



**BULK EARTHWORKS REPORT  
CSR EASTERN LANDS, ERSKINE PARK**

**June 2006**

Report No. W03033.12-01

Prepared for CSR Limited



**BROWN CONSULTING**

Engineers & Managers

PEOPLE & PROJECTS

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June 2006

**DOCUMENT CONTROL**

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A	Jan 06	Client Review	WA	RP	
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**PROJECT APPLICATION FOR  
BULK EARTHWORKS  
CSR EASTERN LANDS, ERSKINE PARK  
FOR CSR LIMITED**

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# **PROJECT APPLICATION FOR BULK EARTHWORKS**

## **CSR EASTERN LANDS, ERSKINE PARK**

### **1 INTRODUCTION**

Brown Consulting has been engaged by CSR Limited to provide engineering and servicing input for an application to undertake bulk earthworks on CSR's property located within the Erskine Park Employment Area; refer to **Figure 1.1**. This report describes the bulk earthworks in support of the Application. It also provides information for the application for approval of a concept plan for the project.

#### **1.1 Objectives**

Brown Consulting's tasks were to review existing planning documentation; provide advice on bulk earthworks; internal road layout options; liaise with service authorities and other consultants and provide advice on sewer, water, electricity, gas and telecommunications. The bulk earthworks design has been prepared taking into account the objectives of the Development Control Plan for the Erskine Park Employment Area. To meet the objectives of the DCP this report will demonstrate the following:

- Describe the proposed road network to access the development.
- Provide preliminary bulk earthworks levels.
- Provide preliminary advice on the availability of services.
- Provide a concept sediment and erosion control plan for the bulk earthworks.



The site is bounded by Lenore Lane to the north, private property to the east, Sydney Water water supply pipelines and a Crown road reserve to the south and the Enviroguard landfill site to the west.

Penrith City Council has issued development consent for the creation of Lots 1, 2 and 3 shown in Figure 1.2 under DA 04/1599, these lots are referred to as the Bluescope Steel and Lysaght development lots.

The Minister for Infrastructure and Planning has granted consent as State Significant Development for the creation of Lot 6 shown in Figure 1.2 under DA-284-11-2004-i.

The site is located in the South Creek catchment and drains via 2 small creeks, which converge immediately south of the low point immediately in Erskine Park Road within Lot 16 DP 259146, which is currently being developed by the Walker Corporation. The site generally drains from east to west and is gently undulating, except for around the ex-quarry site where steep batters with terraces have been formed by the stripping and stockpiling of overburden material.

### **1.3 Proposed Works**

The proposed development includes bulk earthworks over the remainder of CSR eastern lands to form pads for later development.

The bulk earthworks levels have been set after considering the need to balance the overall cut to fill operation over the development zone (including provision for a sufficient quantity of material for capping of the Enviroguard Landfill site), consideration of the overall stormwater master plan for the site and the need to provide lead in utility services to facilitate future development.

## **2 BULK EARTHWORKS**

Bulk earthworks are proposed over the portion of the site identified as being the development zone. This work is separate to the bulk earthworks operations approved under DA 04/1599 (Lots 1, 2 and 3) and bulk earthworks approved under DA-284-11-2004-i (Lot 6). To ensure a balance of cut to fill however, works will be required across all lots within the eastern lands. A stockpile of surplus material generated from the earthworks undertaken on Lots 1, 2 and 3 is currently located over proposed pads 5 and 9 and this material will need to be included within the earthworks proposed by this application.

The earthworks are aimed at providing a framework and master plan to ensure a balance in the overall earthworks quantities. The proposed preliminary bulk earthworks levels aim to minimise the potential for a large surplus of material following completion of work within the development zone. Further refinement of the

proposed levels will need to be undertaken prior to issue of the construction certificate and commencement of the bulk earthworks.

Whilst the expectation is that any deficiency in material required to make up the nominated bulk earthworks levels, can be made up by importing additional material, it is understood that Penrith Council have strict controls over what material can be imported to the Erskine Park Employment Area and as such the preference is that the need for imported material be minimised.

In addition to the proposed bulk earthworks levels within the development zone, this report has taken into consideration the ultimate balance of earthworks from all proposed development, including provision of a sufficient quantity of material to cap the Enviroguard Landfill site to the west with a layer of clay. The quantity of material required for the Enviroguard capping layer is understood to be between 100,000 m<sup>3</sup> and 150,000 m<sup>3</sup>.

## **2.1 Earthworks Quantities**

The proposed levels for the various pads is shown on the 'Overall Engineering and Bulk Earthworks Plan' included in the appendix. It is anticipated that material will need to be cut to a depth of 6 metres in height and that the depth of fill on some parts of the site will measure 10 metres in height.

Topsoil is to be stripped from the site prior to the commencement of any filling activities. Geotechnical reports prepared for the CSR land at Erskine Park indicate that the average depth of topsoil over the site is 200 mm. The topsoil will be placed in temporary stockpiles and either reused in landscape areas on the site or removed off site for reuse at an alternate site.

The pad levels have been determined taking into consideration the existing contours, proposed road grading of internal roads, proposed road levels for Lenore Lane and overall earthworks quantities.

Earthworks batters around the perimeter of the site have been nominally set at 1:4 (vertical : horizontal), however previous development applications have proposed the construction of some retaining walls and the location of these walls has been considered.

The **Table 2.1** below provides a summary of the expected bulk earthworks quantities proposed as part of this application.

**TABLE 2.1 – PROPOSED BULK EARTHWORKS**

<b>Pad</b>	<b>Proposed Level (m AHD)</b>	<b>Top Soil (m<sup>3</sup>)</b>	<b>Cut (m<sup>3</sup>)</b>	<b>Fill (m<sup>3</sup>)</b>	<b>Balance (m<sup>3</sup>)</b>
4	49.2 – 49.7	15,840	- 21,860	262,730	240,870
5	53.2 – 52.7	21,250	- 76,310	202,850	126,540
5A	53.5 – 50.0	540	- 470	13,540	13,070
7	61 – 60.5	10,500	- 108,840	19,900	- 88,940
8	58.2 – 57.7	5,720	- 46,730	15,670	- 31,060
9	56.2 – 55.7	9,290	- 110,609	21,280	- 89,239
4 (creek)	Varies	Included above	- 3,360	15,040	11,680
5 (creek)	Varies	Included above	- 63,030	2,690	60,340
<b>Balance</b>		<b>63,140</b>	<b>- 431,209</b>	<b>553,700</b>	<b>122,491</b>

\* Cut and Fill Volumes do not include topsoil and make no allow for 300mm imported sandstone capping.

Table 2.2 provides an estimate of the quantity of other earth material available on site. This material has been or will be generated from either earthworks operations currently being completed on site, approved works yet to be commenced or from existing on site stockpiles.

**TABLE 2.2 – OTHER MATERIAL AVAILABLE ON SITE (Not Proposed under this Application)**

<b>Source</b>	<b>Quantity of Material Available (m<sup>3</sup>)</b>
Lots 1, 2 and 3	- 85,000
Site Stockpiles	- 92,000
Road 3	- 81,000
Lot 21	- 61,000
<b>Balance</b>	<b>- 319,000</b>

From Table 2.1 above it can be seen that approximately an additional 125,000m<sup>3</sup> of material will be required to establish the nominated pad levels. Table 2.2 confirms the availability of approximately 320,000m<sup>3</sup> of material from other areas of the site that is not part of this application.

Previous experience with the on site clay materials suggest that these clays will break down when exposed to weathering. To protect the clay fill within the pads, it is proposed that a 1000mm thick rock capping will be provided. This rock capping will be sourced from rock excavated on the site and to be stabilised to the recommendations provided in the Geotechnical Engineer’s report. Over the rock layer, a nominal 150mm thick topsoil layer will be provided. This topsoil layer will be seeded to minimise the potential for erosion to occur.

In addition to the bulk earthworks figures above the construction of roads 1, 2 and 3 has also been considered, the material generated from the construction of these roads has also been included figures provided in Table 2.2.

The figures above make no allowance for material required outside the CSR Eastern Lands and proposed development of the ‘Western Lands’ under DA 04/2795 and DA 04/1221. These lots are expected to

require material in the order of 40,000 to 50,000m<sup>3</sup>, however it is understood that this material will be sourced from another site.

A summary of the overall earthworks figures above is shown in **Table 2.3** below.

**TABLE 2.3 – EARTHWORKS QUANTITIES SUMMARY**

<b>Section</b>	<b>Balance (m<sup>3</sup>)</b>
Pads 4, 5, 7, 8 and 9	+ 122,491
Lot 21	- 61,000
Lots 1, 2, 3	- 85,000
Road 3	- 81,000
Site Stockpiles	- 92,000
Quarry Capping (Clay)	+ 150,000
<b>Balance</b>	<b>-46,509</b>

The balance of materials left as part of the bulk earthworks is proposed to be placed to reduce existing batter slopes and/or stockpiled on Pad 10 (the area known as the southern lands).

## **2.2 Staging of Earthworks**

Based on the expected earthworks quantities and Brown Consulting understanding of CSR's program for development the eastern lands an indicative staging of the earthworks is provided below.

From the earthworks required to form Lots 1, 2 and 3 a surplus of material has been generated in the order of 85,000m<sup>3</sup> of material, which is currently stockpiled on proposed pads 5 and 9. To facilitate the proposed earthworks the material from Lots 1, 2 and 3 and the existing on site stockpiles (92,000m<sup>3</sup>) will need to be removed and placed on proposed pad 4. It is estimated that pad 4 will require approximately 240,000m<sup>3</sup> of fill material to make up the nominated pad level of 49.2 to 49.7, adding the material from Lots 1, 2 and 3 and the existing site stockpiles to pad 4 still leaves a requirement of 163,000m<sup>3</sup>.

From **Table 2.1** it can be seen that pads 7, 8 will yield a surplus of material in the order of 120,000m<sup>3</sup> of material. This material will be used to make up the majority of the remainder of material required for Pads 4 and 5. Once pad 4 is complete the material required to be set aside for capping of the Enviroguard landfill site is likely to be placed south of the landfill site. Access to this area will need to be via pad 4 as building works have commenced on Lot 3.

Earthworks have recently been completed on Lot 21, the surplus material (61,000m<sup>3</sup>) generated from this project is likely to be placed as fill on pads 4 and 5. Included in the work being completed for Lot 21 is the formation of Road 3, again the surplus of material (81,000m<sup>3</sup>) generated could be placed as fill on pad 5. Pad 5 requires approximately 140,000m<sup>3</sup> of material to make up the nominated pad level

Following completion of the works outlined above, pad will require formation. Pad 9 will generate a surplus of material of approximately 99,000m<sup>3</sup>, which could be taken and placed as capping material for the landfill area.

### **2.3 Earthworks Operations**

It is recommended that the contractor prepare an Environmental Management Plan (EMP) to address how the proposed site works will be managed and coordinated taking into consideration this report, the project application conditions of consent and other reports as required. This section of the report is provided as a guide for the contractor and highlights some of the issues that should be identified in the EMP.

Prior to the commencement of the bulk earthworks on the site all soil and water management measures are to be installed / constructed as required by the approved soil and water management plan. Further detail of the proposed soil and water management measures is provided in the next section of this report.

In addition to the soil and water management features the limits of the development zone are to be clearly defined and marked to prevent unauthorised access by construction traffic to areas outside of the development zone.

Following installation of the soil and water management measures and identifying the limits of development, it is recommended that the site be progressively stripped of existing topsoil and vegetation. Vegetation should be retained in areas not subject to earthworks for as long as possible to limit the potential for dust generation from exposed areas. Where areas need to be stripped to enable earthworks to progress the contractor will need to provide appropriate dust control measures.

It is proposed that the earthworks be completed using standard earth moving machinery. All earthworks are to be completed under the supervision of a Geotechnical Engineer. The scope of services to be provided by the geotechnical testing authority must comply with Level 1 geotechnical testing as defined in Appendix B of AS 3798 –1996.

Whilst it is understood that an Environmental Site Assessment has been completed and no specific contamination has been found in the area to be developed. As a result no special contamination related measures or safeguards are considered necessary, the contractor's EMP should include a contingency provision for the appropriate characterisation and off site disposal of any unanticipated, sub surface affected materials encountered during earthworks.

### **3 SOIL & WATER MANAGEMENT DURING CONSTRUCTION**

Sedimentation and erosion controls will be constructed prior to commencement of any work to minimise the discharge of sediment from the site. The controls will be designed and installed in accordance with the requirements of the NSW Department of Housing 'Soils & Construction' manual.

#### **3.1 Temporary Sediment & Erosion Controls**

The engineering bulk earthworks drawings show the concept sediment and erosion control plan for the development.

- A single all weather access way at the front of the property consisting of 50-75mm aggregate or similar material at a minimum thickness of 150mm, laid over geo-fabric and constructed prior to commencement of works.
- A shaker pad will be used at the entrance to the site to remove clay from vehicles leaving the site so as to maintain public roads in a clean condition.
- The sediment control basins should be located where the proposed water quality basins will be constructed. Once the majority of the site has been constructed the basins should then be converted to their ultimate use as a water quality control basins.
- Disturbed areas will be rehabilitated with indigenous plant species, landscaped and treated by approved methods of erosion mitigation such as mulching, revegetation with native grasses or other suitable stabilising processes within fifteen days of the completion of works.
- All runoff and erosion controls will be installed before any works are carried out at the site.
- Upslope clean surface runoff will be diverted via diversion drains and sediment fencing around the disturbed areas.
- Installing *SoilLocker* at the down-slope of the disturbed areas and batters to capture sediment and debris escaping from the site.
- *SoilLocker* shall be installed on the boundary of the creek buffer area.
- Topsoil stockpiling stripped from the construction site shall be diverted away from drainage lines, stormwater inlets and be suitably covered by impervious membrane material and screened by sediment fencing.
- Sediment end erosion controls shall be inspected weekly or after each storm event for litter, sediment, and organic waste accumulation. All sediment/debris shall be removed within two (2) working days.



### **3.2 Sediment Basin Concept Design**

The basins will be designed to capture the first 25mm runoff from the 75th percentile, 5-day rainfall event, as per the NSW Department of Housing Guidelines. An additional 50% capacity will be provided for storage of sediment.

The concept design is based on the equation:  $V = 10.C_v.A.R_{5\text{day } 75\text{th\% ile}}$

As recommended by the *NSW Department of Housing (1998)*, a volumetric runoff coefficient ( $C_v$ ) of 0.5 has been adopted for the construction phase. The outlet to each of the basins will be a slow control discharge. A spillway will be incorporated into the basin designs for an overflow.

### **3.3 Sediment Basin Flocculation & Discharge Water Quality Criteria**

Runoff captured in the sediment basins will be treated with an approved flocculating agent before discharging water, as the catchment contains soils that are classified as fine dispersible, which do not readily settle from suspension. The flocculation should ensure that discharges contain no more than 50 mg/L of suspended solids or 30 NTU before being discharged.

## **4 ROAD ACCESS**

### **4.1 Road Network**

Previously approved development applications have approved the proposed road network. Generally these roads will be the point of access to the proposed bulk earthworks pads however it is likely that these roads will not be completed or dedicated as public road until such time as the bulk earthworks operations have been completed.

Templar Road (Road 1) will serve as an access point to the site from Lenore Lane and will primarily run north – south. This road was approved as part of DA 04/1599. Part of this application is the proposed construction of a permanent cul-de-sac and water quality basin at the southern end of this road. The proposed water quality basin is to be located in the centre of the cul-de-sac with a loop road construction around the basin to allow 'u' turn truck movements.

A temporary cul-de-sac has previously been approved and constructed at the end of Templar Road. It is proposed to remove this cul-de-sac and replace it with the one described above.

Lockwood Road (Road .3) is currently being extended from Templar Road in an easterly direction, temporarily a cul de sac will be constructed at the CSR eastern boundary however it is likely that the adjoining owner will extend this road onto their property at a later date. This work is being undertaken under a previous development consent.

Road 2 will also serve as an access point to the CSR Eastern Lands from Lenore Lane, however this road is proposed as a cul de sac and is unlikely to have any other roads connected to it. Road 2 will have its intersection with Lenore Lane west of the intersection between Templar Road and Lenore Lane. The Road 2 intersection with Lenore Lane has been aligned to coincide with the proposed PacLib intersection north of Lenore Lane.

The construction of roads 2 and 3 are not part of this application.

It is understood that plans exist to extend Lenore Lane east through to Eastern Creek and ultimately make connection with the M7 Motorway. Currently Lenore Lane connects with Erskine Park Road west of the CSR Eastern Lands, Erskine Park Road currently provides access to the M4 Motorway.

## **5 SERVICES**

The availability of services has been investigated, a summary of the findings is given below for electricity, water, sewer, telecommunications and gas. Generally this application being lodged is for bulk earthworks only and therefore the permanent supply of services is not required for this development application.

### **5.1 Electricity**

The availability of electricity has been investigated. In industrial subdivisions conduits are laid throughout the estate for the high voltage system the high voltage lines are then reticulated to service individual requirements. Additional substations may be required to service each lot dependent on the required power usage. The site will be connected to the new zone substation constructed by Integral Energy on Erskine Park Road.

Discussions will need to be held with Integral Energy once the power requirements of individual future developments are known. Power is available within the area to service the ultimate industrial use as envisaged in the Concept Plan Application subject to applications being lodged with Integral Energy.

Arrangements have been made to provide a temporary construction power to the Bluescope and Lysaght sites (lots 2 and 3), similar arrangements are envisaged to enable the bulk earthworks operations to proceed.

## **5.2 Sewer**

The availability of sewer services has been investigated and confirmed. As part of the Bluescope Steel and Lysaght development the sewer mains will be extended to the south eastern corner of the Bluescope Steel lot, the sewer main will require extension to service future lots and further development to the east.

The sewer system has capacity for development envisaged in the Concept Plan.

## **5.3 Water**

The provision of water has been investigated and it has been confirmed that by extension from existing mains, water can be provided for drinking and fire services. Water can be supplied at a rate of 20 l/s, which is adequate for street hydrants and normal water usage, but will not supply a sprinkler system within the buildings. Should sprinkler systems be required, these will need to be designed by a hydraulic engineer as part of the building design and will probably require a storage tank and booster pump.

The water system has capacity for development envisaged in the Concept Plan.

## **5.4 Gas**

Gas mains are to be extended to the Erskine Park site to meet the requirements of the Bluescope Steel and Lysaght development. Agility has previously advised that their policy is not to supply street mains within an industrial/commercial complex until requested by an individual consumer. The provision of gas will then be based upon their own cost analysis of the particular circumstances.

Following a request from CSR Agility have indicated that they will be extending their mains to service the Erskine Park Employment Lands.

The gas system has capacity for development envisaged in the Concept Plan.

## **5.5 Telecommunications**

Contact has been made with Telstra who advised verbally that they envisaged no difficulty in providing services. The telecommunications system has capacity for development envisaged in the Concept Plan.



## APPENDICES

All drawings have been prepared by Brown Consulting (NSW) Pty Ltd. The applicable Project No. is W03033.12.

- 1 Drawing No. DA101 – Rev 05 – Overall Engineering Plan
- 2 Drawing No. DA102 – Rev 05 – Bulk Earthwork Plan
- 3 Drawing No. DA103 – Rev 05 – Bulk Earthworks Sections 1
- 4 Drawing No. DA104 – Rev 05 – Bulk Earthworks Sections 2
- 5 Drawing No. DA105 – Rev 05 – Bulk Earthworks Sections 3
- 6 Drawing No. DA106 – Rev 05 – Bulk Earthworks Sections 4
- 7 Drawing No. DA107 – Rev 05 – Bulk Earthworks Sections 5
- 8 Drawing No. DA108 – Rev 05 – Bulk Earthworks Sections 6
- 9 Drawing No. DA109 – Rev 05 – Bulk Earthworks Sections 7
- 10 Drawing No. DA110 – Rev 05 – Erosion and Sediment Control Plan
- 11 Drawing No. DA111 – Rev 05 – Erosion and Sediment Control Plan
- 12 Drawing No. DA112 – Rev 05 – Basin 3 Retaining Wall Plan and Sections

# ERSKINE PARK EASTERN SITE WORKS SUBDIVISION

\* BULK EARTHWORKS  
STREAMWORKS AND  
STORMWATER CONCEPT PLAN  
PROJECT APPLICATION

DRAWING SCHEDULE

DRAWING No.	TITLE
DA101	OVERALL ENGINEERING PLAN
DA102	BULK EARTHWORKS PLAN
DA103	BULK EARTHWORKS SECTION 1
DA104	BULK EARTHWORKS SECTION 2
DA105	BULK EARTHWORKS SECTION 3
DA106	BULK EARTHWORKS SECTION 4
DA107	BULK EARTHWORKS SECTION 5
DA108	BULK EARTHWORKS SECTION 6
DA109	BULK EARTHWORKS SECTION 7
DA110	EROSION AND SEDIMENT CONTROL PLAN
DA111	EROSION AND SEDIMENT CONTROL PLAN
DA112	BASIN 3 RETAINING WALL LONGITUDINAL SECTION

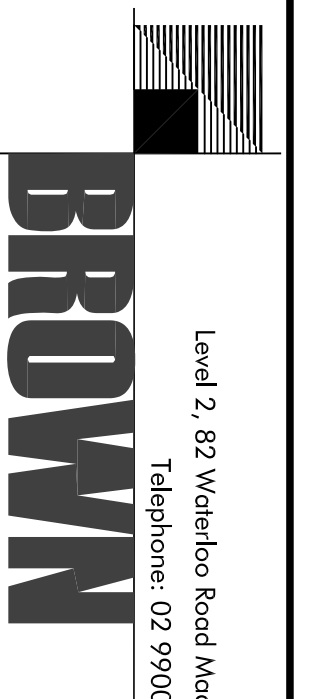




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 SCALE 1:4000 (A3)

REV	DATE	ISSUE FOR PROJECT APPLICATION	DESCRIPTION	AMENDMENTS
01	01/08/06	ISSUE FOR PROJECT APPLICATION		

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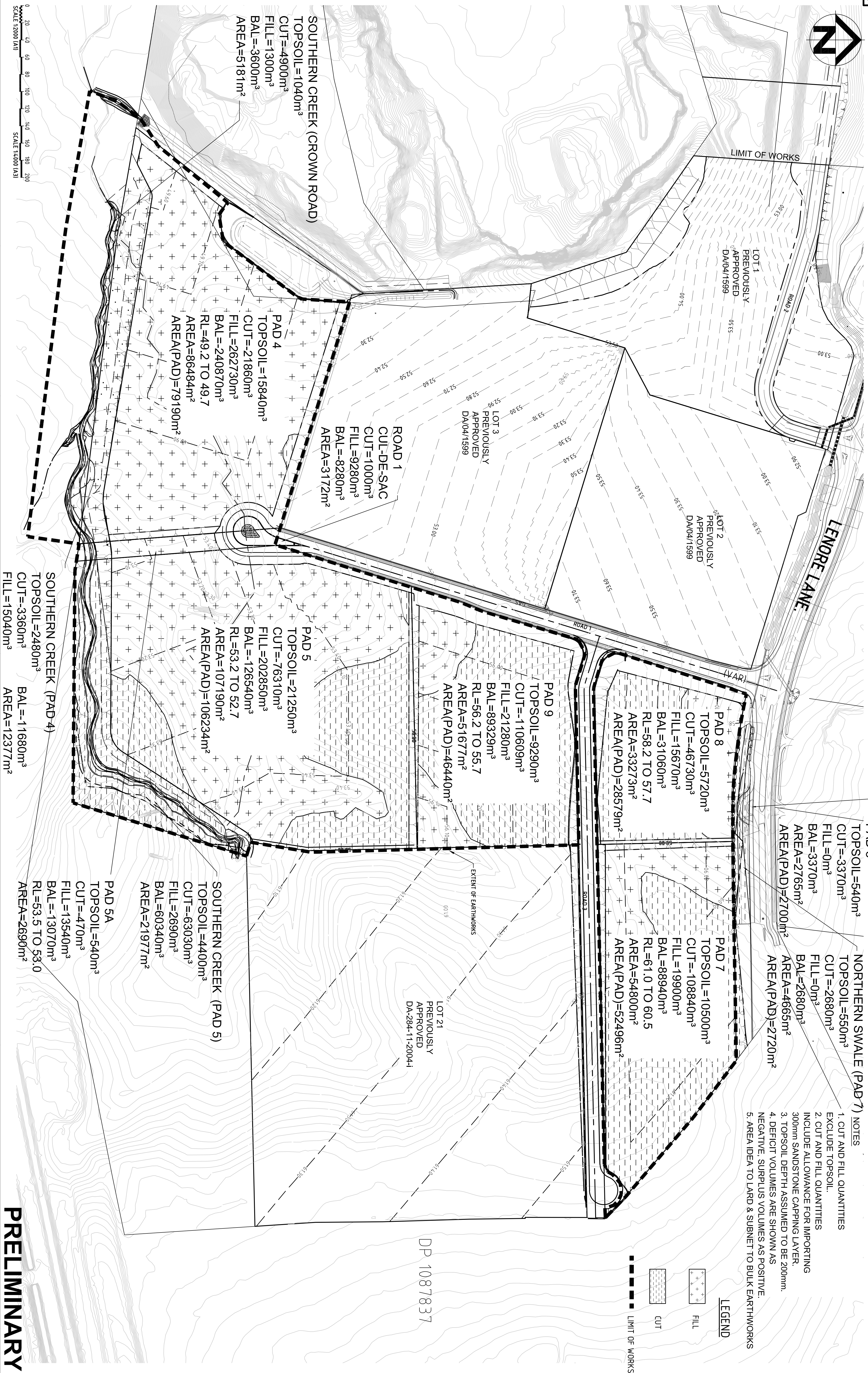
Brown Consulting (NSW) Pty Ltd  
 Level 2, 82 Waterloo Road Macquarie Park NSW Australia 2113  
 Telephone: 02 9900 1000 Facsimile: 02 9900 1099

VERIFICATION		Client:
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VERIFY		
APPROVED		

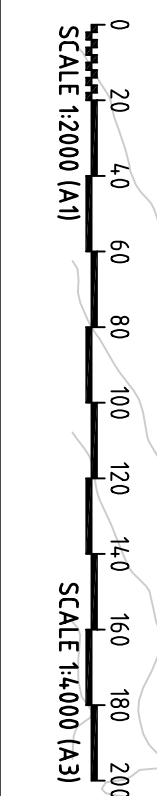
Project: **EASTERN SITE WORKS SUBDIVISION BULK EARTHWORKS**  
 Drawing: **OVERALL ENGINEERING PLAN**  
 Drawn by: AK  
 Design by: AK / WA  
 Project No: W03033.12  
 Drawing No: DA101  
 Sheet: 1 OF 12  
 Scale: 1:2000  
 Ref: 01

**PRELIMINARY**





- LEGEND**
- FILL
  - CUT
  - LIMIT OF WORKS
- NOTES**
1. CUT AND FILL QUANTITIES EXCLUDE TOPSOIL.
  2. CUT AND FILL QUANTITIES INCLUDE ALLOWANCE FOR IMPORTING 300mm SANDSTONE CAPPING LAYER.
  3. TOPSOIL DEPTH ASSUMED TO BE 200mm.
  4. DEFICIT VOLUMES ARE SHOWN AS NEGATIVE, SURPLUS VOLUMES AS POSITIVE.
  5. AREA IDEA TO LARD & SUBNET TO BULK EARTHWORKS



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DESIGN	VERIFY	APPROVED

Client: CSR LIMITED  
 Project: EASTERN SITE WORKS SUBDIVISION  
 BULK EARTHWORKS

INITIALS	SIGNATURE	DATE

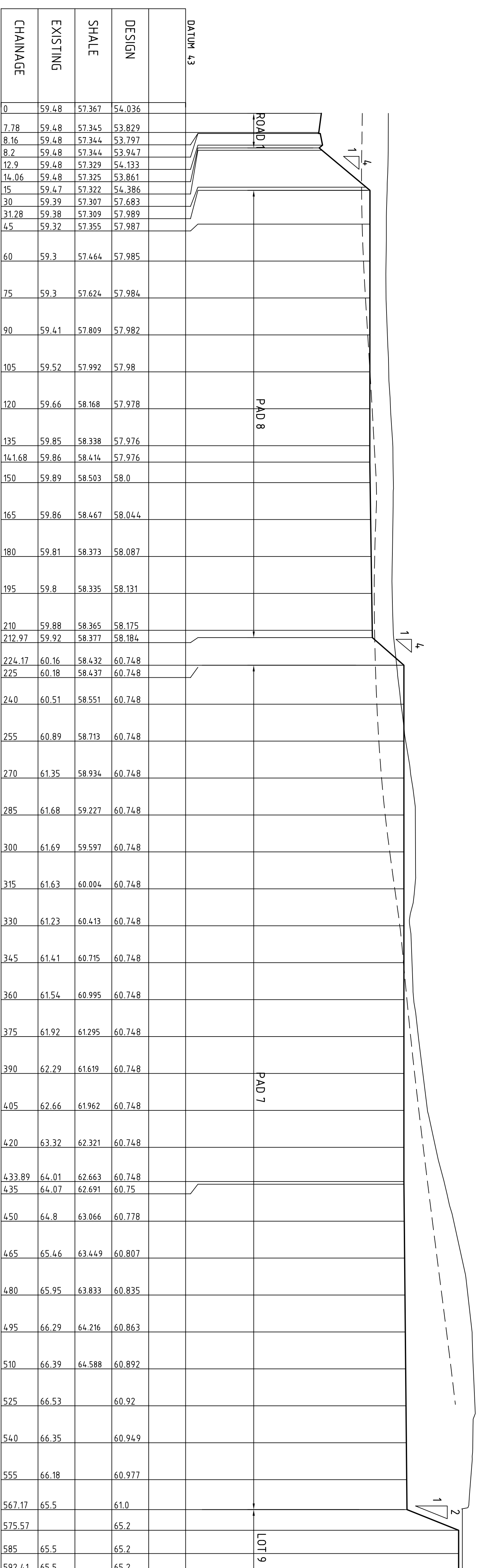
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 Design by: AK/WA  
 Project No: W03033.12  
 Drawing No: DA102

Sheet: 2 OF 12  
 Scale: 1:2000  
 Ref: 07

**PRELIMINARY**

DP 1087837





NOTE:  
 SHALE LEVELS DETERMINED FROM BORE HOLE LOGS  
 SUPPLIED BY DOUGLAS PARTNERS PTY LTD  
 PROJECT NO. 563164 BY LINE TYPE

SECTION 1  
 SCALE 1:1000 (H)  
 SCALE 1:200 (V)

REV	DATE	DESCRIPTION	BY	VER	APP
02	02/08/05	REMOVED DATA SERIES	RAP	RAP	
01	07/02/06	SCOPE SYMBOLS ADDED TEXT AMENDED	RAP	RAP	
03	08/11/2006	REMOVED LAYOUT WITH AVERAGE 30m BUFFER	RAP	RAP	
02	02/08/05	ISSUE FOR DA APPROVAL	RAP	RAP	
01	01/08/05	ISSUE FOR COMMENTS	RAP	RAP	
		DESCRIPTION	BY	VER	APP
		AMENDMENTS			

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VERIFICATION	INITIALS	SIGNATURE	DATE
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Client: **CSR LIMITED**

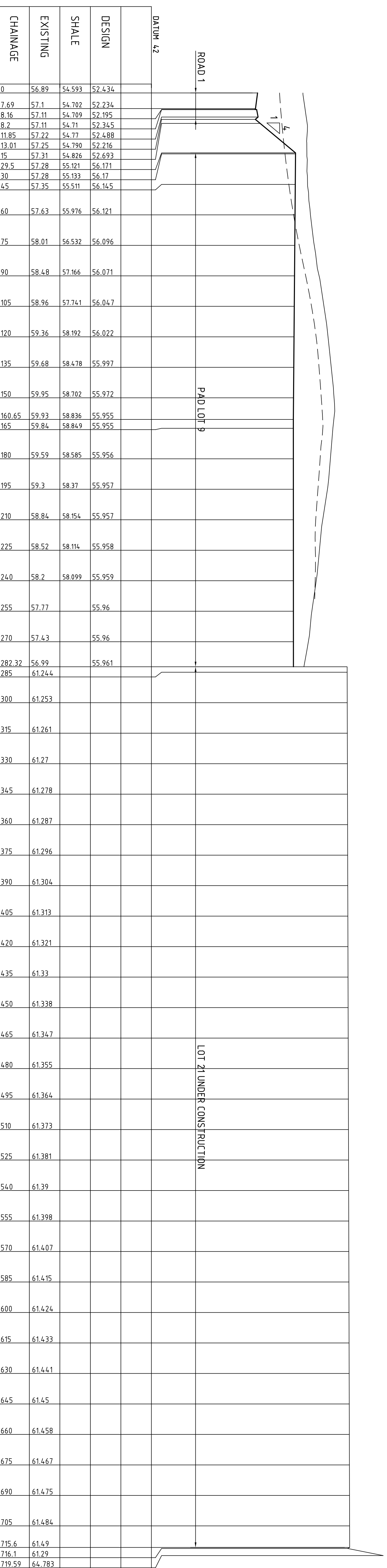
Project: **EASTERN SITE WORKS SUBDIVISION  
 BULK EARTHWORKS**

Drawing: **BULK EARTHWORKS  
 SECTION 1**

Drawn by: AK  
 Design by: AK/WA  
 Project No: M03033.12  
 Drawing No: DA103

Sheet: 3 OF 12  
 Scale: 1:1000 (H)  
 1:200 (V)  
 Ref: 05

**PRELIMINARY**

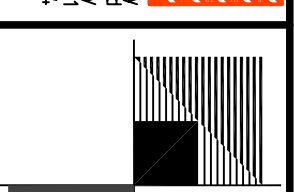


NOTE:  
SHALE LEVELS DETERMINED FROM BORE HOLE LOGS  
SUPPLIED BY DOUGLAS PARTNERS PTY LTD  
PROJECT NO. 3636A BY LINE TYPE \_\_\_\_\_

SECTION 2  
SCALE 1:1000 (H)  
SCALE 1:200 (V)

REV	DATE	DESCRIPTION	BY	VER	APP
06	02/08/06	REVISD 2/02/06	RAP	RAP	
05	07/02/06	GENERAL AMENDMENTS	RAP	RAP	
03	18/11/05	REVISD LAYOUT WITH AVERAGE 30M BUFFER	RAP	RAP	
02	02/08/05	ISSUE FOR DA APPROVAL	RAP	RAP	
01	01/08/05	ISSUE FOR COMMENTS	RAP	RAP	

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VERIFICATION	INITIALS	SIGNATURE	DATE
DRAFTING			
DESIGN			
VERIFY			
APPROVED			

Client: **CSR LIMITED**  
Project: **EASTERN SITE WORKS SUBDIVISION  
BULK EARTHWORKS**

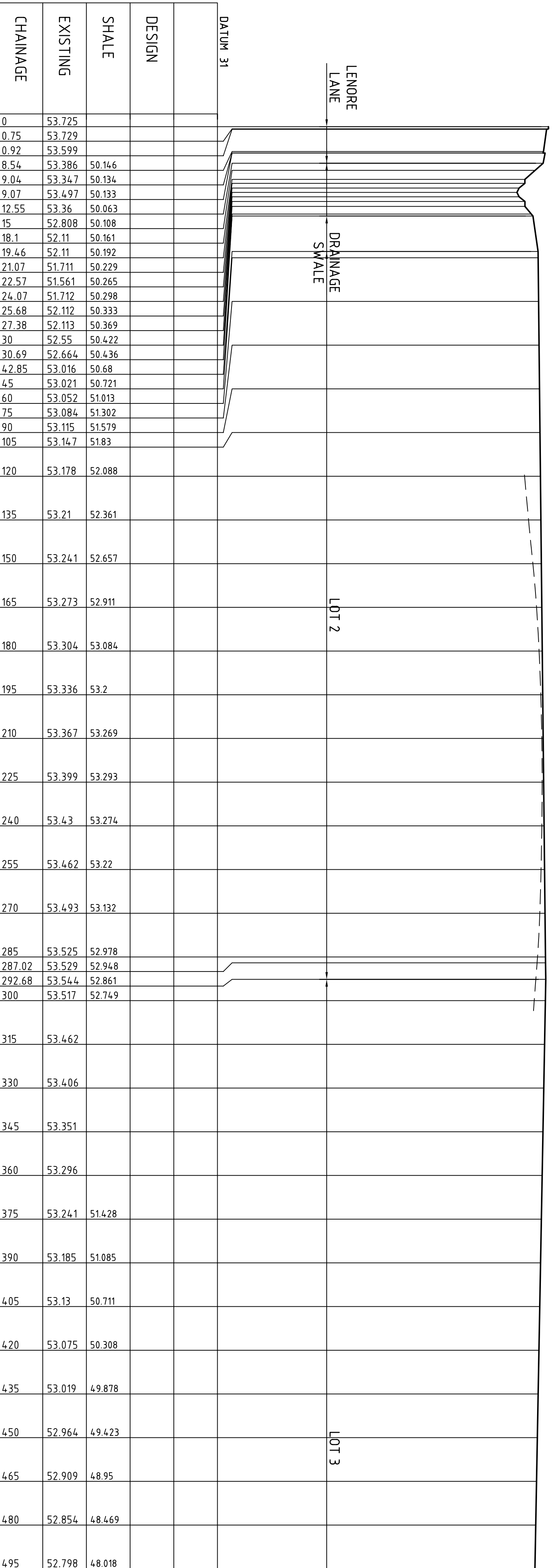
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Drawn by: AK  
Design by: AK/WA  
Project No: M09033.12  
Drawing No: DA104  
Scale: 4 OF 12  
1:1000 (H)  
1:200 (V)  
Rev: 05

**PRELIMINARY**



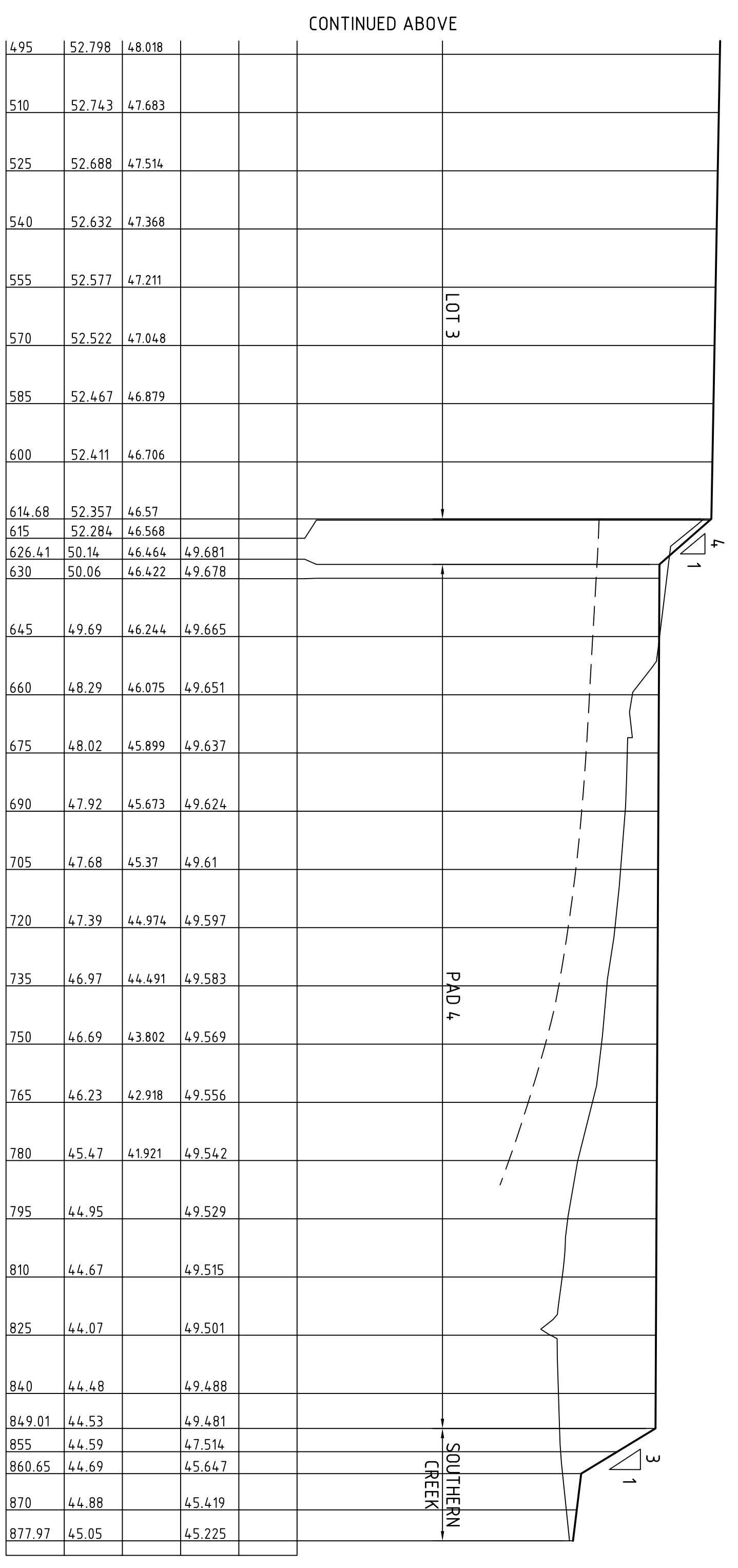






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SUPPLIED BY DOUGLAS PARTNERS PTY LTD  
PROJECT NO. 36364 BY LINE TYPE — — — — —

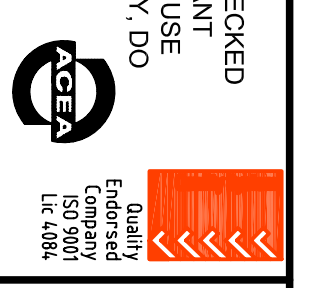
SECTION 5  
SCALE 1:1000 (H) 1:200 (V)  
DA01



SECTION 5  
SCALE 1:1000 (H) 1:200 (V)  
DA01

REV	DATE	ISSUE FOR COMMENTS	DESCRIPTION	BY	VER	APP
02	02/08/05	ISSUE FOR DA APPROVAL	REVISIONS TO BE CHECKED ON SITE BY SUPERINTENDANT PRIOR TO CONSTRUCTION. USE WRITTEN DIMENSIONS ONLY. DO NOT SCALE.	RAP	RAP	
03	08/11/2005	ISSUE FOR DA APPROVAL	REVISIONS TO BE CHECKED ON SITE BY SUPERINTENDANT PRIOR TO CONSTRUCTION. USE WRITTEN DIMENSIONS ONLY. DO NOT SCALE.	RAP	RAP	
01	01/08/05	ISSUE FOR COMMENTS	REVISIONS TO BE CHECKED ON SITE BY SUPERINTENDANT PRIOR TO CONSTRUCTION. USE WRITTEN DIMENSIONS ONLY. DO NOT SCALE.	RAP	RAP	

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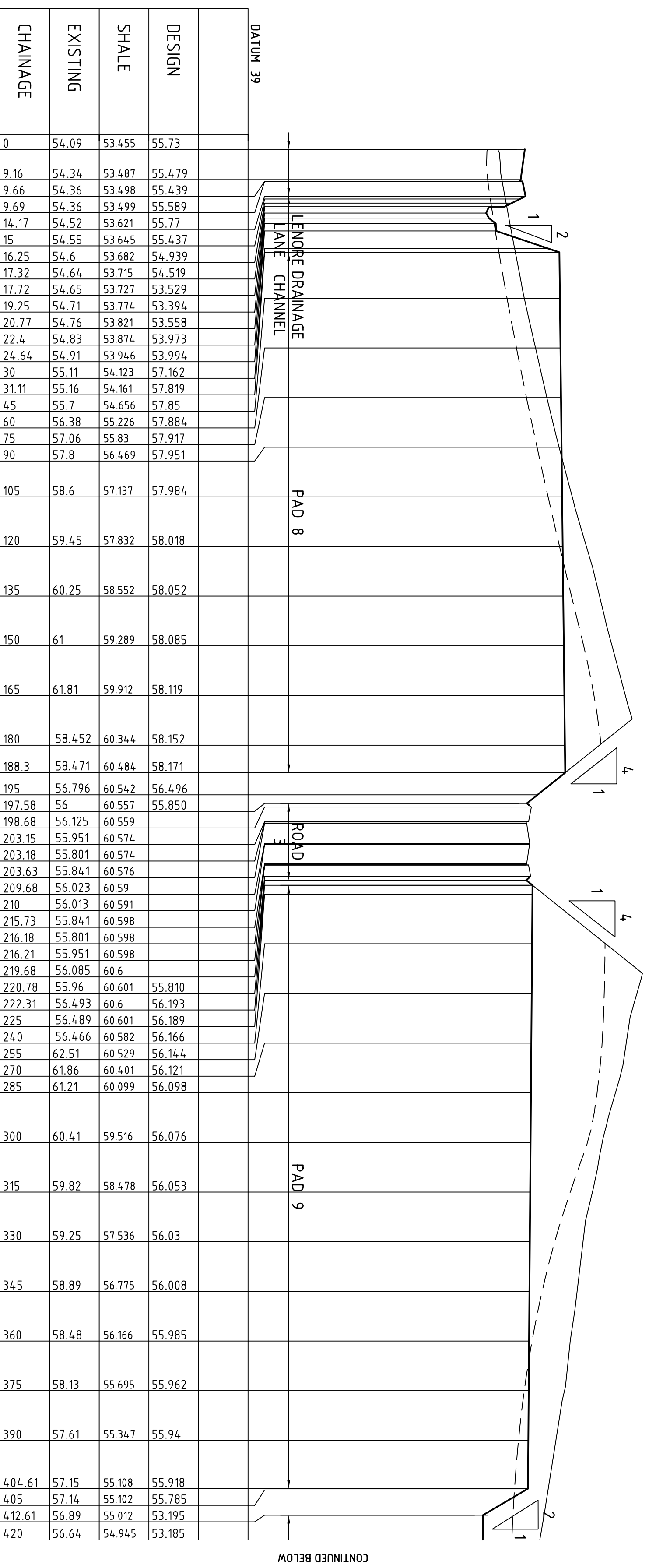
Client: **CSR LIMITED**  
Project: **EASTERN SITE WORKS SUBDIVISION BULK EARTHWORKS**

Drawing: **BULK EARTHWORKS SECTION 5**

Drawn by: AK  
Design by: AK/WA  
Project No: W03033.12  
Drawing No: DA107

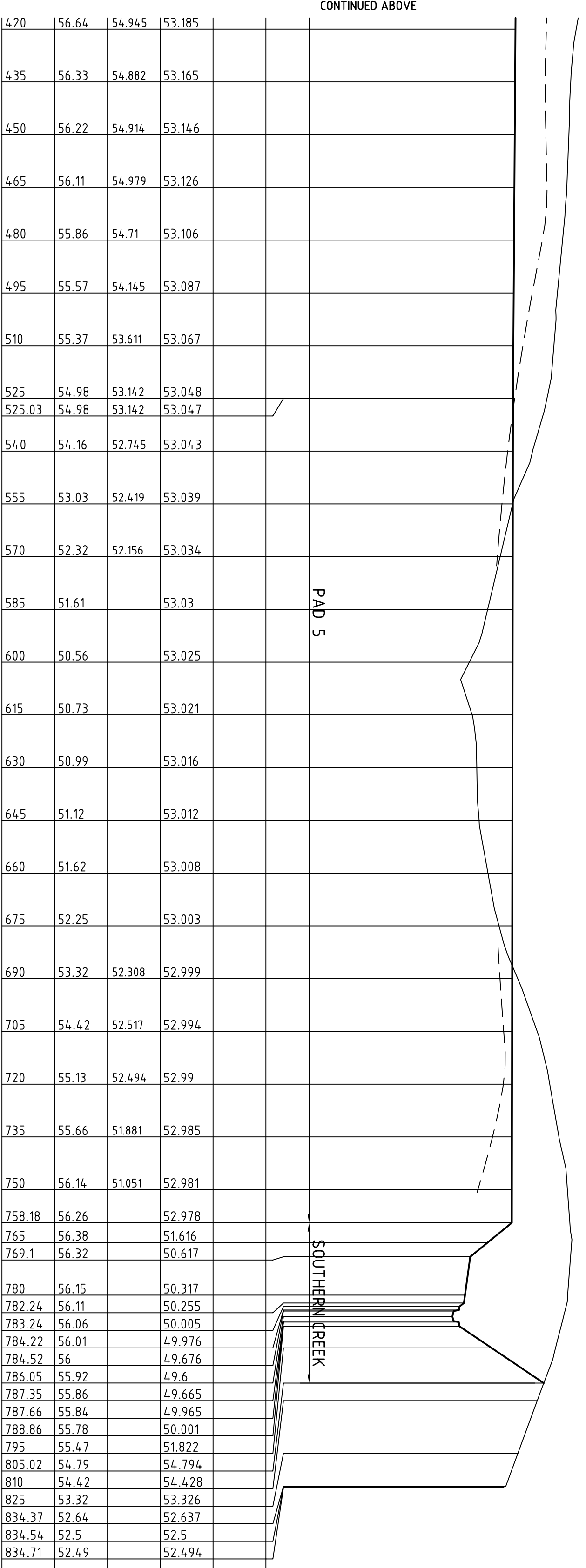
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Rev: 05

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NOTE:  
SHALE LEVELS DETERMINED FROM BORE HOLE LOGS  
SUPPLIED BY DOUGLAS PARTNERS PTY LTD  
PROJECT NO. 36316A BY LINE TYPE ———

SECTION 6  
SCALE 1:1000 (H)  
SCALE 1:200 (V)



SECTION 6  
SCALE 1:1000 (H)  
SCALE 1:200 (V)

REV	DATE	DESCRIPTION	BY	VER	APP
01	01/08/05	ISSUE FOR COMMENTS	RAP	RAP	
02	02/08/05	ISSUE FOR DA APPROVAL	RAP	RAP	
03	08/11/2005	REVISED LAYOUT WITH AVERAGE 30m BUFFER	RAP	RAP	
04	07/02/06	GENERAL AMENDMENTS	RAP	RAP	
05	02/09/06	REVISED DA01 ENIGS	RAP	RAP	

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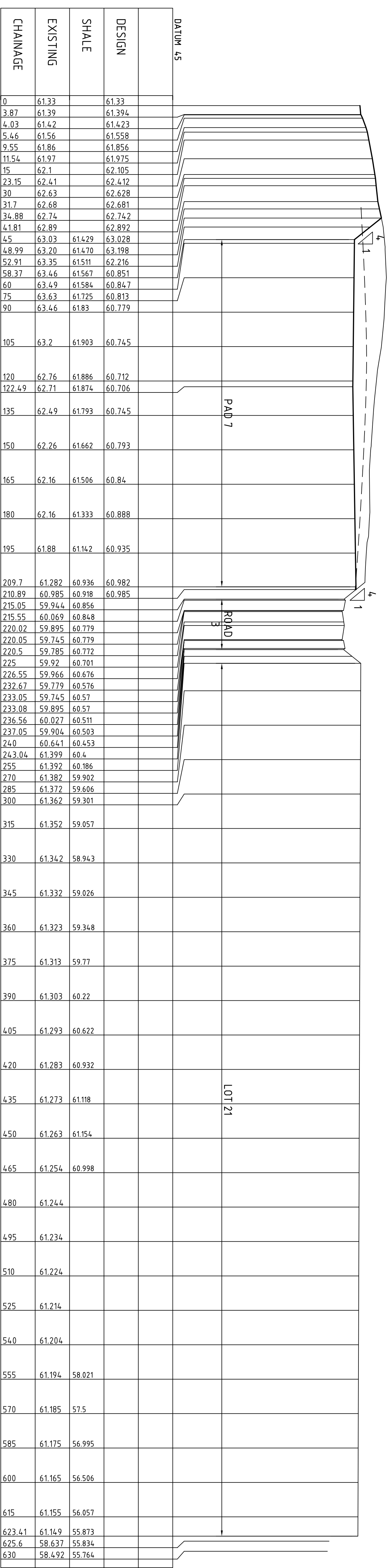
VERIFICATION	INITIALS	SIGNATURE	DATE
DRAFTING			
DESIGN			
CHECK			
APPROVED			

Client: **CSR LIMITED**  
Project: **EASTERN SITE WORKS SUBDIVISION BULK EARTHWORKS**

Drawing: **BULK EARTHWORKS SECTION 6**  
Drawn by: AK  
Design by: AK/WA  
Project No: M03033.12  
Drawing No: DA108  
Scale: 1:1000 (H)  
1:200 (V)  
Sheet: 8 OF 12  
Rev: 05

**PRELIMINARY**





NOTE:  
SHALE LEVELS DETERMINED FROM BORE HOLE LOGS  
SUPPLIED BY DOUGLAS PARTNERS PTY LTD  
PROJECT NO. 3636A BY LINE TYPE ———

SECTION 7  
SCALE 1:1000 (H)  
SCALE 1:200 (V)

REV	DATE	ISSUE FOR COMMENTS	DESCRIPTION	BY	VER	APP
01	01/08/05	ISSUE FOR COMMENTS	AMENDMENTS	RAP	RAP	APP
02	02/08/05	ISSUE FOR DA APPROVAL		RAP	RAP	
03	08/11/2005	REVISION LAID OUT WITH AVERAGE 30m BUFFER		RAP	RAP	
04	01/02/06	GENERAL AMENDMENTS		RAP	RAP	
05	02/08/06	REVISION 2005 ENIGS		RAP	RAP	

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Client: **CSR LIMITED**  
Project: **EASTERN SITE WORKS SUBDIVISION BULK EARTHWORKS**

Drawing: **BULK EARTHWORKS SECTIONS 7**

Drawn by: AK  
Design by: AK/WA  
Project No: M03033.12  
Drawing No: DA109

Sheet: 9 OF 12  
Scale: 1:1000 (H)  
1:200 (V)  
Rev: 05

**PRELIMINARY**







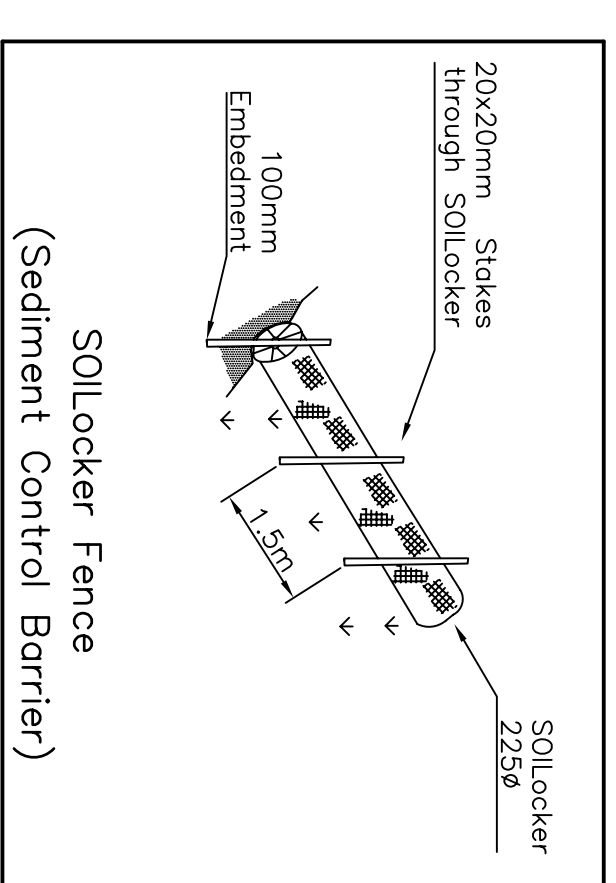
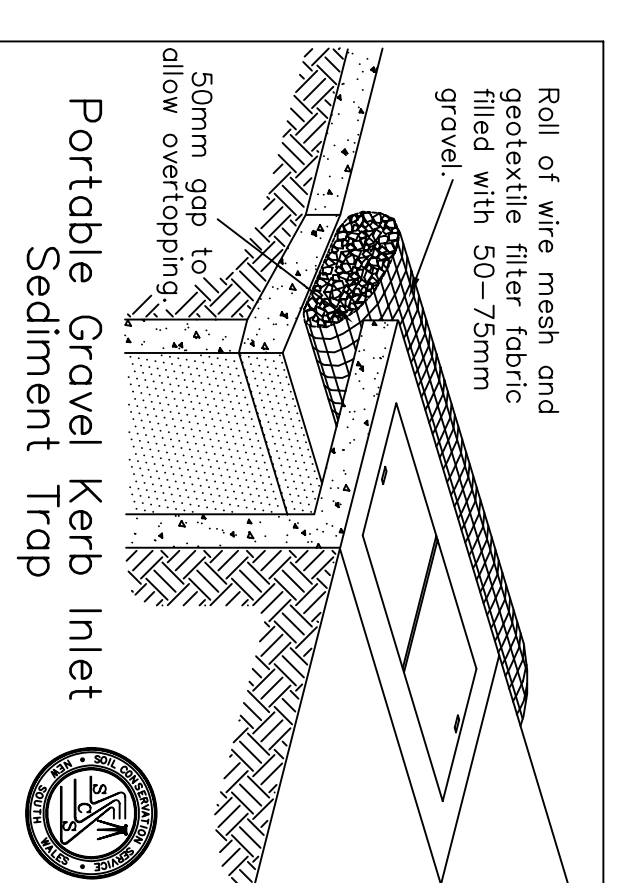
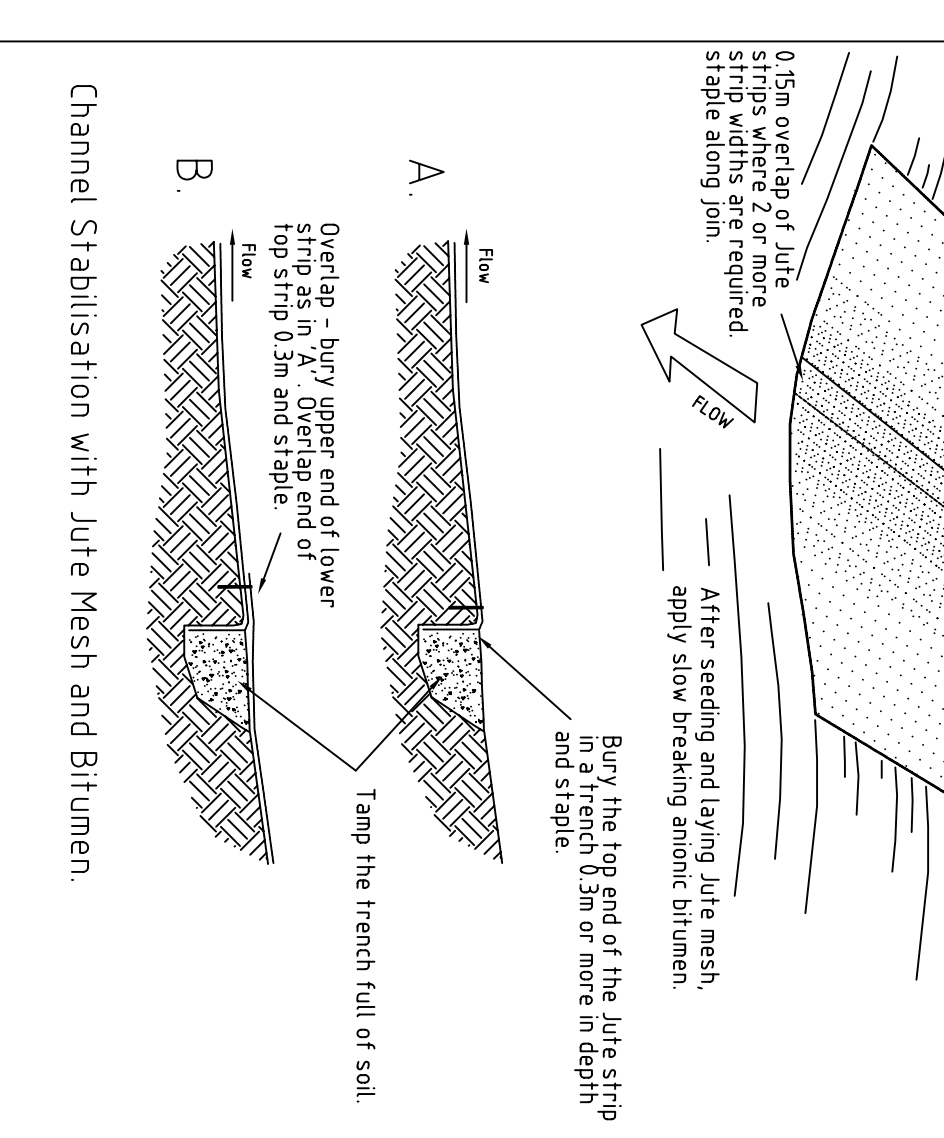
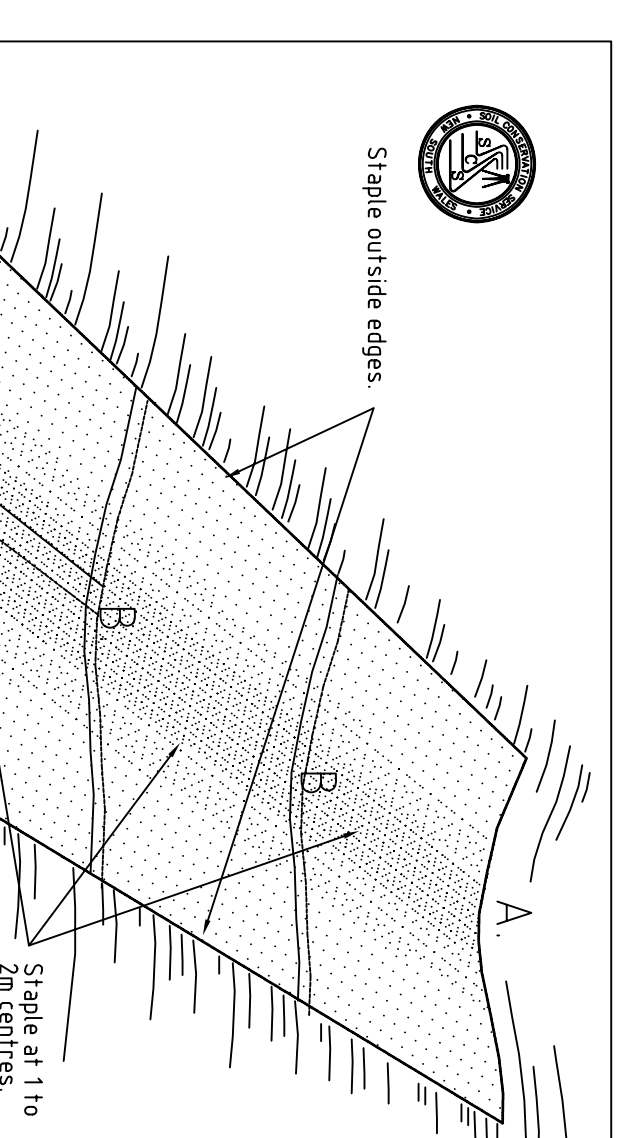
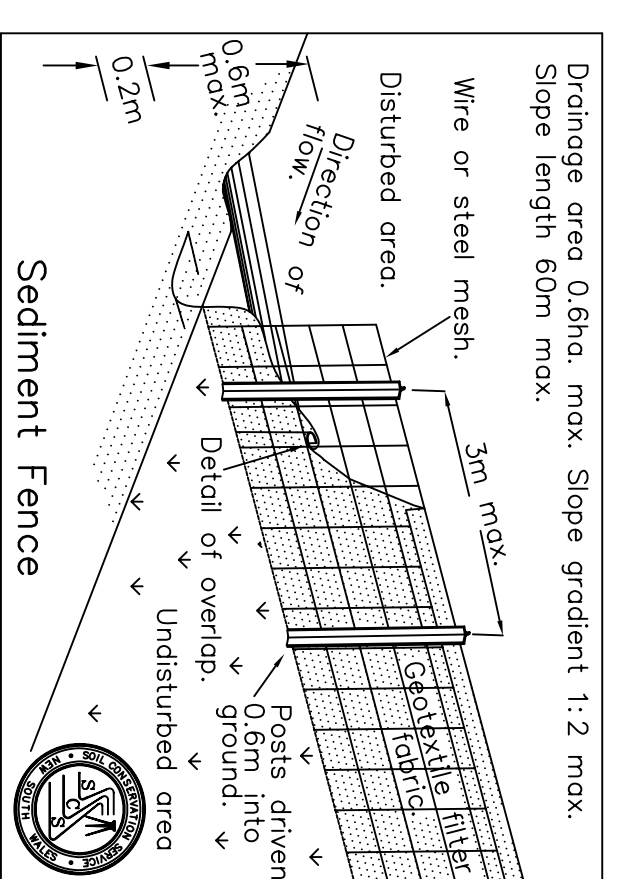
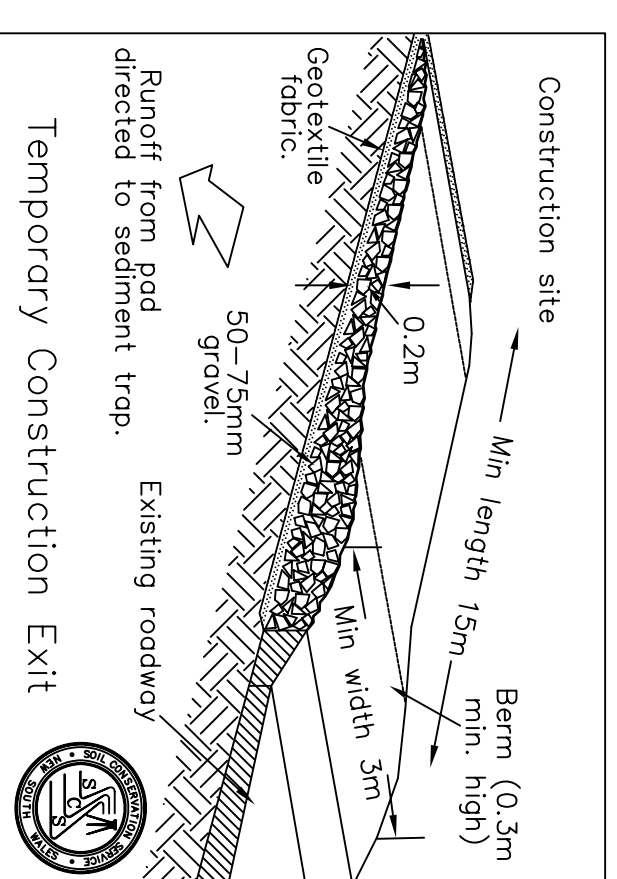
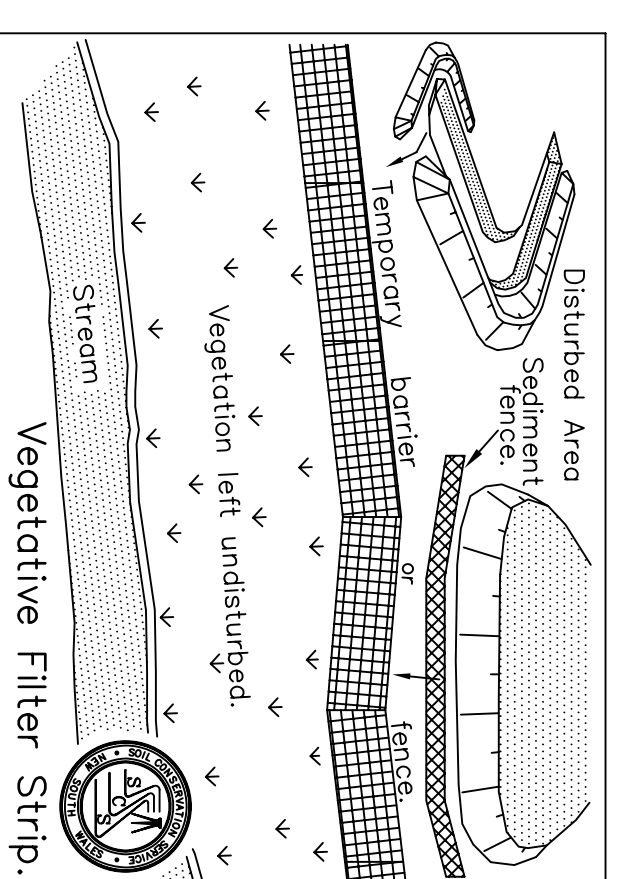
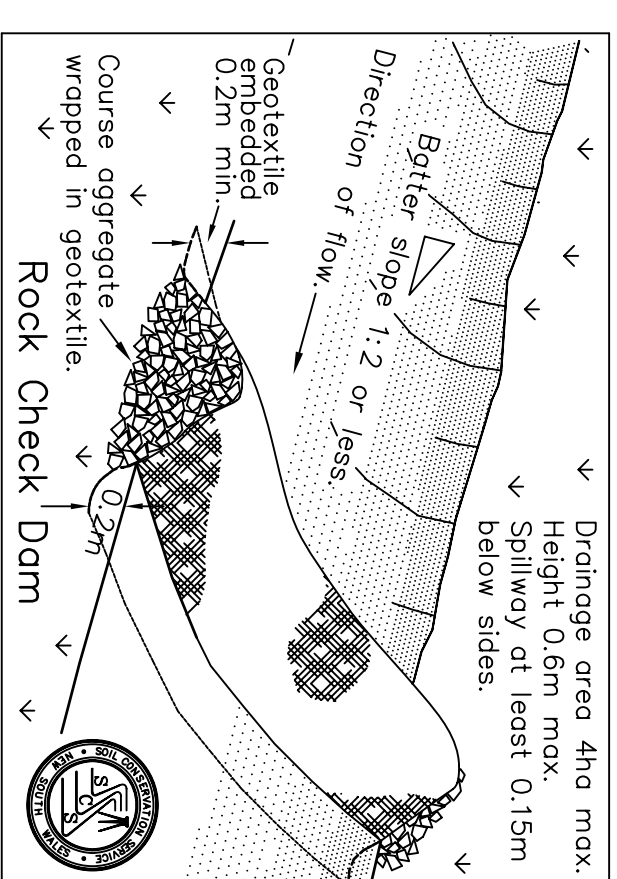
**EROSION CONTROL MEASURES:**

- E1 CONTROLLED BY WORKS ARE TO BE RE-ESTABLISHED PRIOR TO THE COMPLETION OF EACH DAYS WORK.
- E2 THE CONTRACTOR IS TO STABILISE TOPSOIL STOCKPILE AND ALL DISTURBED AREAS AS SOON AS THE RECEPTUAL LEVELS STABILISATION TO BE BY PROPOSED OTHER METHOD APPROVED BY SUPERINTENDENT AND COUNCIL ENGINEER. ALL SEEDED AREAS TO BE WATERED TWICE WEEKLY UNTIL GRASS IS ESTABLISHED OR COVERED WITH BITUMEN WATER MULCH. SEED MIXTURE FOR RESERVES, FOOT WAYS AND EMBANKMENTS TO BE IN ACCORDANCE WITH COUNCIL SPECIFICATION. FOR OTHER AREAS A RECOMMENDED LIST OF PLANT SPECIES FOR TEMPORARY COVER IS:
  - JAPANESE MILLET 125kg/ha SPRINGER
  - JAPANESE MILLET 25kg/ha SUMNER
  - JAPANESE MILLET 10kg/ha AUTUMN
  - OATS (RYEGRASS) 30kg/ha WINTER
  - GYPSUM AND MULTIGRANULAR ENRICH FERTILIZER AT RATES TO BE DETERMINED BY SUBSOIL AND TOPSOIL TESTING.
  - A RECOMMENDED LIST OF PLANT SPECIES FOR PERMANENT GRASSINGS IS:
    - DURAPURE PARK BLEND (WRIGHT STEPHENSON SEED MIX) + COVER CROP
    - JAPANESE MILLET
    - OATS (RYEGRASS) 10kg/ha
    - HORNBURDED TUFFE TALL FESCUE 15kg/ha
    - PERENNIAL RYEGRASS 37kg/ha
    - CHEWINGS FESCUE 5kg/ha
    - UNMULLED COUGH
    - TACKIFYING AGENT (CURASOL OR SIMILAR) 4kg/ha
- E3 WHERE SURFACE SLOPES ARE MORE THAN 6H:1V BITUMEN STRAW MULCH SHALL BE APPLIED AFTER SEEDING AT THE FOLLOWING RATES:
  - MULCH 0.5kg/m<sup>2</sup>
  - BITUMEN EMULSION 0.25 l/m<sup>2</sup> (50% WATER, 50% SLOW BREAKING ANIONIC EMULSION MIX)
- E4 DUST CONTROL MEASURES SHALL BE IMPLEMENTED CONTINUOUSLY DURING CONSTRUCTION WORKS TO THE SATISFACTION OF THE SUPERINTENDENT AND COUNCIL.
- E5 TOPSOIL SHALL BE RESPREAD AND STABILISED AS SOON AS POSSIBLE. DISTURBED AREAS SHALL BE LEFT WITH A SCARIFIED SURFACE TO ENCOURAGE WATER INFILTRATION AND ASSIST HEATING IN TOPSOIL.
- E6 THE CONTRACTOR SHALL TEMPORARILY REHABILITATE ANY DISTURBED AREAS WITHIN 60 DAYS WHERE FINAL SHARPING HAS OCCURRED THE CONTRACTOR

**SEDIMENT CONTROL MEASURES:**

- S1 DURING ROADWORKS, TEMPORARY DIVERSION BARRS SHOULD BE CONSTRUCTED TO LIMIT SLOPE LENGTH, WHERE POSSIBLE, IN ACCORDANCE WITH THE FOLLOWING:
 

RECOMMENDED MAXIMUM SPACING BETWEEN CROSS BARRS ON ALL ROADS	MAXIMUM SPACING (m)
SLOPE 0 TO 1%	150
1 TO 3%	100
3 TO 5%	70
5 TO 10%	50
10 TO 17%	16
- S2 ALL STORMWATER PITS TO BE COVERED OR DROP INLET SEDIMENT TRAPS IN ACCORDANCE WITH DRAWINGS IN THIS SHEET SHALL BE PROVIDED. KERB INLET TRAPS ARE TO BE INSTALLED AFTER COMPLETION OF PAVING.
  - S2.1 SEDIMENT TRAPS AND BASINS ARE TO BE MAINTAINED SUCH THAT:
    - (A) SEDIMENT IS REMOVED SUCH THAT NO LESS THAN 70% OF THE DESIGN CAPACITY REMAINS AT ANY ONE TIME
    - (B) MATERIALS ARE REPALED OR REPAIRED AS REQUIRED TO ENSURE SERVICEABILITY OF BOTH THE ELEMENT AND THE TRAP OR BASIN.
- S3 PERMANENT DRAINAGE STRUCTURES INCLUDING PITS ARE TO BE HANDED OVER IN A CLEAN CONDITION AT THE COMPLETION OF THE CONTRACT MAINTENANCE PERIOD.
- S4 FOLLOWING COMPLETION AND RESTORATION OF SITE REMOVE ALL MATERIALS AND FILL DIVERSION DRAINS, WATERWAYS, SEDIMENT TRAPS, AND SEDIMENT BASINS AND COMPACT IN ACCORDANCE WITH COUNCIL SPECIFICATION TO MATCH LEVELS OF THE PREVIOUSLY COMPLETED WORKS. PROVIDE 150mm TOPSOIL AND HYDROSEED.
- S5 ALL TREES OTHER THAN THOSE IN ROAD RESERVES TO BE RETAINED UNLESS APPROVED FOR REMOVAL BY SUPERINTENDENT.
- S6 STRIP TOPSOIL OVER THE SITE TO AN AVERAGE DEPTH OF 150mm UNLESS OTHERWISE APPROVED BY THE SUPERINTENDENT. TOP SOIL STOCKPILES SHALL NOT EXCEED 2m IN HEIGHT AND BATTER SLOPES TO BE 3H:1V MAXIMUM.
- S7 ALL ACCESS TO SITE TO BE THROUGH SITE COMPOUND. TRUCK SHAKER TO BE INSTALLED AND MAINTAINED AT GATEWAY TO COMPOUND. SITE SHALL BE FULLY FENCED TO PREVENT ACCESS FROM EXISTING ROADS.
- S8 ACCESS POINT TO ALLOW MACHINE ENTRY / EXIT ARE TO INCLUDE A ROUNDED DIVERSION BANK 0.3m HIGH WITH 10H:1V BATTERS TO DIVERT RUNOFF TO SEDIMENT FENCES EITHER SIDE OF ENTRY.
- S9 NO TRAFFIC AREA TO BE ENCLOSED WITH BARRIADRE WEBBING FENCE TO MAINTAIN EXISTING PASTURE DOWNSLOPE FROM SEDIMENT CONTROL. LEVEL SPREADER UNDER NO CIRCUMSTANCES SHALL THE CONTRACTOR DISTURB ANY AREAS OUTSIDE THE BASIN CATCHMENT BOUNDARY.
- S10 A MARKER IS TO BE PLACED WITHIN EACH SEDIMENT POND TO INDICATE THE LEVEL OF THE POND ABOVE WHICH CAPACITY IS AVAILABLE FOR CONTAINMENT OF ALL RUNOFF EXPECTED FROM THE DESIGN STORM.
- S11 TEMPORARY KERB INLET SEDIMENT TRAPS TO BE PROVIDED TO ALL EXISTING KERB INLETS.
- S12 THE CONTRACTOR SHALL PROVIDE A 10m WIDE TUFFE STRIP BEHIND ALL KERB AND BUTTER AT COMPLETION OF FOOTPATH FORMATION.
- S13 WHERE FLOCCULATION OF BASINS IS REQUIRED UNLESS OTHERWISE SPECIFIED THE RECOMMENDED INITIAL DOSING IS 32KG OF GYPSUM PER 100 CUBIC METRES OF BASIN VOLUME. THE CONTRACTOR MAY VARY THIS RATE SUBJECT TO TESTING OF PREVIOUS WATER SAMPLES AND THE AGREEMENTS OF THE REQUIRED WATER QUALITY STANDARDS. FLOCCULATION TO TAKE PLACE WITHIN 48 HOURS OF AN EVENT.
- S14 THE CONTRACTOR SHALL MAINTAIN A LOG BOOK OF FAILING:
  - RECORDS OF ALL RAINFALL
  - CONDITION OF SOIL AND WATER MANAGEMENT STRUCTURES
  - ANY APPLICATION OF FLOCCULATING AGENTS TO SEDIMENT BASIN
  - VOLUMES OF ALL WATER DISCHARGED FROM SEDIMENT BASINS
  - ANY ADDITIONAL REMEDIAL WORKS REQUIRED
 THE LOG BOOK SHALL BE MAINTAINED ON A WEEKLY BASIS AND BE MADE AVAILABLE TO ANY AUTHORISED PERSON UPON REQUEST. THE ORIGINAL LOG BOOK SHALL BE ISSUED TO THE PROJECT MANAGER AT THE COMPLETION OF THE WORKS.
- S15 THE CONTRACTOR SHALL AT ALL TIMES RESTRICT CONSTRUCTION EQUIPMENT MOVEMENT TO THE ESSENTIAL CONSTRUCTION AREAS. THE CONTRACTOR SHALL NOT EXTEND LAND DISTURBANCE BEYOND 2m FROM THE EDGE OF ANY ESSENTIAL CONSTRUCTION ACTIVITY.



REV	DATE	DESCRIPTION	BY	VER	APP
06	02/09/06	REQUIRED DATA ENIGNS	RAP	RAP	
04	07/02/06	GENERAL AMENDMENTS	RAP	RAP	
03	08/11/2005	REVISSED LAYOUT WITH AVERAGE 30m BUFFER	RAP	RAP	
02	02/08/05	ISSUE FOR DDA APPROVAL	RAP	RAP	
01	01/08/05	ISSUE FOR COMMENTS	RAP	RAP	

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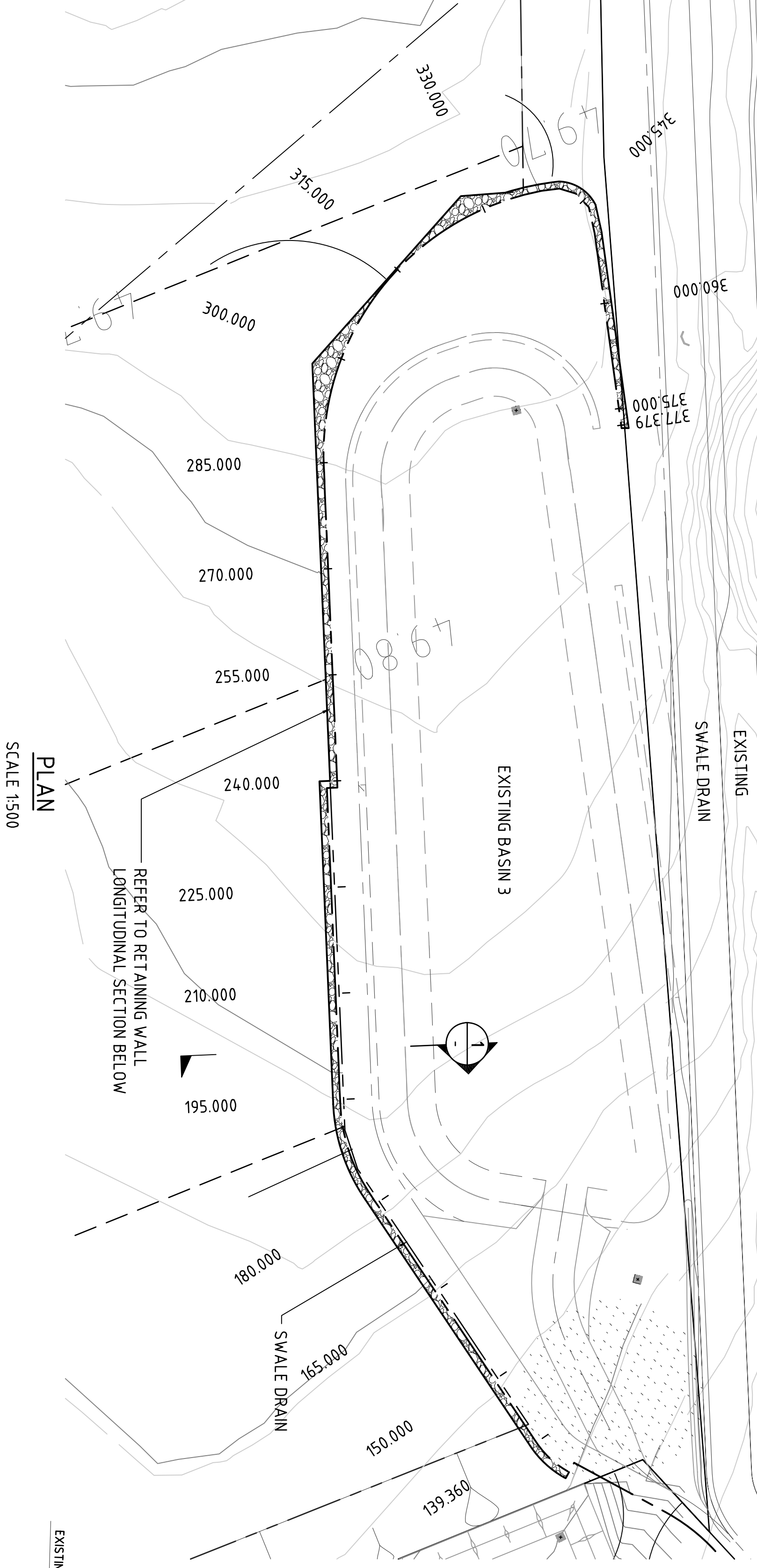
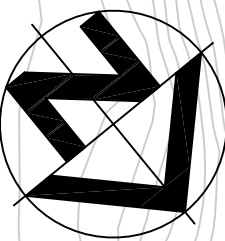
VERIFICATION	INITIALS	SIGNATURE	DATE
DRAFTING			
DESIGN			
VERIFY			
APPROVED			

Client: **CSR LIMITED**  
 Project: **EASTERN SITE WORKS SUBDIVISION BULK EARTHWORKS**

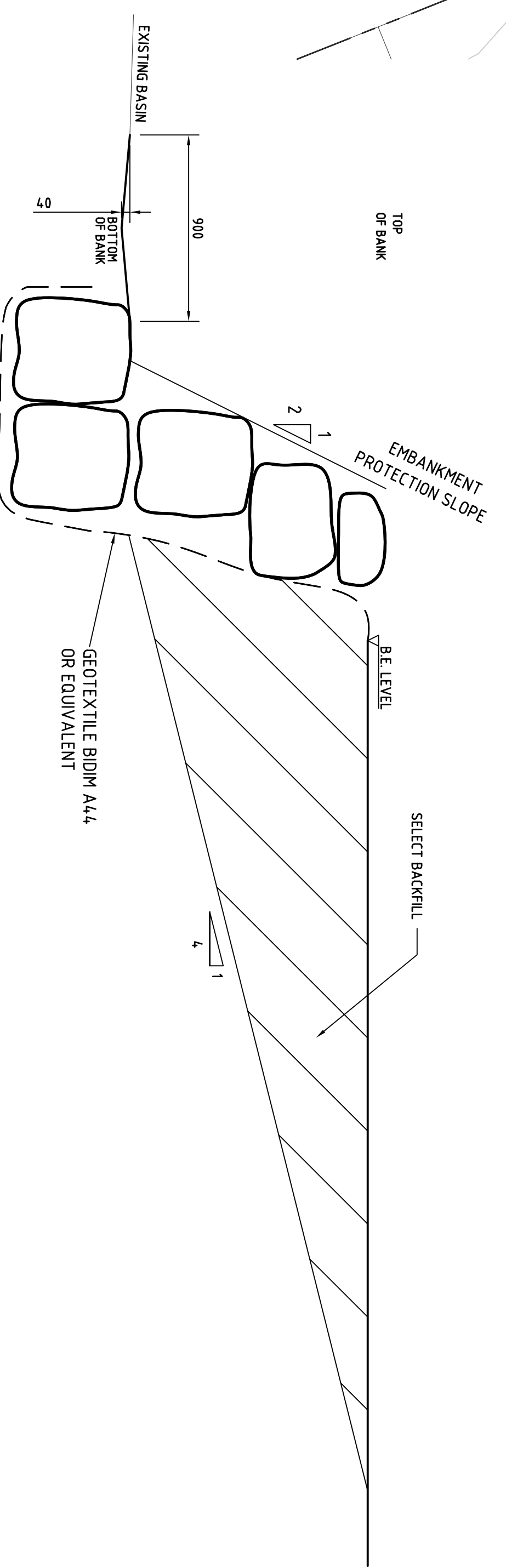
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 Drawn by: BU  
 Design by: AK  
 Project No: W090303.12  
 Drawing No: DA111  
 Sheet: 11 OF 12  
 Scale: NTS  
 Rec: 05

**PRELIMINARY**





PLAN  
SCALE 1:500



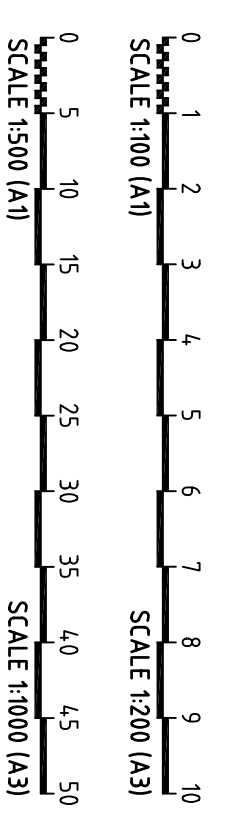
SECTION 1  
SCALE 1:20

NOTE:  
WALL AREA: 686.42m<sup>2</sup>

CHAINAGE	TOP OF WALL R.A.P.	DESIGN R.A.P.	DATE
139.36	49.686	48.15	
150	49.669	47.641	
165	49.644	47.026	
180	49.619	46.91	
195	49.595	46.91	
210	49.571	46.91	
225	49.547	46.91	
240	49.523	46.91	
255	49.5	47.09	
270	49.476	47.09	
285	49.452	47.097	
300	49.431	47.2	
315	49.416	47.363	
330	49.41	47.525	
345	47.625	47.625	
360		47.289	
375	47.093	47.093	
377.38	47.09	47.09	

LONGITUDINAL SECTION RETAINING WALL

Horizontal scale 1:500  
Vertical scale 1:100



**PRELIMINARY**  
 CSR LIMITED  
 EASTERN SITE WORKS SUBDIVISION  
 BULK EARTHWORKS  
 BASIN 3 RETAINING WALL  
 LONGITUDINAL SECTION  
 Drawing No: DA112  
 Sheet: 12 OF 12  
 Scale: 1:250  
 Ref: 02

Drawn by: AK	Checked by: AK	Design by: AK/IVA	Project No: M09033.12
Issue for: ISSUED FOR COMMENTS	Issue for: ISSUED FOR COMMENTS	Issue for: ISSUED FOR COMMENTS	Issue for: ISSUED FOR COMMENTS
Rev: 01	Date: 02/02/06	Rev: 01	Date: 02/02/06

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 Quality Management ISO 9001  
 Environmental Management ISO 14001  
 Health & Safety Management ISO 45001