the addendum Concept ESCPs in Appendix A.

4.3 Construction phase de-watering and discharge

Water Quality Objectives (WQOs) for the Hawkesbury-Nepean River are determined by the nature of the local land use and the prevailing waterway conditions. All waterways within close proximity to the revised proposal area have been previously affected by urban development, although those impacts are relatively minor. Typically, the turbidity threshold for the protection of aquatic ecosystems in upland streams is 2 to 25 NTU.

If an Environment Protection Licence (EPL) is required from the Environment Protection Authority (EPA) for all or part of this proposal, an assessment of construction sediment basin discharges would need to be prepared. That assessment would be required to assess the appropriate water quality limits for sediment basin discharges and ensure consistency with the WQOs for this location.

Given the location of the revised proposal area to the Blue Mountains National Park and numerous sensitive waterways, the typical Blue Book recommendation of 50mg/L for sediment basin discharge would not be consistent with the WQOs for this location.

The original REF proposal for the Katoomba to Blackheath proposal recommended that an assessment to determine appropriate water quality limits for sediment basin discharges be undertaken as part of the detailed design process. The outcomes of that assessment could then be applied to the revised proposal area as well. Achieving the required discharge limits is a cost-sensitive issue for construction contractors, so it is important that they are known at the time the project goes to tender.

Outlet structures are to be provided at all discharge points to spread out flows, encourage dissipation and minimise erosion. The permanent sediment basin spillways and dissipations structures (where applicable) should ideally be constructed early to help achieve this.

5 Proposed erosion and sediment controls

5.1 Assessment of applicability of erosion and sediment controls

In preparing the addendum Concept ESCPs (Appendix A), a review was conducted of the revised proposal to determine how these might impact on the effective implementation of erosion and sediment controls during construction.

Table 5-1 provides details of the principles of erosion and sediment control typically adopted on road projects, along with an assessment of whether each can be effectively applied to the revised proposal area.

Where constraints to the effective implementation of typical erosion and sediment controls are identified in Table 5-1, details of proposed mitigation and/or management measures for each are contained in Table 5-2 and also on the addendum Concept ESCPs in Appendix A.

Table 5-1 Assessment of typical erosion and sediment controls in the revised proposal area

No.	Erosion and Sediment Control Principle	Typical requirements	Assessment of applicability for the revised proposal area
1	Assess constraints and opportunities for erosion and sediment control during the planning/design phase.	Assess existing site conditions to determine how they might influence the selection, positioning, sizing, design and operation of erosion and sediment controls during construction.	This report includes an assessment of constraints and opportunities for erosion and sediment control. No further action required at this time.
2a	Plan early for erosion and sediment control.	On high risk sites, prepare concept plans for erosion and sediment control during the planning and design phase to determine feasibility for effective implementation during construction.	This report and the accompanying addendum Concept ESCP (Appendix A) demonstrate early planning. No further action required at this time.
2b	Plan early for erosion and sediment control.	Prepare a Primary ESCP in accordance with DECC (2008) (Blue Book Volume 2D), accompanied by a series of Progressive ESCPs.	A Primary ESCP should be prepared prior to site disturbance, following the guidance in Blue Book Volume 2D (DECC, 2008). Progressive ESCPs should be prepared during construction showing the location of controls for each stage of work. Transport QA G38 specification should include requirements for preparation of Primary and Progressive ESCPs. This is noted in Table 5-2.
2c	Plan early for erosion and sediment control.	An up-to-date register of Progressive ESCPs should be maintained during construction.	Recommend that Transport QA G38 specification includes a requirement for a register of Progressive ESCPs to be kept up to date. This is noted in Table 5-2.
2d	Plan early for erosion and sediment control.	Erosion and sediment controls should be installed early in the construction process, generally as part of clearing and grubbing works.	Standard practice. No specific additional requirements for this proposal. No significant limitations to early installation of major erosion and sediment controls as part of clearing and grubbing works.

No.	Erosion and Sediment Control Principle	Typical requirements	Assessment of applicability for the revised proposal area
3a	Minimise the extent and duration of disturbance.	Minimise the extent of disturbance in order to minimise biodiversity impacts and to minimise erosion.	As part of the process of preparing the addendum Concept ESCPs in Appendix A, clearing limits were established that take into account biodiversity constraints, particularly where tree clearing is required. No further assessment is necessary for erosion and sediment control purposes.
3b	Minimise the extent and duration of disturbance.	Minimise the time and extent of disturbance in waterways, and schedule works for lower-risk periods as much as possible.	No watercourse crossings. No further assessment is necessary.
3c	Minimise the extent and duration of disturbance.	Limit site access and haul roads to the minimum required for safe and efficient construction.	<p>Numerous temporary access tracks would be required during construction. A standard suite of erosion and sediment controls would be feasible for these tracks. Notes to this effect have been included in the addendum Concept ESCPs in Appendix 1.</p> <p>No further assessment necessary.</p>
4a	Manage soils, including conserving topsoil for later reuse in rehabilitation.	As much as possible, re-use site-won topsoil for rehabilitation purposes.	<p>Topsoils are typically acidic and infertile. Such soil conditions are appropriate for locally-endemic native vegetation.</p> <p>However, acidic, infertile soils could impact on rehabilitation with other species unless soils are effectively ameliorated and fertilized.</p> <p>Refer to Item 8a in this table for further comments.</p> <p>Refer to Table 5-2 for recommendations regarding topsoil management.</p>
4b	Manage soils, including conserving topsoil for later reuse in rehabilitation.	Determine soil-related constraints that might impact on erosion and sediment control, water quality, or rehabilitation.	<p>Subsoils are locally dispersive so should be managed using sediment basins. These have been included wherever feasible and have been designed to Blue Book guidelines. Where basins are theoretically required but are not feasible, alternatives have been included.</p> <p>Refer to Item 7a, below</p>
5a	Control water flow on, through and off the site.	Control flows of water on, through and off the site. That includes separation of clean offsite water and dirty onsite water.	<p>The management and separation of clean offsite water and dirty onsite water presents significant challenges due to limited space and complex construction staging (to allow for traffic management).</p> <p>Temporary drainage will be required in numerous locations to divert offsite clean water away from construction areas or to direct onsite dirty water to sediment basins or other sediment traps.</p> <p>Refer to Table 5-2 and to the addendum Concept ESCP in Appendix A for recommendations.</p>

No.	Erosion and Sediment Control Principle	Typical requirements	Assessment of applicability for the revised proposal area
5b	Control water flow on, through and off the site.	Stabilise concentrated flows using permanent and temporary ground covers, supplemented by the use of velocity controls such as check dams.	<p>All temporary and permanent drainage devices implemented during construction will be stabilised and have suitable dissipation devices installed to minimise erosion as much as possible, spread out flows and encourage dissipation.</p> <p>Check dams will be installed as required within all concentrated flow areas.</p> <p>Refer to the addendum Concept ESCP in Appendix A for recommendations.</p>
5c	Control water flow on, through and off the site.	Construct cross-alignment culverts early to allow for the passage of offsite clean water across the alignment. This aids with separation of offsite clean water and onsite dirty water.	<p>Cross-formation permanent culverts are typically constructed early to allow for the passage of offsite clean water through the construction area.</p> <p>Assuming traffic generally remains on the current pavement while the new eastbound carriageway is constructed, there are no significant constraints to the early installation of cross-formation permanent culverts.</p> <p>No specific requirements for this revised proposal area.</p>
5d	Control water flow on, through and off the site.	Temporary waterway crossings are to be stable and must minimise impacts to the waterway.	<p>Temporary waterway crossings would be constructed in accordance with Blue Book standard details.</p> <p>No specific additional requirements for this revised proposal area.</p>
5e	Control water flow on, through and off the site.	Discharges from the site are to be managed so as to minimise potential impacts to the receiving waters.	<p>Typical Blue Book (Landcom, 2004) sediment basin discharges of 50mg/L are unlikely to meet the WQOs for the local waterways. This necessitates an assessment of appropriate water quality limits for construction-phase sediment basin discharges.</p> <p>An assessment of Construction Sediment Basin Discharge Impacts should be undertaken as part of the detailed design. This would determine the appropriate water quality criteria for sediment basin discharges.</p>
6a	Minimise erosion as much as possible.	Minimise erosion as much as possible, including the use of enhanced erosion controls on high risk sites.	<p>Enhanced erosion controls are to be applied across all work areas due to the sensitivity of the surrounding environment throughout the Water NSW environmentally special area.</p> <p>Refer to Table 5-2 and the addendum Concept ESCP in Appendix A for recommendations</p>
6b	Minimise erosion as much as possible.	Stockpiles require stabilisation to minimise the risk of erosion.	<p>There are no restrictions to this being implemented on this proposal.</p> <p>No specific additional requirements.</p>

No.	Erosion and Sediment Control Principle	Typical requirements	Assessment of applicability for the revised proposal area
6c	Minimise erosion as much as possible.	<p>Slope breaks should be included to reduce the erosion hazard on long, disturbed slopes prior to rainfall.</p> <p>Note that the use of slope breaks can cause or exacerbate erosion if used on extensive areas of dispersive soils. Dispersive soils occur only in sporadic pockets on this revised proposal area, so slope breaks are unlikely to significantly increase the risk of erosion.</p>	<p>Due to the steepness of the site and the sensitivity of the receiving environment it is recommended that slope breaks are reduced to 40m intervals for this revised proposal area. This is noted on the addendum Concept ESCPs in Appendix A.</p> <p>Dispersive soils occur only in sporadic pockets on this revised proposal area, so slope breaks are unlikely to significantly increase the risk of erosion.</p>
6d	Minimise erosion as much as possible.	Dust control should be undertaken to minimise dust impacts to the environment and to nearby receivers.	<p>This is typically carried out using water carts. There are no significant constraints to typical dust suppression activities providing adequate water supplies can be secured.</p> <p>No specific additional requirements.</p>
7a	Maximise sediment retention onsite.	Provide sediment basins in all catchments where the erosion hazard warrants their use.	<p>Sediment basins are included on the addendum Concept ESCP (Appendix A) in all catchments where they are triggered except at the following locations:</p> <ul style="list-style-type: none"> • The entire width of the alignment between Chainage 5450 and 5640. There is no space to position a sediment basin for the early works here. • Batter works between Chainage 5850 and 6040. Levels do not allow runoff from the batter here to be directed into the sediment basin. • Batter works, a portion of the operational road construction works and active transport trail works between Chainage 6420 and 6790. There is insufficient space to position a sediment basin for the works here. <p>Additional enhanced erosion controls (above the standard suite of enhanced erosion controls that are to be implemented for all work areas due to the sensitivity of the receiving environment – see Item 6a above) are proposed for the catchments identified here.</p> <p>Refer to Table 5-2 and the addendum Concept ESCP in Appendix A for details and recommendations.</p>
7b	Maximise sediment retention onsite.	Design and size sediment basins to achieve the desired water quality, based on the erosion hazard and sensitivity of the receiving waters.	<p>Sediment basins are sized following the methodology described in the Blue Book (Landcom, 2004 and DECC, 2008), based on the assumptions in Section 4.1.</p> <p>Refer to the addendum Concept ESCP in Appendix A for sizing of sediment basins.</p>

No.	Erosion and Sediment Control Principle	Typical requirements	Assessment of applicability for the revised proposal area
7c	Maximise sediment retention onsite.	<p>Sediment basin and sediment trap spillways should flow onto stable ground and/or existing drainage systems (natural or man-made).</p> <p>Dissipation structures must be installed in a manner to spread out and dissipate flows and minimise erosion.</p>	<p>All construction-phase sediment basins utilise the positioning of the permanent water quality basins except for the following:</p> <ul style="list-style-type: none"> ■ SB4980E ■ SB5240E ■ SB6660E ■ SB6800E <p>The above basins and all sediment traps will require temporary spillways (as noted above) that extend to stable ground and into existing drainage systems (natural or man-made).</p> <p>However, if possible it is recommended that the permanent water quality control basin/s near Chainage 5200 are moved to the low point at around Chainage 5240 so that they can be combined with SB5240E for the construction sediment basin. If this is not possible a separate construction phase sediment basin will be required here.</p> <p>Refer to Table 5-2 and the addendum Concept ESCP in Appendix A for recommendations</p>
7d	Maximise sediment retention onsite.	Minimise the risk of sediment tracking onto surrounding roads.	<p>There are no significant constraints to the use of typical gate controls on this proposal.</p> <p>However, sediment tracking presents a significant risk for safety on the existing road network due to roads being relatively winding. As such, a greater focus on minimising sediment tracking is required, as typical Blue Book measures would be inadequate.</p> <p>Enhanced egress controls and a high focus on street sweeping, vehicle wash/hosing down is recommended.</p> <p>Refer to Table 5-2 for details.</p>
7e	Maximise sediment retention onsite.	Position sediment basins to avoid intercepting groundwater.	<p>Given the position of this section of the proposal on or near a ridgeline and overlying Narrabeen Sandstone, significant groundwater impacts on sediment basins are unlikely.</p> <p>Sediment basins have been positioned outside of cut batters and groundwater impacts are unlikely. No specific additional requirements for this section of the proposal.</p>
7f	Maximise sediment retention onsite.	Direct as much onsite dirty water to sediment basins as possible.	This is achievable in all locations. No additional or alternative requirements.

No.	Erosion and Sediment Control Principle	Typical requirements	Assessment of applicability for the revised proposal area
8a	Rehabilitate disturbed lands progressively, ensuring rehabilitation is effective to reduce the erosion hazard.	<p>At the conclusion of works in any area, rehabilitation should occur efficiently to rapidly reduce the erosion hazard.</p> <p>Revegetation will rely on suitable growing media, species selection and ongoing maintenance.</p>	<p>Topsoils are typically acidic and infertile. Such soil conditions are appropriate for locally-endemic native vegetation.</p> <p>However, acidic, infertile soils could impact on rehabilitation if non-native, non-adapted species are selected (or if seed mixes include temporary non-invasive grasses for erosion control such as ryegrass or millet) unless soils are effectively ameliorated and fertilized.</p> <p>Note that ameliorating soil acidity and fertility could promote weed growth and inhibit the growth of native species.</p> <p>Landscaping should preference endemic native vegetation that is adapted to acidic, low fertility soils.</p> <p>Avoid ameliorating soils to amend pH and fertility. However, this will impact on the ability to use annual grasses (e.g. ryegrass or millet) for erosion control.</p> <p>Refer to Table 5-2 for recommendations regarding topsoil management to aid with rehabilitation after construction.</p>
8b	Rehabilitate disturbed lands progressively, ensuring rehabilitation is effective to reduce the erosion hazard.	Avoid creating steep batters that are difficult to revegetate, especially those with a north or westerly aspect.	<p>Batters steeper than 3:1 limit the potential for certain revegetation techniques, especially on north- and west-facing batters where evapotranspiration rates are higher.</p> <p>Landscape design must be considerate of batter gradients and aspect.</p> <p>Refer to Table 5-2 for recommendations regarding batter revegetation.</p>
8c	Rehabilitate disturbed lands progressively, ensuring rehabilitation is effective to reduce the erosion hazard.	Undertake maintenance of revegetation areas to promote growth and control weeds.	<p>There are no significant constraints that limit the feasibility for applying water for vegetation growth following batter construction.</p> <p>No specific additional requirements for this proposal.</p>
9	Conduct regular inspections of the site to identify potential problems and allow for rectification or repair.	Undertake regular inspections of erosion and sediment controls.	<p>The requirement for documented inspections is typically included in Transport QA G36 and G38 specifications.</p> <p>No specific additional requirements for this proposal.</p>
10	Maintain all erosion and sediment controls, including cleaning out sediment traps, until the upslope catchments are effectively rehabilitated.	Undertake maintenance of erosion and sediment controls including cleaning out (de-silting) and repairing controls as required.	<p>The requirement to maintain and/or clean out erosion and sediment controls until the upslope catchments are rehabilitated is typically included in Transport QA G36 and G38 specifications.</p> <p>No specific additional requirements for this proposal.</p>

5.2 Proposal-Specific recommendations

Table 5-2 contains a summary of those locations and aspects that are considered high-risk or that are outside of typical best-practice for a road construction project, as identified in Table 5-1 (for the revised proposal area).

Where typical erosion and sediment controls are adequate and can be reasonably installed, these have been shown on the accompanying addendum Concept ESCP in Appendix A.

Table 5-2 Summary of proposal-specific recommendations for the revised proposal area.

No.	Location	Reason for adoption as a high risk area/aspect	Reference from Table 5-1	Recommended action(s) for revised proposal area
1	Whole proposal	Primary and progressive planning of erosion and sediment control measures will be required due to the staged nature of the works.	2b	Transport QA G38 specification should be amended to include a requirement for the contractor to prepare a Primary ESCP prior to site disturbance, plus Progressive ESCPs prior to commencement of any ground-disturbing works.
2	Whole proposal	Progressive planning of erosion and sediment control measures will be required due to the staged nature of the works.	2c	Transport QA G38 specification should be amended to include a requirement for the contractor to keep an up to date register of Progressive ESCPs onsite.
3	Whole proposal	<p>Acidic and infertile soils help reduce the potential for weed infestation and promote the potential success of locally-endemic, native species.</p> <p>However, these soils limit the potential for using non-native, non-endemic vegetation including erosion-control grasses such as ryegrass and millet.</p>	4a and 8a	<p>It is recommended that Transport QA G38 and R144 specifications: :</p> <ul style="list-style-type: none"> ■ Require no amelioration of soil acidity or fertility. ■ Include requirements to utilise locally endemic native species for rehabilitation. ■ Do not promote the use of fast-growing annual grass species (e.g. ryegrass or millet) for erosion control or in hydroseed mixes. ■ Include requirements to provide temporary erosion control using mulches, compost blankets or organic Rolled Erosion Control Products (RECPs) such as Jute or Coir Matting.
4	Numerous locations: refer to addendum Concept ESCPs in Appendix A	Temporary drainage will be required to divert offsite clean water away from work areas and to direct onsite dirty water to sediment control structures such as sediment basins.	5a	Refer to the addendum Concept ESCPs in Appendix A for locations.
5	Whole proposal	Typical Blue Book (Landcom, 2004) sediment basin discharges of 50mg/L are unlikely to meet the WQOs for the local waterways. This necessitates an assessment of appropriate water quality limits for construction-phase sediment basin discharges.	5e	<p>An assessment of Construction Sediment Basin Discharge Impacts should be undertaken as part of the detailed design. This would determine the appropriate water quality criteria for sediment basin discharges.</p> <p>The original REF proposal for the full scope of the Katoomba to Blackheath proposal recommended that an assessment to determine appropriate water quality limits for sediment basin discharges be undertaken as part of the detailed design process. The outcomes of this assessment are to be applied for the revised proposal area as well.</p> <p>This requirement should be included in Transport PS311 specification for the detailed design phase of this section of the proposal.</p>

No.	Location	Reason for adoption as a high risk area/aspect	Reference from Table 5-1	Recommended action(s) for revised proposal area
6	Whole proposal	Enhanced erosion controls are to be applied across all work areas due to the sensitivity of the surrounding environment throughout the Water NSW environmentally special area.	6a	<p>Enhanced erosion controls include:</p> <ul style="list-style-type: none"> • Temporary stabilisation of exposed batters and steep slopes prior to rainfall and site shutdown; • Installation of regular slope breaks at maximum 40m intervals to slow down flows and break up catchments; • Stabilisation of all concentrated flow areas; • Dissipation of all concentrated flows including diversion drains and outlet structures to achieve sheet flow; • Installation of check dams within concentrated flow paths; • Progressive stabilisation of batters as soon as works are complete in each section/lift; and • Supplementary online holding devices (e.g. temporary online sediment traps/sumps installed prior to rainfall) to break up catchments, slow flows, and minimise erosion and the total disturbance. <p>This is identified and detailed on the addendum Concept ESCPs in Appendix A.</p>
7	Chainage 5450 to 5640	A sediment basin is theoretically required for all works in this catchment. However, a sediment basin cannot be constructed for the early works due to limited space and potential vegetation impacts.	7a	<p>Sediment traps are proposed instead, augmented with additional enhanced erosion controls (above the standard suite recommended for all areas) to offset the lack of a sediment basin.</p> <p>This is identified and the details of additional enhanced erosion controls are outlined on the addendum Concept ESCPs in Appendix A.</p>
8	Batters between Chainage 5850 and 6040	<p>Ideally dirty onsite runoff from the batters in this area should be directed to a sediment basin during construction.</p> <p>However, levels do not allow runoff from the batters to be directed to the identified sediment basins and a sediment basin is not constructible downslope of the batters due to topography, space and potential vegetation impacts.</p>	7a	<p>Sediment traps are proposed instead, augmented with additional enhanced erosion controls (above the standard suite recommended for all areas) to offset the lack of a sediment basin.</p> <p>This is identified and the details of additional enhanced erosion controls are outlined on the addendum Concept ESCPs in Appendix A.</p>
9	Batter works, a portion of the operational road construction works and active transport trail works between Chainage 6420 and 6790	A sediment basin is theoretically required for all works in this catchment. However, a sediment basin cannot be constructed for these work areas due to space constraints and potential vegetation impacts.	7a	<p>Sediment traps are proposed instead, augmented with additional enhanced erosion controls (above the standard suite recommended for all areas) to offset the lack of a sediment basin.</p> <p>This is identified and the details of additional enhanced erosion controls are outlined on the addendum Concept ESCPs in Appendix A.</p>

No.	Location	Reason for adoption as a high risk area/aspect	Reference from Table 5-1	Recommended action(s) for revised proposal area
10	Sediment basins: <ul style="list-style-type: none"> ■ SB4980E ■ SB5240E ■ SB6660E ■ SB6800E 	<p>These are temporary construction-phase sediment basins that don't utilise the positioning of the permanent water quality basins.</p> <p>They will require temporary spillways that extend to stable ground and into existing drainage systems (natural or man-made).</p>	7c	<p>The requirement for temporary spillways has been noted on the addendum Concept ESCPs in Appendix A, with conceptual locations shown.</p> <p>Actual locations and discharge points for sediment basin spillways will need to be determined on-ground during construction.</p>
11	Whole proposal	<p>Sediment tracking onto public roads is a potential traffic safety hazard due to the winding nature of roads in the area, plus frequent fog and drizzle.</p>	7d	<p>Transport QA G38 specification should be amended to include the following requirements:</p> <ol style="list-style-type: none"> 1. When onsite conditions are damp, construction traffic exiting onto sealed public roads must pass over a rumble grid and have tyres cleaned, either in a drive-through wheel bath or by spraying tyres manually to minimise tracking of wet sediment. 2. The need for street sweeping is to be assessed daily and undertaken as required.
12	Whole proposal	<p>Batters steeper than 3:1 limits the potential for certain revegetation techniques, especially on north- and west-facing batters where evapotranspiration rates are higher.</p>	8b	<p>Landscape design must be considerate of batter gradients and aspect. Recommend the landscape design make reference to the Roads and Maritime (2015) "Guideline for Batter Surface Stabilisation using vegetation".</p>

6 Conclusion and recommendations

Transport for NSW (Transport) propose to upgrade the Great Western Highway between Katoomba and Blackheath. The upgrade comprises two sections:

- Katoomba to Medlow Bath (K2M) between Rowan Lane, Katoomba and Bellevue Crescent, Medlow Bath (about 3.5 kilometres)
- Medlow Bath to Blackheath (M2B) between Station Street, Medlow Bath and Tennyson Road, Blackheath (about 1.8 kilometres).

Transport prepared a review of environmental factors (REF) to assess the potential environmental impacts of the proposal.

Following exhibition of the REF, the proposal design has been refined (referred to as 'the revised proposal area') in response to stakeholder feedback and further design development to either realise social benefits earlier or to allow construction efficiencies.

This addendum ESMR has been prepared to assess the potential soil and surface water-related impacts of the revised proposal area. It considers the areas and works directly associated with the revised proposal area as well as the implications of these works on the original operational road design and associated erosion and sediment control measures for the entire Medlow Bath to Blackheath section.

- Section 3 identifies site conditions and identifies any potential soil and surface water constraints, including constraints to construction-phase erosion and sediment control;
- Section 4 identifies design considerations for erosion and sediment control measures;
- Section 5 assesses the feasibility for constructing typical erosion and sediment control structures to address soil and surface water constraints, with a series of recommendations to manage or mitigate potential impacts.

Section 5 is accompanied by a set of addendum Concept ESCP drawings in Appendix A showing the setup of key erosion and sediment control measures.

In preparing the addendum Concept ESCP in Appendix A, a review was conducted of the site conditions and anticipated construction works to determine how these aspects would impact on effective implementation of erosion and sediment control during construction. In a number of locations specific constraints to the implementation of erosion and sediment controls were identified. Recommendations have been included in Table 5-2 to address these issues.

Providing the recommendations in Section 5 of this report and the addendum Concept ESCP (Appendix A) are considered in the detailed design and planning of the proposal (and into the construction phase) or appropriate alternatives are adopted instead, the risk of soil and surface water impacts can be managed in accordance with recognised best-practice in NSW (Landcom 2004 and DECC, 2008).

It is recommended that Transport specifications be modified where required to ensure that the recommendations in Table 5-2 are incorporated and thus carry through to the detailed design and construction-phase.



A

Appendix A: Addendum
Concept Erosion and
Sediment Control Plans

Appendix A

Addendum Concept Erosion and Sediment Control Plans

See overpage.

TABLE 1 – CATCHMENT AND SEDIMENT BASIN ASSESSMENT

CATCHMENT / BASIN ID	Catchment area total (ha)	Catchment area disturbed (ha)	LS-factor *	Soil loss (t/ha/yr)	Catchment soil loss (t/yr)	Is a basin required? Y/N	Is a sediment basin feasible? (Y/N) Refer to Plan for details	Sediment basin storage (soil) volume (m ³)	Sediment basin settling (water) volume (m ³)	Total sediment basin volume (m ³)	Comments or recommendations
4900E	1.52	0.96	2.81	246	237	Y	Y	30	400	430	Permanent basin/s used as construction sediment basin.
4980E	0.92	0.79	7.32	643	508	Y	Y	65	242	307	Additional construction sediment basin.
5200E	2.42	2	11.60	1019	2037	Y	Y	261	637	898	Permanent basin/s potentially moved and combined with construction sediment basin at CH5240 if feasible.
5240E	1.9	1.64	9.51	835	1370	Y	Y	176	500	676	Additional construction sediment basin.
5620E	1.71	1.51	5.06	445	671	Y	N	N/A	N/A	N/A	Additional enhanced erosion controls to be implemented in conjunction with sediment trap/s for this catchment area.
5700E	4.3	3.76	5.97	524	1971	Y	Y	253	1132	1385	Permanent basin/s used as construction sediment basin.
6100E	4.78	4.14	7.32	643	2662	Y	Y	341	1259	1600	Permanent basin/s used as construction sediment basin.
6660E	2.39	2.13	5.06	445	947	Y	Y	121	629	750	Additional construction sediment basin.
6720E	1.43	1.17	2.81	246	288	Y	Y	37	377	414	Permanent basin/s used as construction sediment basin.
6760E	1.3	1.3	5.06	445	578	Y	N	N/A	N/A	N/A	Additional enhanced erosion controls to be implemented in conjunction with sediment trap/s for this catchment area.
6800E	0.85	0.85	11.60	1019	866	Y	Y	111	224	335	Additional construction sediment basin.
6820E	0.3	0.3	4.32	379	114	N	N/A	N/A	N/A	N/A	Sediment trap/s to be utilised for this catchment area
7020E	0.27	0.27	3.05	268	72	N	N/A	N/A	N/A	N/A	Sediment trap/s to be utilised for this catchment area
7040E	0.22	0.22	1.75	154	34	N	N/A	N/A	N/A	N/A	Sediment trap/s to be utilised for this catchment area
7320E	0.58	0.58	3.05	268	155	N	N/A	N/A	N/A	N/A	Sediment trap/s to be utilised for this catchment area
7320E	0.45	0.45	4.32	379	171.0	N	N/A	N/A	N/A	N/A	Sediment trap/s to be utilised for this catchment area

* This is a composite LS-factor, which has been determined based on variable catchment slope gradients and slope lengths.

R factor is 1930 for all basins

K factor is 0.035 for all catchments

P factor is 1.3 for all basins

C factor is 1.0 for all basins

Cv is 0.58 for all basins

x-day, y-percentile rainfall event is 45.4mm for all basins

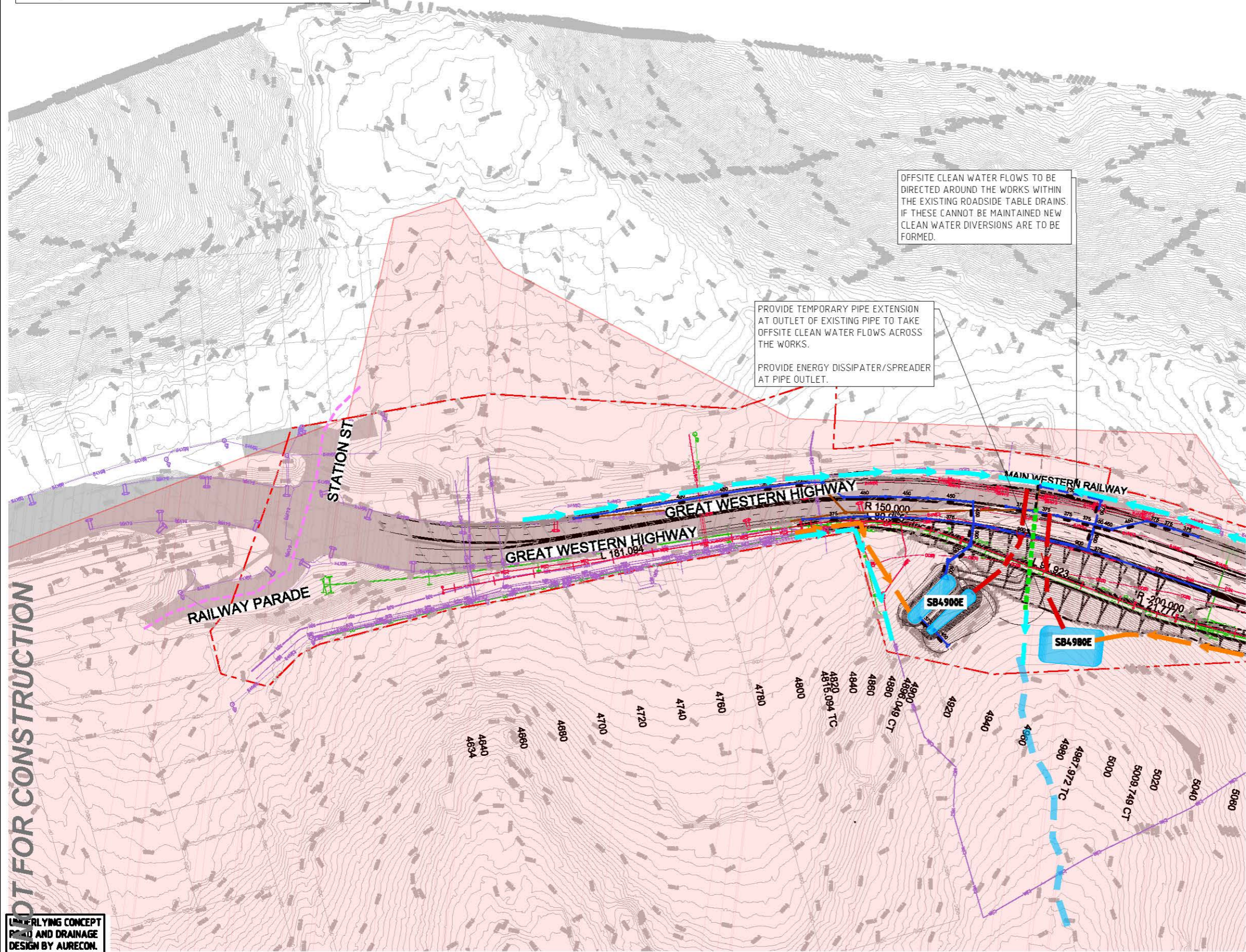
- Outlet structures are to be provided from all sediment basins to spread out flows, encourage dissipation and minimise erosion. Utilise permanent drainage outlets and dissipation devices where applicable by installing these structures early.

- The permanent bioretention and onsite detention basin structures are to be excavated as early works as construction sediment basins. However, the filtration media within the bioretention basin areas is not to be installed until the end of construction, once all surfaces within the relevant catchment area are complete and stabilised/landscaped.

NOT FOR CONSTRUCTION

REV	DATE	DES.	DRN.	APP.	REVISION DETAILS	DRAWING STATUS		North	CLIENT	  <p>Suites 7 & 8, 68-70 Station Street PO Box 1098, Bowral NSW 2576. (t) 02 4862 1633 (f) 02 4862 3088 email: reception@seec.com.au WWW.SEEC.COM.AU</p>	PROJECT TITLE	DRAWING TITLE			
						DESIGN BY	A.T.				GREAT WESTERN HIGHWAY UPGRADE – ADDENDUM FOR REVISED PROPOSAL AREA MEDLOW BATH TO BLACKHEATH	CONCEPT EROSION AND SEDIMENT CONTROL – BASIN SCHEDULE MEDLOW BATH TO BLACKHEATH			
						DRAWN BY	A.T.				PROJECT NO.	SUB-PR NO.	DRAWING NO.	REV	
						FINAL APPROVAL	A.M.				20000424	P03	ESCP100	00	
						SCALE:	N.T.S.								
						(on A1 Original)									
00	05/10/22	A.T.	A.T.	A.M.	FINAL										
A	07/09/22	A.T.	A.T.	A.M.	DRAFT ISSUE – ADDENDUM FOR REVISED PROPOSAL AREA										

REFER TO THE ACCOMPANYING ADDENDUM EROSION AND SEDIMENT MANAGEMENT REPORT BY SEEC FOR BACKGROUND INFORMATION, DESIGN DETAILS, STANDARD REQUIREMENTS AND GENERAL RECOMMENDATIONS.



LEGEND

- - - PROPOSED CONSTRUCTION FOOTPRINT
- - - NATURAL/EXISTING CREST/RIDGELINE
- - - PROPOSED ROAD CREST LOCATION
- - - NATURAL DRAINAGE FLOW LINE
- OFFSITE CLEAN WATER DIVERSION [1] [3]
- ONSITE DIRTY WATER DIVERSION [1] [3]
- DIRTY WATER DIVERSION (TEMPORARY REQUIRED DURING RAINFALL) (SD 5-5) [3]
- WORK AREAS THAT CANNOT DRAIN INTO A SEDIMENT BASIN AS REQUIRED - ADDITIONAL ENHANCED EROSION CONTROLS TO BE IMPLEMENTED [1] [2]
- SEDIMENT BASIN (SB) (SD 6-4) - (INDICATIVE FOOTPRINT ONLY) - (SEE TABLE 1 FOR SEDIMENT BASIN VOLUMES) [1] [3]
- SEDIMENT TRAP (E.G. SUMP, LARGE MULCH FILTER BUND, ROCK FILTER DAM, U-TRAP OR SIMILAR) - (INDICATIVE FOOTPRINT ONLY) [1] [3]
- PROPOSED STORMWATER DRAINAGE (REFER TO AURECON DRAINAGE PLAN FOR DETAILS)
- STORMWATER DRAINAGE INSTALLED EARLY [3]
- - - TEMPORARY PIPE [1] [3]
- WATER NSW ENVIRONMENTALLY SPECIAL AREA

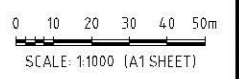
- [1] DETAILS TO FUTURE DESIGN
- [2] ADDITIONAL ENHANCED EROSION CONTROLS (FOR AREAS THAT CANNOT DRAIN TO A SEDIMENT BASIN AS REQUIRED) INCLUDE TIMING OF WORKS TO LOW RAINFALL PERIODS AND TEMPORARY STABILISATION OF ALL EXPOSED SURFACES PRIOR TO RAINFALL (>50% CHANCE OF RAINFALL >5mm) AND SITE SHUTDOWN. THESE ARE IN ADDITION TO THE STANDARD SUITE OF ENHANCED EROSION CONTROLS THAT ARE TO BE IMPLEMENTED FOR ALL WORK AREAS (AS NOTED BELOW).
- [3] OUTLETS STRUCTURES ARE TO BE PROVIDED FROM ALL SEDIMENT BASINS, SEDIMENT TRAPS AND OUTLETS OF DRAINAGE DEVICES TO SPREAD OUT FLOWS, ENCOURAGE DISSIPATION AND MINIMISE EROSION. UTILISE PERMANENT DRAINAGE OUTLETS AND DISSIPATION DEVICES WHERE APPLICABLE BY INSTALLING THESE STRUCTURES EARLY.

ENHANCED EROSION CONTROLS
 ENHANCED EROSION CONTROL MEASURES ARE TO BE APPLIED ACROSS ALL WORK AREAS DUE TO THE SENSITIVITY OF THE SURROUNDING ENVIRONMENT THROUGHOUT THE WATER NSW ENVIRONMENTALLY SPECIAL AREA. THESE INCLUDE:

- TEMPORARY STABILISATION OF EXPOSED BATTERS AND STEEP SLOPES PRIOR TO RAINFALL (>70% CHANCE OF RAINFALL >10mm) AND SITE SHUTDOWN >2DAYS WITH A SOIL POLYMER, GEOFABRIC, MULCH, MATTING OR SIMILAR;
- INSTALLATION OF SLOPE BREAKS (CONTOUR BERMS) AT MAXIMUM 40m INTERVALS ACROSS ALL EXPOSED SURFACES;
- STABILISATION OF ALL CONCENTRATED FLOW AREAS;
- DISSIPATION OF ALL CONCENTRATED FLOWS INCLUDING DIVERSION DRAINS AND OUTLET STRUCTURES TO ACHIEVE SHEET FLOW;
- INSTALLATION OF CHECK DAMS WITHIN CONCENTRATED FLOW AREAS;
- PROGRESSIVE STABILISATION OF BATTERS AS SOON AS WORKS ARE COMPLETE IN EACH SECTION/LIFT; AND
- SUPPLEMENTARY ONLINE HOLDING DEVICES (E.G. TEMPORARY ONLINE SEDIMENT TRAPS/SUMPS INSTALLED PRIOR TO RAINFALL) TO BREAK UP CATCHMENTS, SLOW FLOWS, AND MINIMISE SEDIMENT BASIN FOOTPRINTS. THIS WILL ESSENTIALLY MINIMISE EROSION AND THE TOTAL DISTURBANCE.

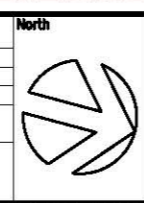
NOT FOR CONSTRUCTION

UNDERLYING CONCEPT ROAD AND DRAINAGE DESIGN BY AURECON.



REV	DATE	DES.	DRN.	APP.	REVISION DETAILS
00	05/10/22	A.T.	A.T.	A.M.	FINAL
A	07/09/22	A.T.	A.T.	A.M.	DRAFT ISSUE - ADDENDUM FOR REVISED PROPOSAL AREA

DRAWING STATUS	
DESIGN BY	A.T.
DRAWN BY	A.T.
FINAL APPROVAL	A.M.
SCALE:	1:1000
(on A1 Original)	
FINAL	



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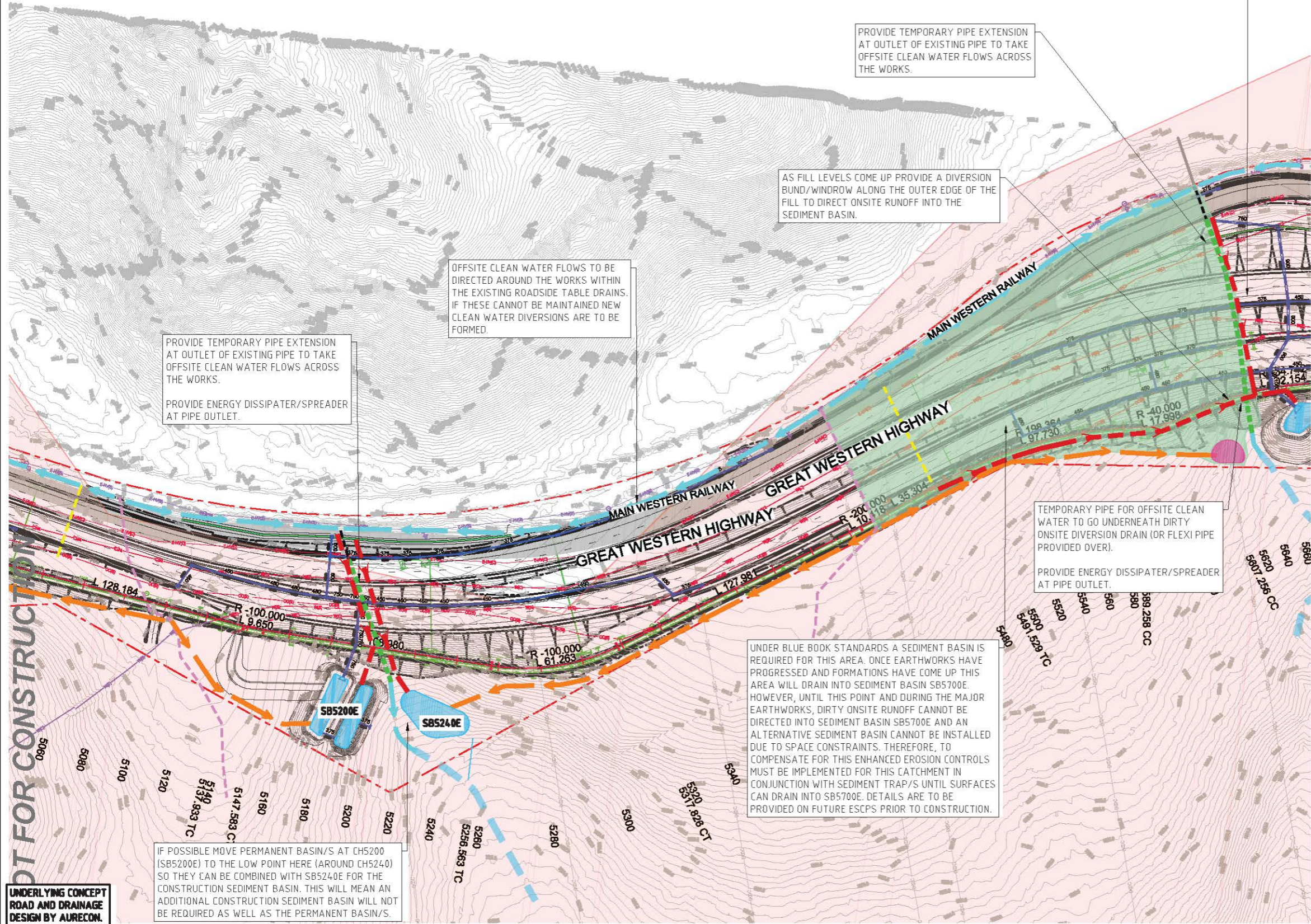
Suites 7 & 8, 68-70 Station Street
 PO Box 1098, Bowral NSW 2576.
 (t) 02 4862 1633
 (f) 02 4862 9088
 email: reception@seec.com.au
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PROJECT TITLE
**GREAT WESTERN HIGHWAY
 UPGRADE - ADDENDUM FOR
 REVISED PROPOSAL AREA
 MEDLOW BATH TO BLACKHEATH**

DRAWING TITLE			
CONCEPT EROSION AND SEDIMENT CONTROL PLAN - MEDLOW BATH TO BLACKHEATH - PLAN 1 OF 5			
PROJECT NO.	SUB-PR NO.	DRAWING NO.	REV
20000424	P03	ESCP101	00

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REFER TO THE ACCOMPANYING ADDENDUM EROSION AND SEDIMENT MANAGEMENT REPORT BY SEEC FOR BACKGROUND INFORMATION, DESIGN DETAILS, STANDARD REQUIREMENTS AND GENERAL RECOMMENDATIONS.



DURING THE INITIAL WORKS PROVIDE A DIVERSION BUND/DRAIN ACROSS THE WORKS (UPSLOPE OF EXISTING DRAINAGE LINE) TO DIRECT ONSITE CLEAN RUNOFF INTO THE SEDIMENT BASIN SB5700E.

PROVIDE TEMPORARY PIPE EXTENSION AT OUTLET OF EXISTING PIPE TO TAKE OFFSITE CLEAN WATER FLOWS ACROSS THE WORKS.

AS FILL LEVELS COME UP PROVIDE A DIVERSION BUND/WINDROW ALONG THE OUTER EDGE OF THE FILL TO DIRECT ONSITE RUNOFF INTO THE SEDIMENT BASIN.

OFFSITE CLEAN WATER FLOWS TO BE DIRECTED AROUND THE WORKS WITHIN THE EXISTING ROADSIDE TABLE DRAINS. IF THESE CANNOT BE MAINTAINED NEW CLEAN WATER DIVERSIONS ARE TO BE FORMED.

PROVIDE TEMPORARY PIPE EXTENSION AT OUTLET OF EXISTING PIPE TO TAKE OFFSITE CLEAN WATER FLOWS ACROSS THE WORKS.

PROVIDE ENERGY DISSIPATER/SPREADER AT PIPE OUTLET.

TEMPORARY PIPE FOR OFFSITE CLEAN WATER TO GO UNDERNEATH DIRTY ONSITE DIVERSION DRAIN (OR FLEXI PIPE PROVIDED OVER).

PROVIDE ENERGY DISSIPATER/SPREADER AT PIPE OUTLET.

UNDER BLUE BOOK STANDARDS A SEDIMENT BASIN IS REQUIRED FOR THIS AREA. ONCE EARTHWORKS HAVE PROGRESSED AND FORMATIONS HAVE COME UP THIS AREA WILL DRAIN INTO SEDIMENT BASIN SB5700E. HOWEVER, UNTIL THIS POINT AND DURING THE MAJOR EARTHWORKS, DIRTY ONSITE RUNOFF CANNOT BE DIRECTED INTO SEDIMENT BASIN SB5700E AND AN ALTERNATIVE SEDIMENT BASIN CANNOT BE INSTALLED DUE TO SPACE CONSTRAINTS. THEREFORE, TO COMPENSATE FOR THIS ENHANCED EROSION CONTROLS MUST BE IMPLEMENTED FOR THIS CATCHMENT IN CONJUNCTION WITH SEDIMENT TRAP/S UNTIL SURFACES CAN DRAIN INTO SB5700E. DETAILS ARE TO BE PROVIDED ON FUTURE ESCPS PRIOR TO CONSTRUCTION.

IF POSSIBLE MOVE PERMANENT BASIN/S AT CH5200 (SB5200E) TO THE LOW POINT HERE (AROUND CH5240) SO THEY CAN BE COMBINED WITH SB5240E FOR THE CONSTRUCTION SEDIMENT BASIN. THIS WILL MEAN AN ADDITIONAL CONSTRUCTION SEDIMENT BASIN WILL NOT BE REQUIRED AS WELL AS THE PERMANENT BASIN/S.

UNDERLYING CONCEPT ROAD AND DRAINAGE DESIGN BY AURECON.

LEGEND

- PROPOSED CONSTRUCTION FOOTPRINT
- NATURAL/EXISTING CREST/RIDGELINE
- PROPOSED ROAD CREST LOCATION
- NATURAL DRAINAGE FLOW LINE
- OFFSITE CLEAN WATER DIVERSION [1] [3]
- ONSITE DIRTY WATER DIVERSION [1] [3]
- DIRTY WATER DIVERSION (TEMPORARY REQUIRED DURING RAINFALL) (SD 5-5) [3]
- WORK AREAS THAT CANNOT DRAIN INTO A SEDIMENT BASIN AS REQUIRED - ADDITIONAL ENHANCED EROSION CONTROLS TO BE IMPLEMENTED [1] [2]
- SEDIMENT BASIN (SB) (SD 6-4) - (INDICATIVE FOOTPRINT ONLY) - (SEE TABLE 1 FOR SEDIMENT BASIN VOLUMES) [1] [3]
- SEDIMENT TRAP (E.G. SUMP, LARGE MULCH FILTER BUND, ROCK FILTER DAM, U-TRAP OR SIMILAR) - (INDICATIVE FOOTPRINT ONLY) [1] [3]
- PROPOSED STORMWATER DRAINAGE (REFER TO AURECON DRAINAGE PLAN FOR DETAILS)
- STORMWATER DRAINAGE INSTALLED EARLY [3]
- TEMPORARY PIPE [1] [3]
- WATER NSW ENVIRONMENTALLY SPECIAL AREA

- [1] DETAILS TO FUTURE DESIGN
- [2] ADDITIONAL ENHANCED EROSION CONTROLS (FOR AREAS THAT CANNOT DRAIN TO A SEDIMENT BASIN AS REQUIRED) INCLUDE TIMING OF WORKS TO LOW RAINFALL PERIODS AND TEMPORARY STABILISATION OF ALL EXPOSED SURFACES PRIOR TO RAINFALL (>50% CHANCE OF RAINFALL >5mm) AND SITE SHUTDOWN. THESE ARE IN ADDITION TO THE STANDARD SUITE OF ENHANCED EROSION CONTROLS THAT ARE TO BE IMPLEMENTED FOR ALL WORK AREAS (AS NOTED BELOW).
- [3] OUTLETS STRUCTURES ARE TO BE PROVIDED FROM ALL SEDIMENT BASINS, SEDIMENT TRAPS AND OUTLETS OF DRAINAGE DEVICES TO SPREAD OUT FLOWS, ENCOURAGE DISSIPATION AND MINIMISE EROSION. UTILISE PERMANENT DRAINAGE OUTLETS AND DISSIPATION DEVICES WHERE APPLICABLE BY INSTALLING THESE STRUCTURES EARLY.

ENHANCED EROSION CONTROLS
ENHANCED EROSION CONTROL MEASURES ARE TO BE APPLIED ACROSS ALL WORK AREAS DUE TO THE SENSITIVITY OF THE SURROUNDING ENVIRONMENT THROUGHOUT THE WATER NSW ENVIRONMENTALLY SPECIAL AREA. THESE INCLUDE:

- TEMPORARY STABILISATION OF EXPOSED BATTERS AND STEEP SLOPES PRIOR TO RAINFALL (>70% CHANCE OF RAINFALL >10mm) AND SITE SHUTDOWN >2DAYS WITH A SOIL POLYMER, GEOFABRIC, MULCH, MATTING OR SIMILAR;
- INSTALLATION OF SLOPE BREAKS (CONTOUR BERMS) AT MAXIMUM 40m INTERVALS ACROSS ALL EXPOSED SURFACES;
- STABILISATION OF ALL CONCENTRATED FLOW AREAS;
- DISSIPATION OF ALL CONCENTRATED FLOWS INCLUDING DIVERSION DRAINS AND OUTLET STRUCTURES TO ACHIEVE SHEET FLOW;
- INSTALLATION OF CHECK DAMS WITHIN CONCENTRATED FLOW AREAS;
- PROGRESSIVE STABILISATION OF BATTERS AS SOON AS WORKS ARE COMPLETE IN EACH SECTION/LIFT; AND
- SUPPLEMENTARY ONLINE HOLDING DEVICES (E.G. TEMPORARY ONLINE SEDIMENT TRAPS/SUMPS INSTALLED PRIOR TO RAINFALL) TO BREAK UP CATCHMENTS, SLOW FLOWS, AND MINIMISE SEDIMENT BASIN FOOTPRINTS. THIS WILL ESSENTIALLY MINIMISE EROSION AND THE TOTAL DISTURBANCE.

0 10 20 30 40 50m
SCALE: 1:1000 (A1 SHEET)

REV	DATE	DES.	DRN.	APP.	REVISION DETAILS
00	05/10/22	A.T.	A.T.	A.M.	FINAL
A	07/09/22	A.T.	A.T.	A.M.	DRAFT ISSUE - ADDENDUM FOR REVISED PROPOSAL AREA

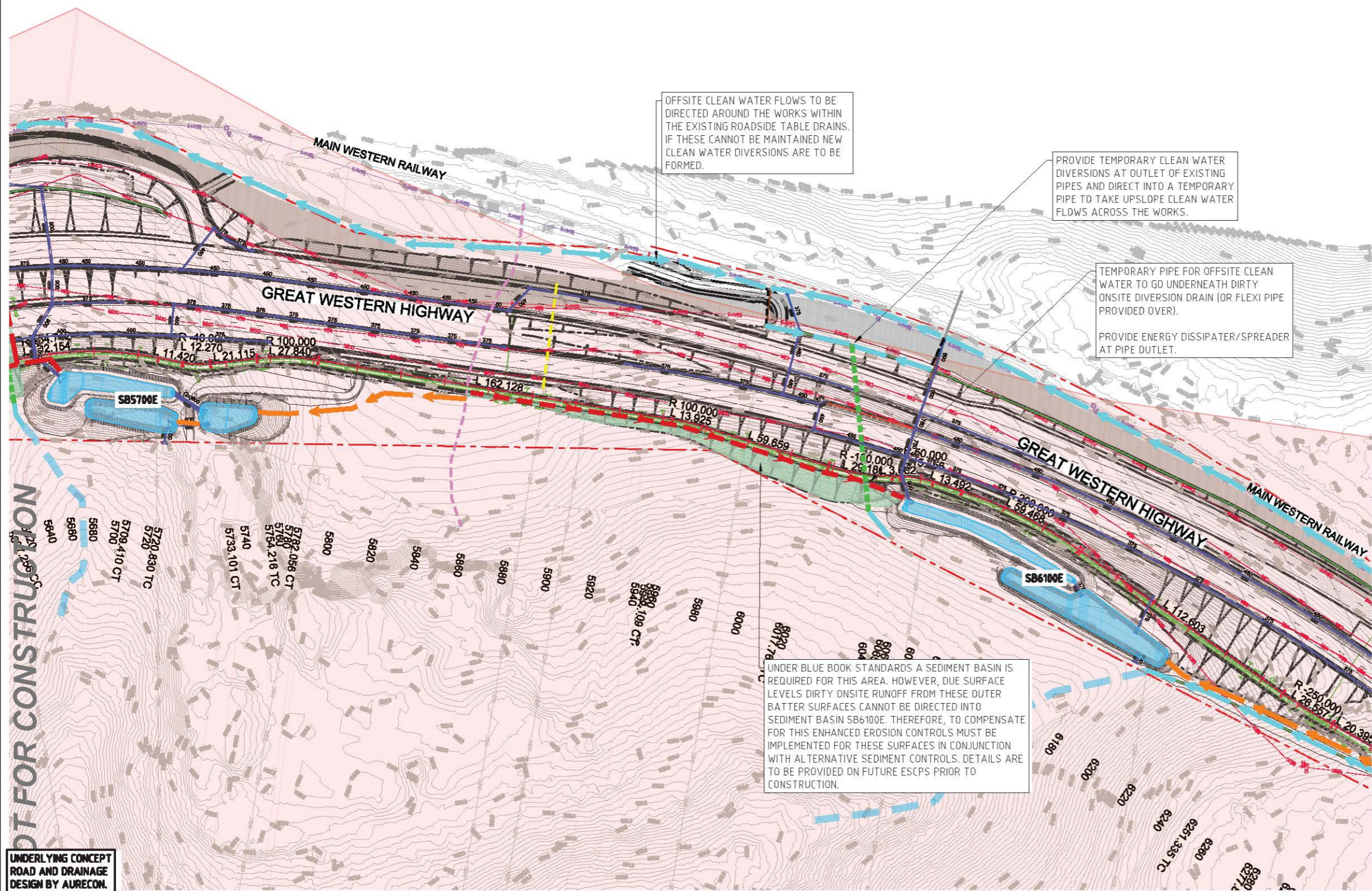
DRAWING STATUS	
DESIGN BY	A.T.
DRAWN BY	A.T.
FINAL APPROVAL	A.M.
SCALE:	1:1000
(on A1 Original)	
FINAL	



PROJECT TITLE
GREAT WESTERN HIGHWAY
UPGRADE - ADDENDUM FOR
REVISED PROPOSAL AREA
MEDLOW BATH TO BLACKHEATH

DRAWING TITLE			
CONCEPT EROSION AND SEDIMENT CONTROL PLAN - MEDLOW BATH TO BLACKHEATH - PLAN 2 OF 5			
PROJECT NO.	SUB-PR NO.	DRAWING NO.	REV
20000424	P03	ESCP102	00

REFER TO THE ACCOMPANYING ADDENDUM EROSION AND SEDIMENT MANAGEMENT REPORT BY SEEC FOR BACKGROUND INFORMATION, DESIGN DETAILS, STANDARD REQUIREMENTS AND GENERAL RECOMMENDATIONS.



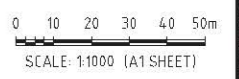
LEGEND

- PROPOSED CONSTRUCTION FOOTPRINT
- NATURAL/EXISTING CREST/RIDGELINE
- PROPOSED ROAD CREST LOCATION
- NATURAL DRAINAGE FLOW LINE
- OFFSITE CLEAN WATER DIVERSION [1] [3]
- ONSITE DIRTY WATER DIVERSION [1] [3]
- DIRTY WATER DIVERSION (TEMPORARY REQUIRED DURING RAINFALL) (SD 5-5) [3]
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- STORMWATER DRAINAGE INSTALLED EARLY [3]
- TEMPORARY PIPE [1] [3]
- WATER NSW ENVIRONMENTALLY SPECIAL AREA

- [1] DETAILS TO FUTURE DESIGN
- [2] ADDITIONAL ENHANCED EROSION CONTROLS (FOR AREAS THAT CANNOT DRAIN TO A SEDIMENT BASIN AS REQUIRED) INCLUDE TIMING OF WORKS TO LOW RAINFALL PERIODS AND TEMPORARY STABILISATION OF ALL EXPOSED SURFACES PRIOR TO RAINFALL (>50% CHANCE OF RAINFALL >5mm) AND SITE SHUTDOWN. THESE ARE IN ADDITION TO THE STANDARD SUITE OF ENHANCED EROSION CONTROLS THAT ARE TO BE IMPLEMENTED FOR ALL WORK AREAS (AS NOTED BELOW).
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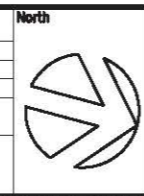
- ENHANCED EROSION CONTROLS**
- ENHANCED EROSION CONTROL MEASURES ARE TO BE APPLIED ACROSS ALL WORK AREAS DUE TO THE SENSITIVITY OF THE SURROUNDING ENVIRONMENT THROUGHOUT THE WATER NSW ENVIRONMENTALLY SPECIAL AREA. THESE INCLUDE:
- TEMPORARY STABILISATION OF EXPOSED BATTERS AND STEEP SLOPES PRIOR TO RAINFALL (>70% CHANCE OF RAINFALL >10mm) AND SITE SHUTDOWN >2DAYS WITH A SOIL POLYMER, GEOFABRIC, MULCH, MATTING OR SIMILAR;
 - INSTALLATION OF SLOPE BREAKS (CONTOUR BERMS) AT MAXIMUM 4.0m INTERVALS ACROSS ALL EXPOSED SURFACES;
 - STABILISATION OF ALL CONCENTRATED FLOW AREAS;
 - DISSIPATION OF ALL CONCENTRATED FLOWS INCLUDING DIVERSION DRAINS AND OUTLET STRUCTURES TO ACHIEVE SHEET FLOW;
 - INSTALLATION OF CHECK DAMS WITHIN CONCENTRATED FLOW AREAS;
 - PROGRESSIVE STABILISATION OF BATTERS AS SOON AS WORKS ARE COMPLETE IN EACH SECTION/LIFT; AND
 - SUPPLEMENTARY ONLINE HOLDING DEVICES (E.G. TEMPORARY ONLINE SEDIMENT TRAPS/SUMPS INSTALLED PRIOR TO RAINFALL) TO BREAK UP CATCHMENTS, SLOW FLOWS, AND MINIMISE SEDIMENT BASIN FOOTPRINTS. THIS WILL ESSENTIALLY MINIMISE EROSION AND THE TOTAL DISTURBANCE.

UNDERLYING CONCEPT ROAD AND DRAINAGE DESIGN BY AURECON.



REV	DATE	DES.	DRN.	APP.	REVISION DETAILS
00	05/10/22	A.T.	A.T.	A.M.	FINAL
A	07/09/22	A.T.	A.T.	A.M.	DRAFT ISSUE - ADDENDUM FOR REVISED PROPOSAL AREA

DRAWING STATUS	
DESIGN BY	A.T.
DRAWN BY	A.T.
FINAL APPROVAL	A.M.
SCALE:	1:1000
(on A1 Original)	
FINAL	



PROJECT TITLE
GREAT WESTERN HIGHWAY
UPGRADE - ADDENDUM FOR
REVISED PROPOSAL AREA
MEDLOW BATH TO BLACKHEATH

DRAWING TITLE			
CONCEPT EROSION AND SEDIMENT CONTROL PLAN - MEDLOW BATH TO BLACKHEATH - PLAN 3 OF 5			
PROJECT NO.	SUB-PR NO.	DRAWING NO.	REV
20000424	P03	ESCP103	00

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REFER TO THE ACCOMPANYING ADDENDUM EROSION AND SEDIMENT MANAGEMENT REPORT BY SEEC FOR BACKGROUND INFORMATION, DESIGN DETAILS, STANDARD REQUIREMENTS AND GENERAL RECOMMENDATIONS.

OFFSITE CLEAN WATER FLOWS TO BE DIRECTED AROUND THE WORKS WITHIN THE EXISTING ROADSIDE TABLE DRAINS. IF THESE CANNOT BE MAINTAINED NEW CLEAN WATER DIVERSIONS ARE TO BE FORMED.

PROVIDE TEMPORARY PIPE EXTENSION AT OUTLET OF EXISTING PIPE (UNDER EXISTING HIGHWAY) TO TAKE OFFSITE CLEAN WATER FLOWS ACROSS THE OPERATIONAL ROAD NORTHBOUND WORKS. OUTLET THESE FLOWS INTO A TEMPORARY CLEAN WATER DIVERSION AND THEN INTO ANOTHER TEMPORARY PIPE PROVIDED UNDER THE OPERATIONAL ROAD SOUTHBOUND WORKS. OUTLET THESE FLOWS INTO THE CULVERT/DIVERSION PROVIDED ACROSS THE ACTIVE TRANSPORT TRAIL WORKS.

OFFSITE CLEAN WATER FLOWS TO BE DIRECTED AROUND THE ACTIVE TRANSPORT TRAIL WORKS VIA CLEAN WATER DIVERSION/S.

UNDER BLUE BOOK STANDARDS A SEDIMENT BASIN IS REQUIRED FOR THIS AREA. HOWEVER, DIRTY ONSITE RUNOFF FROM THE SOUTHBOUND OPERATIONAL ROAD WORKS AND ALL OF THE ACTIVE TRANSPORT TRAIL WORKS FROM CH6420 TO CH6780 CANNOT BE DIRECTED INTO A SEDIMENT BASIN DUE TO SPACE CONSTRAINTS. THEREFORE, TO COMPENSATE FOR THIS ENHANCED EROSION CONTROLS MUST BE IMPLEMENTED FOR ALL EXPOSED SURFACES HERE IN CONJUNCTION WITH ALTERNATIVE SEDIMENT CONTROLS. DETAILS ARE TO BE PROVIDED ON FUTURE ESCPS PRIOR TO CONSTRUCTION.

INSTALL THE PERMANENT DRAINAGE CULVERT EARLY OR PROVIDE TEMPORARY DIVERSION (PIPE OR LINED DRAIN) TO TAKE OFFSITE CLEAN WATER FLOWS

INSTALL THE PERMANENT DRAINAGE CULVERT EARLY OR PROVIDE TEMPORARY DIVERSION (PIPE OR LINED DRAIN) TO TAKE OFFSITE CLEAN WATER FLOWS

LEGEND

- PROPOSED CONSTRUCTION FOOTPRINT
- NATURAL/EXISTING CREST/RIDGELINE
- PROPOSED ROAD CREST LOCATION
- NATURAL DRAINAGE FLOW LINE
- OFFSITE CLEAN WATER DIVERSION [1] [3]
- ONSITE DIRTY WATER DIVERSION [1] [3]
- DIRTY WATER DIVERSION (TEMPORARY REQUIRED DURING RAINFALL) (SD 5-5) [3]
- WORK AREAS THAT CANNOT DRAIN INTO A SEDIMENT BASIN AS REQUIRED - ADDITIONAL ENHANCED EROSION CONTROLS TO BE IMPLEMENTED [1] [2]
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- PROPOSED STORMWATER DRAINAGE (REFER TO AURECON DRAINAGE PLAN FOR DETAILS)
- STORMWATER DRAINAGE INSTALLED EARLY [3]
- TEMPORARY PIPE [1] [3]
- WATER NSW ENVIRONMENTALLY SPECIAL AREA

- [1] DETAILS TO FUTURE DESIGN
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ENHANCED EROSION CONTROLS

ENHANCED EROSION CONTROL MEASURES ARE TO BE APPLIED ACROSS ALL WORK AREAS DUE TO THE SENSITIVITY OF THE SURROUNDING ENVIRONMENT THROUGHOUT THE WATER NSW ENVIRONMENTALLY SPECIAL AREA. THESE INCLUDE:

- TEMPORARY STABILISATION OF EXPOSED BATTERS AND STEEP SLOPES PRIOR TO RAINFALL (>70% CHANCE OF RAINFALL >10mm) AND SITE SHUTDOWN >2DAYS WITH A SOIL POLYMER, GEOFABRIC, MULCH, MATTING OR SIMILAR;
- INSTALLATION OF SLOPE BREAKS (CONTOUR BERMS) AT MAXIMUM 40m INTERVALS ACROSS ALL EXPOSED SURFACES;
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- DISSIPATION OF ALL CONCENTRATED FLOWS INCLUDING DIVERSION DRAINS AND OUTLET STRUCTURES TO ACHIEVE SHEET FLOW;
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- SUPPLEMENTARY ONLINE HOLDING DEVICES (E.G. TEMPORARY ONLINE SEDIMENT TRAPS/SUMPS INSTALLED PRIOR TO RAINFALL) TO BREAK UP CATCHMENTS, SLOW FLOWS, AND MINIMISE SEDIMENT BASIN FOOTPRINTS. THIS WILL ESSENTIALLY MINIMISE EROSION AND THE TOTAL DISTURBANCE.

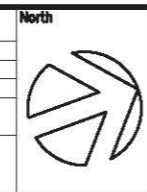
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SCALE: 1:1000 (A1 SHEET)

DRAFT FOR CONSTRUCTION

UNDERLYING CONCEPT ROAD AND DRAINAGE DESIGN BY AURECON.

REV	DATE	DES.	DRN.	APP.	REVISION DETAILS
00	05/10/22	A.T.	A.T.	A.M.	FINAL
A	07/09/22	A.T.	A.T.	A.M.	DRAFT ISSUE - ADDENDUM FOR REVISED PROPOSAL AREA

DRAWING STATUS	
DESIGN BY	A.T.
DRAWN BY	A.T.
FINAL APPROVAL	A.M.
SCALE:	1:1000
(on A1 Original)	
FINAL	



CLIENT



aurecon



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PROJECT TITLE

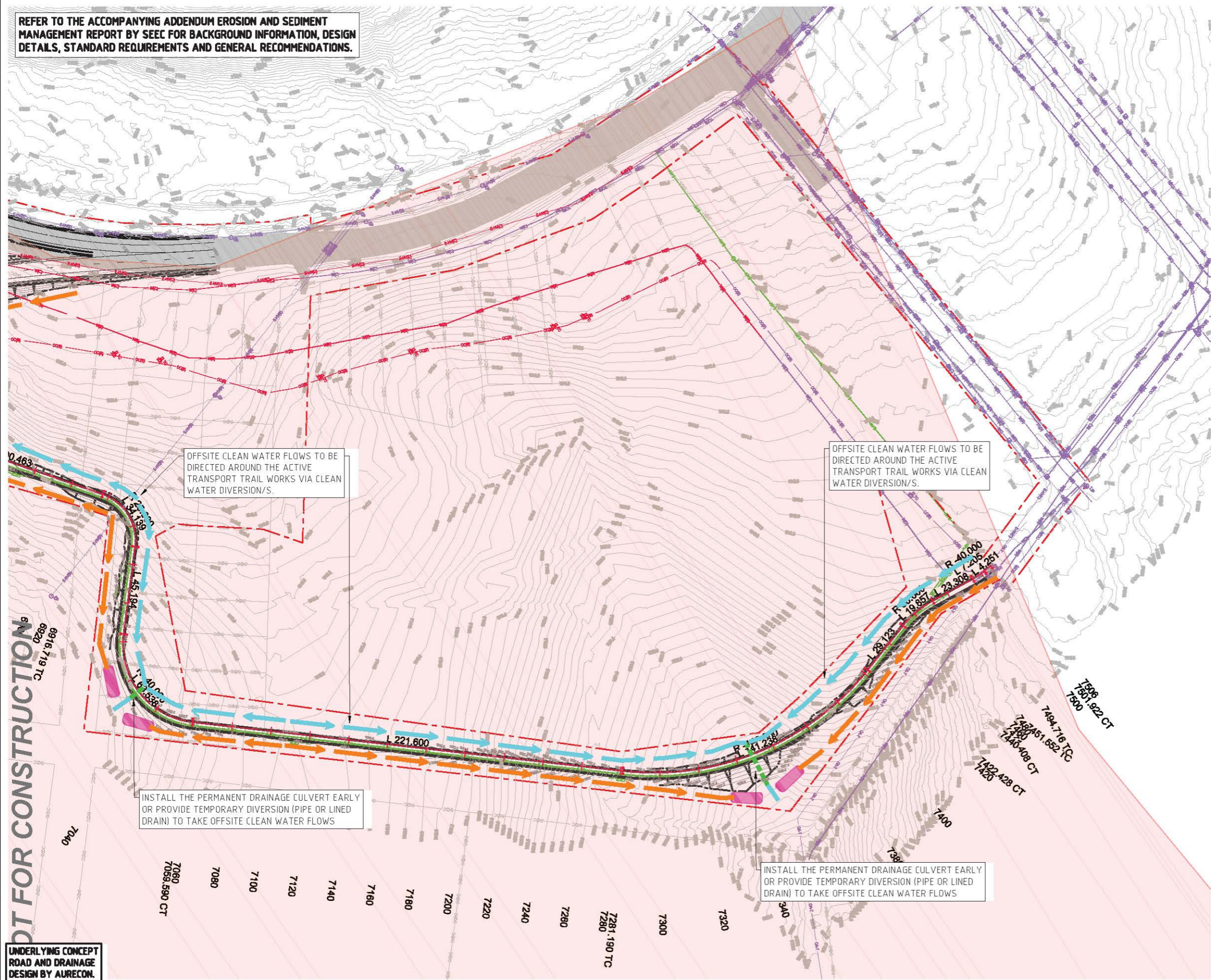
**GREAT WESTERN HIGHWAY
UPGRADE - ADDENDUM FOR
REVISED PROPOSAL AREA
MEDLOW BATH TO BLACKHEATH**

DRAWING TITLE

**CONCEPT EROSION AND SEDIMENT
CONTROL PLAN - MEDLOW BATH TO
BLACKHEATH - PLAN 4 OF 5**

PROJECT NO.	SUB-PR NO.	DRAWING NO.	REV
20000424	P03	ESCP104	00

REFER TO THE ACCOMPANYING ADDENDUM EROSION AND SEDIMENT MANAGEMENT REPORT BY SEEC FOR BACKGROUND INFORMATION, DESIGN DETAILS, STANDARD REQUIREMENTS AND GENERAL RECOMMENDATIONS.



OFFSITE CLEAN WATER FLOWS TO BE DIRECTED AROUND THE ACTIVE TRANSPORT TRAIL WORKS VIA CLEAN WATER DIVERSION/S.

OFFSITE CLEAN WATER FLOWS TO BE DIRECTED AROUND THE ACTIVE TRANSPORT TRAIL WORKS VIA CLEAN WATER DIVERSION/S.

INSTALL THE PERMANENT DRAINAGE CULVERT EARLY OR PROVIDE TEMPORARY DIVERSION (PIPE OR LINED DRAIN) TO TAKE OFFSITE CLEAN WATER FLOWS

INSTALL THE PERMANENT DRAINAGE CULVERT EARLY OR PROVIDE TEMPORARY DIVERSION (PIPE OR LINED DRAIN) TO TAKE OFFSITE CLEAN WATER FLOWS

LEGEND

- PROPOSED CONSTRUCTION FOOTPRINT
- NATURAL/EXISTING CREST/RIDGELINE
- PROPOSED ROAD CREST LOCATION
- NATURAL DRAINAGE FLOW LINE
- OFFSITE CLEAN WATER DIVERSION [1] [3]
- ONSITE DIRTY WATER DIVERSION [1] [3]
- DIRTY WATER DIVERSION (TEMPORARY REQUIRED DURING RAINFALL) (SD 5-5) [3]
- WORK AREAS THAT CANNOT DRAIN INTO A SEDIMENT BASIN AS REQUIRED - ADDITIONAL ENHANCED EROSION CONTROLS TO BE IMPLEMENTED [1] [2]
- SEDIMENT BASIN (SB) (SD 6-4) - (INDICATIVE FOOTPRINT ONLY) - (SEE TABLE 1 FOR SEDIMENT BASIN VOLUMES) [1] [3]
- SEDIMENT TRAP (E.G. SUMP, LARGE MULCH FILTER BUND, ROCK FILTER DAM, U-TRAP OR SIMILAR) - (INDICATIVE FOOTPRINT ONLY) [1] [3]
- PROPOSED STORMWATER DRAINAGE (REFER TO AURECON DRAINAGE PLAN FOR DETAILS)
- STORMWATER DRAINAGE INSTALLED EARLY [3]
- TEMPORARY PIPE [1] [3]
- WATER NSW ENVIRONMENTALLY SPECIAL AREA

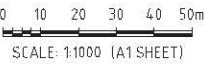
- [1] DETAILS TO FUTURE DESIGN
- [2] ADDITIONAL ENHANCED EROSION CONTROLS (FOR AREAS THAT CANNOT DRAIN TO A SEDIMENT BASIN AS REQUIRED) INCLUDE TIMING OF WORKS TO LOW RAINFALL PERIODS AND TEMPORARY STABILISATION OF ALL EXPOSED SURFACES PRIOR TO RAINFALL (>50% CHANCE OF RAINFALL >5mm) AND SITE SHUTDOWN. THESE ARE IN ADDITION TO THE STANDARD SUITE OF ENHANCED EROSION CONTROLS THAT ARE TO BE IMPLEMENTED FOR ALL WORK AREAS (AS NOTED BELOW).
- [3] OUTLETS STRUCTURES ARE TO BE PROVIDED FROM ALL SEDIMENT BASINS, SEDIMENT TRAPS AND OUTLETS OF DRAINAGE DEVICES TO SPREAD OUT FLOWS, ENCOURAGE DISSIPATION AND MINIMISE EROSION. UTILISE PERMANENT DRAINAGE OUTLETS AND DISSIPATION DEVICES WHERE APPLICABLE BY INSTALLING THESE STRUCTURES EARLY.

ENHANCED EROSION CONTROLS
 ENHANCED EROSION CONTROL MEASURES ARE TO BE APPLIED ACROSS ALL WORK AREAS DUE TO THE SENSITIVITY OF THE SURROUNDING ENVIRONMENT THROUGHOUT THE WATER NSW ENVIRONMENTALLY SPECIAL AREA. THESE INCLUDE:

- TEMPORARY STABILISATION OF EXPOSED BATTERS AND STEEP SLOPES PRIOR TO RAINFALL (>70% CHANCE OF RAINFALL >10mm) AND SITE SHUTDOWN >2DAYS WITH A SOIL POLYMER, GEOFABRIC, MULCH, MATTING OR SIMILAR;
- INSTALLATION OF SLOPE BREAKS (CONTOUR BERMS) AT MAXIMUM 40m INTERVALS ACROSS ALL EXPOSED SURFACES;
- STABILISATION OF ALL CONCENTRATED FLOW AREAS;
- DISSIPATION OF ALL CONCENTRATED FLOWS INCLUDING DIVERSION DRAINS AND OUTLET STRUCTURES TO ACHIEVE SHEET FLOW;
- INSTALLATION OF CHECK DAMS WITHIN CONCENTRATED FLOW AREAS;
- PROGRESSIVE STABILISATION OF BATTERS AS SOON AS WORKS ARE COMPLETE IN EACH SECTION/LIFT; AND
- SUPPLEMENTARY ONLINE HOLDING DEVICES (E.G. TEMPORARY ONLINE SEDIMENT TRAPS/SUMPS INSTALLED PRIOR TO RAINFALL) TO BREAK UP CATCHMENTS, SLOW FLOWS, AND MINIMISE SEDIMENT BASIN FOOTPRINTS. THIS WILL ESSENTIALLY MINIMISE EROSION AND THE TOTAL DISTURBANCE.

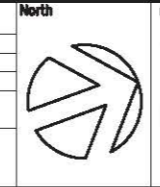
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UNDERLYING CONCEPT ROAD AND DRAINAGE DESIGN BY AURECON.



REV	DATE	DES.	DRN.	APP.	REVISION DETAILS
00	05/10/22	A.T.	A.T.	A.M.	FINAL
A	07/09/22	A.T.	A.T.	A.M.	DRAFT ISSUE - ADDENDUM FOR REVISED PROPOSAL AREA

DRAWING STATUS	
DESIGN BY	A.T.
DRAWN BY	A.T.
FINAL APPROVAL	A.M.
SCALE:	1:1000
(on A1 Original)	
FINAL	



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PROJECT TITLE
**GREAT WESTERN HIGHWAY
 UPGRADE - ADDENDUM FOR
 REVISED PROPOSAL AREA
 MEDLOW BATH TO BLACKHEATH**

DRAWING TITLE			
CONCEPT EROSION AND SEDIMENT CONTROL PLAN - MEDLOW BATH TO BLACKHEATH - PLAN 5 OF 5			
PROJECT NO.	SUB-PR NO.	DRAWING NO.	REV
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