

In the matter of the
Commissions Of Inquiry Act 1950

Commission of Inquiry Order (No. 1) 2011

QUEENSLAND FLOODS COMMISSION OF INQUIRY

CLAYTON UTZ--(Ipswich City Council)
2nd Statements of Gary Ellis
#1763240 & Attach GE-1 #1763251
File 539764/1
Volume 1 of 2 ORIGINAL

Second Witness Statement of Gary Ellis

Engineering and Environment Manager
Ipswich City Council

Volume 1 of 2

QFCI

Date: 28/10/11 Jm

Exhibit Number: 907

In the matter of the

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QUEENSLAND FLOODS COMMISSION OF INQUIRY

Second Witness Statement of Gary Ellis

Engineering and Environment Manager
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	Description	Date
GE-1	Development Application (3262/10)	19 May 2010
GE-2	Development Application (6291/2009)	8 October 2009
GE-3	Letter regarding lapsing of 6291/09	31 May 2010
GE-4	Decision Notice for 3262/10	15 July 2010
GE-5	Figure 1 Proposed within Lots 51-55	Undated
GE-6	Riverlinks Central – Flood Study, Job Number 3502/84-2	23 July 2008
GE-7	Riverlinks Central – Flood Study, Job Number 3503/70	August 2009
GE-8	Riverlinks Central – Flood Study, Job Number 3503/70	7 October 2009
GE-9	Council letter to DERM concerning the third party advice	26 May 2010
GE-10	Letter to ICC from Mr White	22 October 2010
GE-11	Cardno response to Mr. White's letter of 22 October 2010	12 November 2010
GE-12	Letter from GeoEnvironmental Consultants	6 January 2011
GE-13	Letter from VDM Consulting to the Council	25 January 2011

I, Gary Stephen Ellis, of [REDACTED] Ipswich, in the State of Queensland swear as follows:

INTRODUCTION AND QUALIFICATIONS

1. My qualifications are set out at paragraphs 1 to 4 of my statement dated 13 October 2011.
2. The sources of information for the matters set out in this statement are:
 - (a) my personal knowledge and recollection of relevant events; and
 - (b) my review of the relevant Ipswich City Council (ICC or Council) development application files.
3. I provide this statement in response to the statement of Mr. Nicholas White, dated 11 October 2011, with regards to operational works application 6291/2009 and operational works application 3262/2010.
4. The further statement of Brett Davey, provides a response to the statement of Mr. White with regards to material change of use application 6293/2009 and material change of use application 2727/2010.

APPLICATION 6291/2009 AND 3262/2010

5. Application 3262/10 and 6291/2009 involved bulk earthworks and remediation works for Lots 51-55 on SP222487. Copies of the application documents are included at attachments **GE-1** and **GE-2**, respectively.
6. Application 6291/09 lapsed. A copy of the letter from Council to the Applicant regarding the lapsing of Application 6291/09 is included as attachment **GE-3**.
7. Application 3262/10 was received by Council on 19 May 2010 as a subsequent application following on from the lapsed application 6291/09. Application 3262/10 was approved by Council on 13 July 2010. A copy of the decision notice is included at attachment **GE-4**. Application 3262/10 did not undergo public notification, as it was code assessable under the Ipswich Planning Scheme.
8. The works proposed by Application 3262/10 includes a combination of remediation works for contamination and the excavation and placement of fill within Lots 51-55 (refer Figure 1 at attachment **GE-5**). The application does not include the southern lower portion of Lot 54.

[REDACTED]
[REDACTED]
Solicitor

9. Application 3262/10 is an Operational Works application for earthworks not associated with a material change of use (MCU) and is code assessable in accordance with Ipswich Planning Scheme.
10. Application 3262/10 was supported by a series of inter-related flood investigations prepared by Cardno, concerning the proposed earthworks and development, including:
 - (a) "Riverlinks Central – Flood Study, dated 23 July 2008", Job Number 3502/84-2 (attachment **GE-6**); and
 - (b) "Riverlinks Central – Flood Study, dated August 2009", Job Number 3503/70 (attachment **GE-7**); and
 - (c) "Riverlinks Central – Flood Study, dated 7 October 2009", Job Number 3503/70. This report investigates any hydraulic impact the proposed development (Application 6293/09 – MCU) may have on the local and regional flooding and includes the analysis of the August 2009 report (attachment **GE-8**).
11. Council issued a letter to the Contaminated Land Unit of DERM as a third party advice agency dated 26 May 2010 seeking comments on the application to be forwarded to Council by 11 June 2010. A copy of the letter to DERM is included at **GE-9**. There is no evidence on Council's corporate system of a response from DERM.
12. Application 3262/10 was approved by Council on 13 July 2010 and imposed conditions, including the following (refer to **GE-4**):
 - (a) Condition 6 - Engineering Certification
 - (b) Condition 8 - Earth works
 - (c) Condition 8 - Stormwater and Drainage
 - (d) Condition 11 - Internal Works
13. The approval also included concurrence agency responses from DTMR and an advice Agency response from Energex.
14. After the approval of Application 3262/10, Mr. White queried aspects of the flood study presented in support of the application with Council. A copy of Mr. White's letter is attached at **GE-10**.
15. Council requested that the author's of the flood study, Cardno provide a response concerning Mr White's submission and the Cardno response was provided in a letter dated 12 November

2010 and provided to Mr White. A copy of that letter is included at attachment GE-11. That letter states that:

“The impact of the development on peak velocities for a minor flood events (10 year ARI event) was shown to be from -0.08 to 0.09 m/s in the area of the development, with negligible impact upstream or downstream. This change in velocity is not considered sufficient to result in changes to the natural bank erosion and deposition behaviour. The proposed development will widen the flow width in the northern part of the development which will result in reduced velocities in this area.”

RESPONSE TO STATEMENT OF MR. WHITE

Paragraphs noted below are references to the paragraph numbers in Mr White's statement

Paragraph 3


16. Mr White's reference to him becoming aware in January 2010 of an operational works application is likely to have concerned application 6291/09 which was lodged 12 October 2009 but subsequently lapsed in May 2010. These application documents were available on Council's website through its PD Online application search (refer to paragraph 37 below for more detail). Application 3262/10 was subsequently lodged in 21 May 2010.

Paragraphs 4, 8 and 18

17. Paragraphs 4 and 8 of Mr White's statement raises a number of concerns about the proposed development located on Lot 55 including: *“increased flooding towards our property; toxic contamination; erosion to properties on the opposite bank; increased dust and a flawed vegetation management plan”*.
18. Also Mr White statement identifies claimed deficiencies in the 2008 Cardno study, including *“...failure to include 100 year flood scenarios; modelling based on data that does not include post 1974 flood impact; the instability of the proposed site area as result of the planned 19.5m platform; failure to study likely flood scenarios and erosion of properties on the west bank”*.
19. Mr White has concerns *“relating to the inappropriate re-profiling of the riverbank, which I believe will increase flood risk and flood flows...”*.

I responds to these paragraphs as follows:

20. The flood investigations set out in paragraph 10 addressed the increased potential for runoff produced by the proposed development (Material Change of Use applications 6293/09 and 2727/10) and proposed earthworks in the open space and other zoned areas.


Solicitor

21. The study dated 7 October 2009 (GE-8), concluded that the proposed works will have no discernable adverse impact on flood levels in the Bremer River. Further, in some instances the predicted afflux had decreased. In terms of proposed Bremer River frontage earthworks, Cardno Report dated July 2008 (GE-6) states:

“MIKE11 Modelling has shown that the proposed development, due to compensatory excavation, does not increase flood levels for neighbouring properties. The proposed development does produce slight increases to the peak velocities. However, these increases are constrained to the area of development and are only observed for major flood events, so the impact is considered to be minor.”

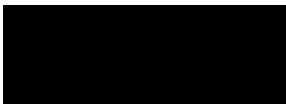
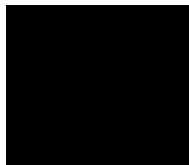
22. In terms of the external local catchment conveyance and flooding, the predicted results of the Cardno flooding assessment indicate that the proposed development on Lot 55 (both in terms of the impact of the development upon hydrology and changes to ground levels) will not adversely impact the flood levels upstream of the proposed development. The identified impacts are all contained within the subject site and will not significantly impact any adjacent properties. Moreover results of a sensitivity analysis indicate that regional flood levels, and therefore existing property flood immunity, are not changed for tailwater variations and coincident Bremer River flooding.

23. The flood studies set out in paragraph 10 were reviewed by myself in consultation with Principal Development Engineer [REDACTED] (formerly Works Department – Senior Hydraulics Engineer). Additionally, past flood investigations concerning Riverlink Shopping Centre were reviewed by Council’s Works Department, including the then Works Department Manager [REDACTED].

24. The determination of the subject application was reliant upon the satisfactory outcomes of the respective flood study reports.

25. The flood study was undertaken and conducted by a reputable engineering consultancy Cardno who possess suitably qualified and experienced staff concerning hydrological and hydraulic investigations. These subject investigations were internally reviewed and approved by Cardno personnel [REDACTED] who is presently a Registered Professional Engineer of Queensland (RPEQ) for the “civil” area of engineering.

26. The Cardno developed model was based on the MIKE11 hydraulic model established for Ipswich Rivers Flood Study by consultants Sinclair Knight and Merz (SKM) in 2000. The model is one dimensional in nature, *“as the site is located on a relatively straight stretch of the Bremer River it is considered that eddy flows will be minimal and do not need to be modelled in this case”* (Cardno letter to ICC dated 12 November 2010). Each respective study examined



Solicitor

both the Bremer River 18 hour (using the 100 ARI for SKM 2000) and Brisbane River 30 hour flood (using the Q100 under the Ipswich Planning Scheme).

27. These studies provided ICC with the necessary assurance concerning Cardno model accuracy, relevancy and validity to model and simulate the impacts, if any, of the proposed planned filling, cut and profiling within the Riverlink Development and adjacent to the Bremer River.
28. An Environmental Management Plan (EMP), which includes a site Remediation Plan had been prepared for the site by VDM Consulting. The EMP addresses sediment and erosion control. Condition 8 of the Development Approval requires earthworks to be undertaken in accordance with the EMP.
29. Management of contamination and remediation of that contamination on the land is a matter that is within the jurisdiction of DERM rather than Council. [REDACTED] (of WSP Environmental Pty Ltd) has been appointed Third Party Reviewer (TPR) for the subject site and concluded that *“the final Remediation Plan, prepared by GeoEnvironmental, adequately addresses DERM guidelines for the remediation and validation of the portion of the Ipswich Riverlink site in question (Lots 53-55)”*. Further the TPR acknowledges and approves the final Remediation Plan dated 9 February 2010 with conditions and that the Site Management Plan (SMP) will be reviewed upon completion of the remedial work. The submitted Remediation Plan is dated 9 February 2010. The works are required to be supervised by a suitably qualified person in accordance with Section 381 of the Environmental Protection Act 1994 with oversight by the appointed Third Party Reviewer to ensure that any suspected or unforeseen contamination issues are appropriately addressed.
30. The proposed Bremer River frontage earthworks include both placement of fill and re-profiling of existing general fill and in-situ natural material. Specifically the re-profiling involves excavation of these areas in order to stabilise existing fill which is in limited stability equilibrium and provide the necessary compensatory earthworks to ensure that the development did not impact on peak flood levels for neighbouring properties. All proposed earthworks are subject to supervision and certification by RPEQ (Geotechnical) and in accordance with condition as follows:

Any allotment or other filling creating a soil depth of 500mm or more must be conducted in accordance with Australian Standard 3798. Test results as required by Australian Standard 3798 at Responsibility Level 1, and a certificate of quality and uniformity of fill must be provided by a RPEQ.
31. Dust control is an operational matter and is governed by the approved EMP which specifically addresses issues surrounding air pollutants within Appendix E – Comprehensive Health & Safety Plan.

32. In response to Mr White's comments on a "flawed vegetation management plan", there is no approved Vegetation Management Plan (VMP) associated with the operational works application 3262/10 approval, as this is more usually required when the application for MCU is made. The site will require future planning applications which will require the dedication of open space. That open space will be required to be fit for purpose, including for weed management and rehabilitation of the riparian corridor to minimise erosion and sedimentation risks. Riparian corridor widths and extent for open space is determined in accordance with the Ipswich Planning Scheme, which predates the Healthy Waterways Strategy 2008. Landscaping will usually be required in accordance with an approved Landscaping Plan. All relevant vegetation applications are assessed against the Ipswich Planning Scheme and the Riparian Corridor Revegetation Guideline where applicable.

Paragraph 5

33. Paragraph 5 of the White statement refers to "*further concerns of toxic fill and subterranean fires at the site*".
34. Matters regarding contamination are dealt with at paragraphs 29. Fire management is addressed in the EMP for the site prepared by VDM Consulting. Condition 8 of the Development Approval requires earthworks to be undertaken in accordance with the EMP.

Paragraph 17

35. Paragraph 17 of the White statement exhibits correspondence of Mr. White and his partner Ms. Tilbrook which state that there has been "*...extensive sediment and contaminant loss from the site into the river system...*" following the 2011 flood event.
36. Site inspections have been undertaken by qualified experts post the January flood event:
- (a) GeoEnvironmental Consultants attended the site on 5 January 2011 and prepared a letter to the applicants dated 6 January 2011. A copy is attached at attachment GE-12. The letter states that "*Overall, installed control measures appear to have effectively handled stormwater and sediment runoff*" and "*there was no evidence of scouring or removal of large quantities of contaminated soil from the flood affected area*".
 - (b) VDM Consulting attended the site on 21 January 2011 and prepared a letter to the Council dated 25 January 2011. A copy is attached at attachment GE-13. The letter states that "*Overall the site inspection confirmed that the areas not inundated generally performed as intended without loss of contaminated material into the Bremer River from the two land slips, where the material has been contained within the site*".

Paragraph 18

37. Mr White states at paragraph 18 that "*...attaining of applications and other supporting documents was difficult...*" All applications when lodged are publicly accessible on PD Online. This includes any supporting material lodged in respect of the applications including flood studies. This process is also discussed in the further Statement of Brett Davey.

SWORN this 25th day of October 2011 at Ipswich in the State of Queensland in the presence of:

.....
[Redacted Signature]
Gary Stephen Ems (Deponent)

[Redacted Signature]
(Solicitor)

Attachment GE-1



MICHEL
GROUP SERVICES

MEMBERSHIPS:

Association of
Consulting Surveyors
Queensland

Urban Development
Institute of Australia

DIRECTORS:



Quality Assurance:
ANZSIC ISO 9001:2008
ACSIS Reg. No. 411

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18 May 2010

Our Ref. 874206

The Manager
Engineering and Environment Branch
Ipswich City Council
PO Box 191
IPSWICH QLD 4305

Attn: Mr Aaron Katt

Dear Mr Katt,

**RE: APPLICATION FOR OPERATIONAL WORKS APPROVAL:
OPERATIONAL WORKS (BULK EARTHWORKS) AT RIVERLINKS.
NORTH STREET, LAWRENCE STREET AND W.M. HUGHES STREET,
NORTH IPSWICH.
LOTS [REDACTED]**

Please find attached supporting documentation that is seeking Council approval for Operational Works (Bulk Earthworks) over the abovementioned allotments. As indicated, the application is lodged over 5 allotments, all owned by Lipoma Pty Ltd with the proposed works seeking to address the contamination issues associated with the sites.

The following correspondence outlines the relevant background information, details of the relevant supporting information and an assessment of the applicable referral agencies. It is noted that 2 complete copies of the application material have been provided as well as 2 additional copies of the relevant drawings and an electronic copy of the complete application material on CD.

Council's application fee of \$650 is also attached as agreed with Aaron Katt.

BACKGROUND

As Council would be aware three separate applications were previously lodged seeking approval for the proposed works. These applications lapsed as they were not referred within the prescribed timeframes. This new application replaces the three lapsed applications. As Council would be aware a full and final response to Council's information request had been lodged for these applications. This application material includes the various specialist reports etc prepared for these applications and it is assumed that Council will not require further information to complete their assessment of the application.

SUPPORTING INFORMATION

It is noted that three separate sets of design drawings have been prepared which address the three distinct areas of the site (refer to Table 1 below), however it is important to note that the works will occur in a coordinated manner across all three sites.

Table 1:

RELEVANT LOTS	CONSULTANT	APPENDIX NO.
51, 52 & 53	Yeats Consulting Engineers	1
54 – Northern Section	VDM Consulting	2
54 – Southern Section	VDM Consulting	2A
55	Yeats Consulting Engineers	3

An Environmental Management Plan (EMP) has been prepared for the site by VDM Consulting and is attached in Appendix 4. The EMP addresses the following issues (note that all of the issues raised in Council's previously issued information request are addressed):

- The relevant background information.
- The site-specific remediation plan.
- Details of the proposed earthworks across all sites including a staging plan.
- Details of the internal haul roads.
- Stormwater management.
- Disposal of wastewater leachate.
- Fire management.
- Waste management.
- Work place health and safety.
- The EMP also includes a copy of the Remediation Plan prepared for the site and the Third Party Reviewers comments.

The EMP is intended to guide the overall earthworks operation and to inform the contractor employed to complete the works of the site specific issues, and will ensure that the works are undertaken in a coordinated manner with minimal environmental impacts.

The following additional points should also be noted with regard to the proposed works:

- The relevant Bulk Earthworks Drawings address erosion and sediment control as does the EMP.
- All work shall comply with the terms and conditions of all existing easements located within the subject site. It is anticipated that a condition will be included within the approval to ensure that the obligations of all easements are maintained throughout the construction and operational phases of the proposed development.
- With regard to potential flood impacts, it is noted that the Riverlinks Central Flood Study prepared by Cardno is attached in Appendix 5. This report demonstrates that the proposed works do not cause any increases in flood levels in private property upstream of the site. It is however noted that minor impacts will be generated within the allotments themselves, but as the lots are all under the same

ownership, this is not considered to be a barrier to Council approving the application.

- As Council would be aware, a sewer main traverses part of the site. No works with regard to this sewer main are proposed as part of the current application and it is noted that based on geotechnical advice and a structural assessment, the structural integrity of the line during the proposed earthworks is considered to be adequate for the following reasons:
 - The line is approximately 6-7m below the earthworks subgrade level providing sufficient cover.
 - Loads limited to earthmoving equipment
 - No material stockpiles are proposed over the sewer line
 - Adequate strength of in-situ soils

It is also anticipated that a condition of approval will require that any damages caused to the line as a result of the earthworks be remedied at the developer's expense.

- Existing approvals granted by DERM provide for the necessary demolition of the effected State heritage listed buildings (refer Appendix 6).
- As Council would be aware, sections of the site are reflected as open space on the Riverlinks Preliminary Approval. It is noted that open space dedication is not proposed as part of the current application. As Council would be aware the dedication of open space will occur as part of future development applications with specific details of the open space requirements to be assessed as part of those applications. We note that the open space areas indicated on the preliminary approval do not appear to be cadastrally based so further investigations as to the most desirable and practical position of future boundaries will occur as part of individual development applications. It is also noted that as per previous discussions, Council were not supportive of any references on the plans to infrastructure/issues that did not form part of the current application and it is noted that dedication of open space is not proposed.
- Adjoining owners were notified of the proposed works as part of the previous 3 OPW Applications. As the works being contemplated under this application is the same, it is argued that further notification is unnecessary (note that Council Officer's agreed with this position). Copies of the correspondence sent is attached in Appendix 7 and it is noted that no responses have been received to date.
- An assessment of the proposal against the Earthworks Code from the Planning Scheme is attached in Appendix 8.
- Morrison Geotechnic have prepared a report that details requirements of the fill batter (refer Appendix 9) and the design of the proposed works complies with these requirements.



REFERRAL AGENCIES

As indicated on the attached IDAS Checklist Forms, the following referrals are triggered:

- Department of Transport and Main Roads (DTMR) is triggered as a concurrence agency as the proposed works exceed the 10,000 tonne referral trigger specified in Schedule 11 of the *Sustainable Planning Regulation 2009*. As Council would be aware DTMR provided referral agency responses for the 3 previous applications advising that they have no requirements (refer Appendix 10). We have sought advice from DTMR as to whether these previous referral agency responses can be viewed as a referral agency response prior to lodgement of the application pursuant to section 271 of the *Sustainable Planning Act 2009*. As yet we have not had a response and will advise Council once DTMR's comments have been received.
- Energex is triggered as an advice agency as there is an Energex easement on this site and works are proposed in the easement. It is noted that while easements exist on Lots 54 and 55, works are only proposed with the easement located on Lot 55. These works involve the removal of contaminated material and will facilitate the removal of the site from the environmental management register.
- We would also like to note that referral to Queensland Rail (QR) is not triggered as the sites do not adjoin, nor are they within public transport corridors or future public transport corridors, nor do they adjoin rail corridor land, commercial corridor land, future railway land or a railway tunnel easement as mapped under the IDAS referral triggers (note that we assume that the adjoining infrastructure is not mapped by QR as it does not form part of the passenger transport network).

We will await Council's Acknowledgement Notice in due course and should you have any questions please do not hesitate to contact us.

Yours faithfully
Michel Group Services Pty Ltd



Town Planner

Cc.: Leda Developments Pty Ltd (Attn: )



Application Details - IDAS form 1

(Sustainable Planning Act 2009 version 1.0 effective 18 December 2009)

You **MUST** complete **ALL** questions unless the form indicates otherwise. Incomplete forms or forms without all necessary information and documentation will result in your application not being a properly made application.

For all development applications, you must:

- complete this form (*Application details - IDAS form 1*)
- complete any other forms relevant to your application
- provide any mandatory supporting information identified on the forms as being required to accompany your application.

All terms used on this form have the meaning given in the *Sustainable Planning Act 2009* or the *Sustainable Planning Regulation 2009*.

Applicant details (note: the applicant is the person responsible for making the application and need not be the owner of the land. The applicant is responsible for ensuring the information provided on all IDAS application forms is correct. Any development permit or preliminary approval that may be issued as a consequence of this application will be issued to the applicant.)

Please note: If there is more than one applicant, provide additional applicant details by clicking the "Add another applicant" button below.

Name/s (individual or company name in full)

Lipoma Pty Ltd C/ Michel Group Services Pty Ltd

For companies, contact name

[REDACTED]

Postal address

PO Box 2695 NERANG BC QLD 4211

Contact phone number

[REDACTED]

Mobile number (non-mandatory)

[REDACTED]

Fax number (non-mandatory)

[REDACTED]

e-mail address (non-mandatory)

[REDACTED]

1. What is the nature of development proposed? (tick all applicable boxes)

- material change of use of premises
- building work
- operational work
- reconfiguring a lot

2. What type of approval is being sought?

- development permit
 preliminary approval
 both - provide details below

3. Is the application for a mobile and temporary environmentally relevant activity (ERA)?

- No
 Yes - complete table A and then go to question 5

4. Location of the premises (complete table B and/or table C as applicable. Identify each lot in a separate row)**Table B - street address/lot for the premises or street address/lot on plan for the land adjoining or adjacent to the premises**

	Street Address				Lot on plan description		Local government area (e.g. Logan, Cairns)
	Unit No.	Street No.	Street name and official suburb/locality name	Post code	Lot No.	Plan type and plan no.	
<input type="checkbox"/> Street address / lot on plan <input type="checkbox"/> Street address / lot on plan for the land adjoining or adjacent to the premises (appropriate for development in water e.g. jetty, pontoon)	1	2					ICC
<input type="checkbox"/> Street address / lot on plan <input type="checkbox"/> Street address / lot on plan for the land adjoining or adjacent to the premises (appropriate for development in water e.g. jetty, pontoon)	2	20A					CC
<input type="checkbox"/> Street address / lot on plan <input type="checkbox"/> Street address / lot on plan for the land adjoining or adjacent to the premises (appropriate for development in water e.g. jetty, pontoon)	3	22					ICC
<input type="checkbox"/> Street address / lot on plan <input type="checkbox"/> Street address / lot on plan for the land adjoining or adjacent to the premises (appropriate for development in water e.g. jetty, pontoon)	4	48					ICC
<input type="checkbox"/> Street address / lot on plan <input type="checkbox"/> Street address / lot on plan for the land adjoining or adjacent to the premises (appropriate for development in water e.g. jetty, pontoon)	5	21A					ICC
<input checked="" type="checkbox"/> Street address / lot on plan <input type="checkbox"/> Street address / lot on plan for the land adjoining or adjacent to the premises (appropriate for development in water e.g. jetty, pontoon)							



Table C - premises coordinates (appropriate for development in remote areas, over part of a lot or in water e.g. channel dredging in Moreton Bay)

	Coordinates (note: place each set of coordinates in a separate row)				Zone reference	Datum	Local government area (If applicable)
	Easting	Northing	Latitude	Longitude			
1						<input type="checkbox"/> GDA94 <input type="checkbox"/> WGS84 <input type="checkbox"/> other	

5. Total area of the premises on which the development is proposed (indicate hectares or m²)

26.1169 hectares

6. Current use/s of the premises (e.g. vacant land, house, apartment building, cane farm, etc.)

1	Vacant Land
---	-------------

7. Provide a brief description of the proposal (e.g. six unit apartment building, 30 lot residential subdivision etc.)

Operational Works (Bulk Earthworks)

8. Is owner's consent required for this application? (refer to notes at the end of this form for more information)

- No
 Yes - complete either table D, table E or table F as applicable

Table D (note: do not complete this table if lodging the application on-line using Smart eDA)

Name of owner/s of the land

I/We, the above-mentioned owner/s of the land, consent to the making of this application.

Signature of owner/s of the land

Date

Table E

Name of owner/s of the land

Lipoma Pty Ltd A.C.N. 002 203 581

- The owner's written consent is attached or will be provided separately to the assessment manager

Table F

Name of owner/s of the land

- By making this application, I, the applicant, declare that the owner has given written consent to the making of the application.

9. Does the application involve a state resource? (e.g. the application involves state land, or taking quarry materials. Refer to the notes at the end of this form for more information)

- No Yes - complete table G

10. Identify if any of the following apply to the premises (tick applicable box/es)

- adjacent to a water body, watercourse or aquifer (e.g. creek, river, lake, canal) - complete table H
 on strategic port land under the *Transport Infrastructure Act 1994* - complete table I
 in a tidal water area - complete table J

Table H

Name of water body, watercourse or aquifer

1 Bremer River

11. Are there any existing easements on the premises? (e.g. for vehicular access, electricity, overland flow, water, etc.)

- No Yes - ensure the type, location and dimension of each easement is included in the plans submitted

12. Does the proposal include new building work or operational work on the premises? (including any services)

No Yes - ensure the nature, location and dimensions of proposed works are included in plans submitted

13. Is the payment of a portable long service leave levy applicable to this application? (refer to the notes at the end of this form for more information)

No - Go to question 15 Yes

14. Has the portable long service leave levy been paid? (refer to notes at the end of this form for more information)

No

Yes - complete table K and submit with this application the yellow local government/ private certifier's copy of the receipted QLeave Form

Table K	Amount paid	Date paid	QLeave Project Number (6 digit number starting with A, B, E, L or P)
1	\$7,875.00	11/5/2010	E063257

15. Has the local government agreed to apply a superseded planning scheme to this application under section 96 of the Sustainable Planning Act 2009?

No

Yes - provide details below

16. List below all of the forms and supporting information that accompany this application (include all IDAS forms, checklists, mandatory supporting information etc. that will be submitted as part of this application. Note: this question does not apply for applications made online using Smart eDA)

	Description of attachment or title of attachment	Method of lodgement to assessment manager
1	Planning Report contains all supporting information	mail

17. Applicant's declaration

By making this application, I declare that all information in this application is true and correct (note: it is unlawful to provide false or misleading information).



Notes for completing this form

Question 8:

- Section 263 of the *Sustainable Planning Act 2009* sets out when the consent of the owner of the land is required for an application. Section 260(1)(e) of the *Sustainable Planning Act 2009* provides that if the owner's consent is required under section 263, then an application must contain, or be accompanied by, the written consent of the owner, or include a declaration by the applicant that the owner has given written consent to the making of the application.
- Owner's consent is not required for a mobile and temporary ERA.

Question 9:

- Section 264 of the *Sustainable Planning Act 2009* provides that if a development involves a state resource, a regulation may require the application to be supported by certain evidence prescribed under the regulation. Schedule 14 of the *Sustainable Planning Regulation 2009* prescribes the state resources for which evidence is required to be given, and the evidence required, to support the application.

Question 13:

- *The Building and Construction Industry (Portable Long Service Leave) Act 1991* prescribes when the portable long service leave levy is payable.
- The portable long service leave levy amount and other prescribed percentages and rates for calculating the levy are prescribed in the *Building and Construction Industry (Portable Long Service Leave) Regulation 2002*.

Question 14:

- The portable long service leave levy need not be paid when the application is made, but the *Building and Construction Industry (Portable Long Service Leave) Act 1991* requires the levy to be paid before a development permit is issued.
- Building and Construction Industry Notification and Payment Forms are available from any Queensland post office or agency, on request from QLeave, or can be completed on the QLeave website at www.qleave.qld.gov.au. For further information contact QLeave on 1800 803 481 or www.qleave.qld.gov.au.

Privacy -the information collected in this form will be used by the Department of Infrastructure and Planning (DIP) in accordance with the processing and assessment of your application. Your personal details will not be disclosed for a purpose outside of the IDAS process, except where required by legislation (including the *Right to Information Act 2009*) or as required by Parliament. This information may be stored in a departmental database. The information collected will be retained as required by the *Public Records Act 2002*.

OFFICE USE ONLY

Date received

Reference numbers

NOTIFICATION OF ENGAGEMENT OF A PRIVATE CERTIFIER

To:

Council. I have been engaged as the private certifier for the building work referred to in this application.

Date of engagement	Name	BSA Certification license number	Building classification/s



QLEAVE NOTIFICATION AND PAYMENT (for completion by assessment manager or private certifier if applicable)

	Description of the work	QLeave Project Number	Amount paid (\$)	Date paid	Date received form sighted by assessment manager	Name of officer who sighted the form
1						

The *Sustainable Planning Act 2009* (SPA) is administered by the Department of Infrastructure and Planning. This form and all other required application materials should be sent to your assessment manager and any referral agencies.



Building or operational work assessable against a planning scheme - IDAS form 6

(Sustainable Planning Act 2009 version 1.0 effective 18 December 2009)

This form must be completed for development applications for building works or operational work assessable against a planning scheme.

You **MUST** complete **ALL** questions unless the form indicates otherwise. Incomplete forms or forms without all necessary information and documentation will result in your application not being a properly made application.

For all development applications, you must:

- complete *Applicant details - IDAS form 1*
- complete any other forms relevant to your application
- provide any mandatory supporting information identified on the forms as being required to accompany your application.

All terms used on this form have the meaning given in the *Sustainable Planning Act 2009* or the *Sustainable Planning Regulation 2009*.

This form can also be used for development on strategic portland under the *Transport Infrastructure Act 1994*.

1. What is the nature of the work that requires assessment against a planning scheme? (tick applicable box/es)

- building work - complete table A operational work - complete table B

Table B

What is the nature of the operational work made assessable in the planning scheme? (tick applicable box/es)

- | | | |
|---|--|--|
| <input type="checkbox"/> road works | <input type="checkbox"/> stormwater | <input type="checkbox"/> water infrastructure |
| <input type="checkbox"/> drainage Works | <input checked="" type="checkbox"/> earthworks | <input type="checkbox"/> sewerage infrastructure |
| <input type="checkbox"/> landscaping | <input type="checkbox"/> signage | <input type="checkbox"/> clearing vegetation under the planning scheme |
| <input type="checkbox"/> other - please specify below | | |

What type of approval is being sought? (if you have indicated multiple works in the above question, please use an attachment to this form to detail each approval request)

- development permit preliminary approval both - specify below

Is the operational work necessary to facilitate the creation of new lots? (e.g. subdivision)

- No Yes - specify the number of lots being created

Are there any current approvals associated with this application? (e.g. material change of use)

- No Yes - provide details below





	List of approval reference/s	Date approved	Date approval lapses
1	Riverlink Preliminary Approval		

2. What is the dollar value of the proposed building work? (inc GST, materials and labour)	\$ 1,500,000
---	---------------------



3. Confirm the following mandatory supporting information accompanies this application		
	Confirmation of lodgement	Method of lodgement
All applications for operational works		
site plans drawn to scale which show the following: <ul style="list-style-type: none"> the location and site area of the land to which the application relates (<i>relevant land</i>) the north point the boundaries of the relevant land the allotment layout showing existing lots, any proposed lots (including the dimensions of those lots), existing or proposed road reserves, building envelopes and existing or proposed open space (note: numbering is required for all lots) any existing or proposed easements on the relevant land and their function any access limitation strips all existing and proposed roads and access points on the relevant land 	<input checked="" type="checkbox"/> confirmed	mail
a statement about how the proposed development addresses the local government's planning schemes and any other planning documents relevant to the application	<input checked="" type="checkbox"/> confirmed	mail
Applications for operational works involving earthworks (filling and excavating)		
drawings showing: <ul style="list-style-type: none"> existing and proposed contours areas to be cut and filled the location and level of any permanent survey marks or reference stations used as datum for the works the location of any proposed retaining walls on the relevant land and their height the defined flood level (if applicable) the defined fill level (if applicable) 	<input checked="" type="checkbox"/> confirmed	mail
Applications for operational works involving roadworks		
drawings showing: <ul style="list-style-type: none"> existing and proposed contours the centreline or construction line showing chainages, bearings, offsets if the construction line is not the centreline of the road and all intersection points information for each curve including tangent point chainages and offsets, curve radii, arc length, tangent length, superelevation (if applicable) and curve widening (if applicable) kerb lines including kerb radii (where not parallel to centreline) and tangent point changes (where not parallel to centreline) edge of pavement where kerb is not constructed position and extent of channelisation location and details of all traffic signs, guideposts, guardrail and other street furniture pavement markings including details on raised pavement markers catchpit, manhole and pipeline locations drainage details (if applicable) cross road drainage culverts (if applicable) concrete footpaths and cycle paths location and details for access points, ramps and invert crossings changes in surfacing material 	<input type="checkbox"/> confirmed	



	Confirmation of lodgement	Method of lodgement
Applications for operational works involving stormwater drainage		
drawings showing: <ul style="list-style-type: none"> existing and proposed contours drainage locations, diameters and class of pipe, open drains and easements manhole location, chainage and offset or co-ordinates and inlet and outlet invert levels inlet pit locations, chainage and offset or co-ordinates and invert and kerb levels 	<input type="checkbox"/> confirmed	
Applications for operational works involving water reticulation		
drawings showing: <ul style="list-style-type: none"> kerb lines or edge of pavement where kerb is not constructed location and levels of other utility services where affected by water reticulation works pipe diameter, type of pipe and pipe alignment water main alignments water supply pump station details (if applicable) minor reservoir details (if applicable) conduits location of valves and fire hydrants location of house connections (if applicable) location of bench marks and reference pegs 	<input type="checkbox"/> confirmed	
Applications for operational works involving sewerage reticulation		
drawings showing: <ul style="list-style-type: none"> location of all existing and proposed services location of all existing and proposed sewer lines and manhole locations location of all house connection branches kerb lines or edge of pavement where kerb is not constructed chainages design sewer invert levels design top of manhole levels type of manhole and manhole cover pipe diameter, type of pipe and pipe alignment location of house connections (if applicable) sewer pump station details (if applicable) 	<input type="checkbox"/> confirmed	
Applications for operational works involving street lighting		
drawings showing: <ul style="list-style-type: none"> location of all light poles and service conduits location of all other cross road conduits type of wattage and lighting any traffic calming devices additional plans for roundabouts and major roads (if applicable) details of any variations to normal alignment details of lighting levels 	<input type="checkbox"/> confirmed	



	Confirmation of lodgement	Method of lodgement
Applications for operational works involving public utility services		
drawings showing: <ul style="list-style-type: none">any existing light poles and power polesany existing underground servicesdetails of proposed servicesalternation to existing services	<input type="checkbox"/> confirmed	
Applications for operational works involving landscaping works		
drawings showing: <ul style="list-style-type: none">the location of proposed plant speciesa plant schedule indicating common and botanical names, pot sizes and numbers of plantsplanting bed preparation details including topsoil depth, subgrade preparation, mulch type and depth, type of turf, pebble, paving and garden edgethe location and type of any existing trees to be retainedconstruction details of planter boxes, retaining walls and fencesthe proposed maintenance periodirrigation system details	<input type="checkbox"/> confirmed	

Notes for completing this form:

- This form can also be used for development applications for building works or operational works assessable against the land use plan for Cairns airport land or Mackay airport land. Whenever a planning scheme is mentioned, take it to mean the land use plan for the airport land.

Privacy -please refer to your assessment manager for further details on the use of information recorded in this form.

OFFICE USE ONLY

Date Received Reference Numbers

The *Sustainable Planning Act 2009* is administered by the Department of Infrastructure and Planning. This form and all other required application materials should be sent to your assessment manager and any referral agencies.



Development assessment checklist - IDAS checklist 1

(Sustainable Planning Act 2009, version 1.0 18 December 2009)

This checklist applies to the carrying out of development generally.

You are not required to complete this checklist as part of your development application, however you may submit the checklist with your application if you wish. The purpose of the checklist is to assist you in identifying:

- whether you need to make a development application for the proposed development
- if a development application is required, the relevant IDAS forms you need to complete as part of your application
- whether you need to give a copy of your application to any referral agencies.

If your development involves a material change of use, reconfiguring a lot or operational works, it is recommended that you complete *Material change of use - IDAS checklist 2*, *Reconfiguring a lot - IDAS checklist 3* or *Operational works - IDAS checklist 4*, as applicable.

If you are unsure how to answer any questions on this checklist, phone or visit your local government, or go to the Department of Infrastructure and Planning's website at www.dip.qld.gov.au.

All terms used in this checklist have the meaning given in the *Sustainable Planning Act 2009* or the *Sustainable Planning Regulation 2009*.

Part 1 - General questions

1.1 Have you received a referral agency response in relation to this proposed development prior to making an application?

- | | |
|---|--|
| <input type="checkbox"/> No | |
| <input checked="" type="checkbox"/> Yes | • To assist you in preparing your application, completing <i>Referral agency responses - IDAS checklist 6</i> is recommended |

1.2 Do you wish the proposed development to be assessed against a superseded planning scheme?

- | | |
|--|--|
| <input checked="" type="checkbox"/> No | |
| <input type="checkbox"/> Yes | • You must complete <i>Request to apply a superseded planning scheme - Sustainable Planning Act form 2</i> and give this notice to the relevant local government. If the local government agrees to your request, details must be provided in <i>Application details - IDAS form 1</i> |

1.3 Does the proposal involve removing quarry material from a watercourse or lake for which an allocation notice is required under the *Water Act 2000*?

- | | |
|--|--|
| <input checked="" type="checkbox"/> No | |
| <input type="checkbox"/> Yes | • It is recommended that you complete part 2 of this checklist |

1.4 Is any part of the proposed development intended to be carried out on a Queensland heritage place under the *Queensland Heritage Act 1992*?

- | | |
|--|--|
| <input checked="" type="checkbox"/> No | |
| <input type="checkbox"/> Yes | • It is recommended that you complete part 3 of this checklist |



1.5 Does the proposal involve development on a local heritage place?

<input checked="" type="checkbox"/> No	
<input type="checkbox"/> Yes	It is recommended that you complete part 4 of this checklist

1.6 Does the proposal involve an environmentally relevant activity, other than an agricultural ERA, a mining activity or a chapter 5A activity?

<input checked="" type="checkbox"/> No	
<input type="checkbox"/> Yes	It is recommended that you complete part 5 of this checklist

1.7 Is any part of the development on strategic port land or airport land (other than development for a material change of use that is inconsistent with the land use plan for the strategic port land or airport land)

<input checked="" type="checkbox"/> No	
<input type="checkbox"/> Yes	It is recommended that you complete part 6 of this checklist

1.8 Is any part of the development on land below a high water mark within the limits of a port under the Transport Infrastructure Act 1994?

<input checked="" type="checkbox"/> No	
<input type="checkbox"/> Yes	It is recommended that you complete part 7 of this checklist

1.9 Is any part of the premises designated for community infrastructure?

<input checked="" type="checkbox"/> No	
<input type="checkbox"/> Yes	It is recommended that you complete part 8 of this checklist

1.10 Does the proposal involve the establishment or expansion of a waste water disposal system?

<input checked="" type="checkbox"/> No	
<input type="checkbox"/> Yes	It is recommended that you complete part 9 of this checklist

1.11 Is the development on land that adjoins a declared fish habitat area under the Fisheries Act 1994?

<input checked="" type="checkbox"/> No	
<input type="checkbox"/> Yes	It is recommended that you complete part 10 of this checklist

Privacy - please refer to your assessment manager for further details on the use of information recorded in this checklist.

Disclaimer:
While the Department of Infrastructure and Planning (DIP) believes that this information contained on this checklist and provided as part of this process will be of assistance to you, it is provided on the basis that you will not rely on the information without first making your own enquiries regarding the interpretation and application of the applicable legislation to your circumstances.

To the full extent permitted by law DIP expressly disclaims all liability (including but not limited to liability for negligence) for errors or omissions of any kind or for any loss (including direct and indirect losses), damage or other consequence which may arise from your reliance on this process and the information contained on this checklist.



OFFICE USE ONLY

Date received

Reference numbers

The *Sustainable Planning Act 2009* is administered by the Department of Infrastructure and Planning.



Operational Works - IDAS Checklist 4

(Sustainable Planning Act 2009, version 1.0, 18 December 2009)

This checklist only applies when the development application seeks approval for operational works.

You should complete all questions unless the checklist indicates otherwise.

All planning and development applications require applicants to complete the following:

- *Applicant details --IDAS form 1*
- any forms or mandatory supporting information identified as forming part of your application.

If you are unsure of any answers to questions, phone or visit your local government, or go to the Department of Infrastructure and Planning's website, www.dip.qld.gov.au.

The checklist and relevant sections do not need to be completed for applications relating only to building work requiring assessment against *the Building Act 1975*.

Part 1 - General questions

1.1 Is the proposed operational work assessable under the planning scheme?

<input type="checkbox"/> No	
<input checked="" type="checkbox"/> Yes	<ul style="list-style-type: none">• You must complete <i>Building and operational work assessable against a planning scheme - IDAS form 6</i>• Continue on to question 1.3

1.3 Is any part of the premises located in part of a future state-controlled road or within 100 metres of a state-controlled road?

<input checked="" type="checkbox"/> No	<ul style="list-style-type: none">• It is recommended that you complete part 2 (starting from question 2.1) of this checklist.
<input type="checkbox"/> Yes	<ul style="list-style-type: none">• It is recommended that you complete part 2 (starting from question 2.2) of this checklist.

1.4 Does State Planning Policy 2/02: Planning and Managing Development Involving Acid Sulfate Soils apply to the development?

<input checked="" type="checkbox"/> No	
<input type="checkbox"/> Yes	<ul style="list-style-type: none">• It is recommended that you complete part 3 of this checklist.

1.5 Is there any proposed operational work for filling or excavation?

<input type="checkbox"/> No	<ul style="list-style-type: none">• It is recommended that you complete part 4 (starting from question 4.5) of this checklist.
<input checked="" type="checkbox"/> Yes	<ul style="list-style-type: none">• It is recommended that you complete part 4 (starting from question 4.1) of this checklist.

1.6 Is any of the proposed operational work listed in schedule 12 of the Sustainable Planning Regulation 2009 and does it exceed the specified threshold?

<input checked="" type="checkbox"/> No	
<input type="checkbox"/> Yes	<ul style="list-style-type: none">This application requires assessment by the Department of Transport and Main Roads as a concurrence agency

Section reference:

- Sustainable Planning Regulation 2009, schedule 7, table 3, item 14

1.7 Is any of the proposed operational work listed in schedule 13 of the Sustainable Planning Regulation 2009 and does it exceed the specified threshold?

<input checked="" type="checkbox"/> No	
<input type="checkbox"/> Yes	<ul style="list-style-type: none">This application requires assessment by the Department of Transport and Main Roads as a concurrence agency

Section reference:

- Sustainable Planning Regulation 2009, schedule 7, table 3, item 15

1.8 Is any part of the premises in an interim koala habitat protection area identified under the South East Queensland Koala state planning regulatory provisions (SEQ Koala SPRP)?

<input checked="" type="checkbox"/> No	
<input type="checkbox"/> Yes	<ul style="list-style-type: none">It is recommended that you complete part 5 of this checklist.

1.9 Is any of the proposed operational work associated with reconfiguring a lot and the reconfiguration is also assessable?

<input checked="" type="checkbox"/> No	
<input type="checkbox"/> Yes	<ul style="list-style-type: none">It is recommended that you complete part 6 of this checklist.

1.10 Does the Vegetation Management Act 1999 apply to any of the proposed operational work for the clearing of native vegetation?

<input checked="" type="checkbox"/> No	
<input type="checkbox"/> Yes	<ul style="list-style-type: none">It is recommended that you complete part 7 of this checklist.

1.11 Is any of the proposed operational work for any thing constructed or installed that allows, under the Water Act 2000, for taking or interfering with water from a watercourse, lake or spring (other than using a water truck to pump water; and other than under the Water Act 2000, section 20(2), (3) or (5), or from a dam constructed on a watercourse or lake?

<input checked="" type="checkbox"/> No	<ul style="list-style-type: none">It is recommended that you complete part 8 (starting from question 8.8) of this checklist.
<input type="checkbox"/> Yes	<ul style="list-style-type: none">It is recommended that you complete part 8 (starting from question 8.1) of this checklist.

1.12 Is any of the proposed operational work tidal work, other than excluded work defined under the Sustainable Planning Regulation 2009?

<input checked="" type="checkbox"/> No	
<input type="checkbox"/> Yes	<ul style="list-style-type: none">It is recommended that you complete part 9 of this checklist.

1.13 Is any of the operational work proposed to be carried out within a coastal management district?

No

Yes

- It is recommended that you complete part 10 of this checklist.

1.14 Is any of the proposed operational work for constructing or raising waterway barrier works under the Fisheries Act 1994?

No

Yes

- It is recommended that you complete part 11 of this checklist.

1.15 Is any of the proposed operational work to be carried out completely or partly within a declared fish habitat area under the Fisheries Act 1994?

No

Yes

- It is recommended that you complete part 12 of this checklist.

1.16 Is any of the proposed operational work removing, destroying or damaging marine plants under the Fisheries Act 1994?

No

Yes

- It is recommended that you complete part 13 of this checklist.

1.17 Is any of the operational work proposed to be carried out in a wild river area declared under the Wild Rivers Act 2005?

No

Yes

- It is recommended that you complete part 14 of this checklist.

1.18 Is any part of the premises located in part of a future state-controlled road or within 100 metres of a state-controlled road?

No

Yes

- It is recommended that you complete part 15 of this checklist.

Part 2 - State-controlled roads

2.1 Is the proposed operational work for filling or excavating listed in the Sustainable Planning Regulation 2009 schedule 11 and does it exceed the threshold or combined threshold?

No

Yes

- End of part 2 of this checklist.
- This application requires assessment by the Department of Transport and Main Roads as a concurrence agency.

- End of part 2 of this checklist.

Section reference:

- Sustainable Planning Regulation 2009, schedule 7, table 3, items 1(b) and 2

Part 4 - Easements and Substations

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

4.1 Is the filling or excavation associated with reconfiguring a lot?

<input checked="" type="checkbox"/> No	
<input type="checkbox"/> Yes	<ul style="list-style-type: none">Go to question 4.5

4.2 Is any part of the premises subject to an easement in favour of a distribution entity or transmission entity under the *Electricity Act 1994*?

<input type="checkbox"/> No	<ul style="list-style-type: none">Go to question 4.4
<input checked="" type="checkbox"/> Yes	

4.3 Is any of the proposed operational work to be located wholly or partly in the easement?

<input type="checkbox"/> No	
<input checked="" type="checkbox"/> Yes	

- If yes this application requires assessment by the entity responsible for the easement as an advice agency.

4.4 Is any of the operational work to be located wholly or partly within 10 metres of a substation site under the *Electricity Act 1994*?

<input checked="" type="checkbox"/> No	
<input type="checkbox"/> Yes	<ul style="list-style-type: none">This application requires assessment by the the entity responsible for the substation as an advice agency.

4.5 Is any part of the premises subject to an easement in favour of the holder of Pipeline Licence Number 1 issued under the *Petroleum Act 1923* for the construction or operation of the Moonie to Brisbane strategic pipeline?

<input checked="" type="checkbox"/> No	<ul style="list-style-type: none">End of part 4 of this checklist.
<input type="checkbox"/> Yes	<ul style="list-style-type: none">This application requires assessment by the pipeline licence holder as an advice agency.

Section reference:

- Sustainable Planning Regulation 2009*, schedule 7, table 3, items 9(a), 9(b) and 17

Part 8 - Taking or interfering with water

8.8 Is any of the proposed operational work for any thing constructed or installed that allows, under the *Water Act 2000*, for taking or interfering with artesian water (other than using a water truck to pump water)?

<input checked="" type="checkbox"/> No	
<input type="checkbox"/> Yes	<ul style="list-style-type: none">You must complete <i>Taking artesian or sub-artesian water - IDAS form 12</i>.This application requires assessment by the Department of Environment and Resource Management as a concurrence agency.

8.9 Is any of the proposed operational work for any thing constructed or installed that allows, under the *Water Act 2000*, for taking overland flow water (other than using a water truck to pump water)?

<input checked="" type="checkbox"/> No	• Go to question 8.12.
<input type="checkbox"/> Yes	

8.12 Is any of the proposed operational work for any thing constructed or installed that allows, under the *Water Act 2000*, for taking or interfering with subartesian water (other than using a water truck to pump water)?

<input checked="" type="checkbox"/> No	• Go to question 8.14
<input type="checkbox"/> Yes	

8.14 Does any of the proposed operational work for any thing constructed or installed that allows, under the *Water Act 2000*, for interfering with overland flow water (other than using a water truck to pump water)?

<input checked="" type="checkbox"/> No	• Go to question 8.19
<input type="checkbox"/> Yes	

8.19 Is the proposed operational work for the following?

for the construction of a referable dam as defined under the <i>Water Supply (Safety and Reliability) Act 2008</i>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
to increase the storage capacity of a referable dam by more than 10 per cent	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

- If yes to any of the above you must complete *Referable dam - IDAS form 16*.
- This application requires assessment by the Department of Environment and Resource Management (DERM). If DERM is not the assessment manager for the application, the role of the agency will be as a concurrence agency and you must give DERM a copy of the application

Section reference:

- *Sustainable Planning Regulation 2009*, schedule 3, part 1, table 4, items 3 and 4
- *Sustainable Planning Regulation 2009*, schedule 5, part 1, table 4, items 3 and 4
- *Sustainable Planning Regulation 2009*, schedule 7, table 2, items 9, 10 and 11
- *Water Act 2000*, section 966A and 966B (note: no current wild river declaration identifies taking or interfering with subartesian water as assessable)
- *Wild Rivers Act 2005*, section 43A
- Wild Rivers Code (note: this code does not currently contain applicable provision for taking or interfering with artesian water)
- Relevant wild river declarations



Notes for completing this form:

- *Applicant details - IDAS form 1 and Development application assessment - IDAS checklist 1* must be completed for all development applications to be considered.
- The *Sustainable Planning Act 2009* is administered by the Department of Infrastructure and Planning.

Privacy - please refer to the assessment manager for further details on the use of information recorded in this form.

Disclaimer:

While the Department of Infrastructure and Planning (DIP) believes that the information contained on this form and provided as part of this process will be of assistance to you, it is provided on the basis that you will not rely on the information without first making your own enquiries regarding the interpretation and application of the applicable legislation to your circumstances.

To the full extent permitted by law DIP expressly disclaims all liability (including but not limited to liability for negligence) for errors or omissions of any kind or for any loss (including direct and indirect losses), damage or other consequence which may arise from your reliance on this process and the information contained on this form.

Company owner's consent to the making of a development application
under the *Sustainable Planning Act 2009*

I, [redacted]
[insert name in full]
Director and Company Secretary

of Lipoma Pty Ltd A.C.N. 002 203 581
[insert name of company]

as owner of premises identified as follows:

Lots [redacted]
[insert street address, lot or plan description, or coordinates of the premises the subject of the application]

consent to the making of a development application under the *Sustainable Planning Act 2009* by

Michel Group Services Pty Ltd

[insert name of applicant]

on the premises described above for the purposes of

Operational Works (Bulk Earthworks)

[insert details of the proposed development e.g. material change of use for three storey apartment building]

signed on the [redacted] day of May 2010
[signature of Director]



**BUILDING AND CONSTRUCTION INDUSTRY
NOTIFICATION AND PAYMENT FORM**

QLEAVE PROJECT NUMBER

FORM BCI 10 V4 Effective 1-Jan-2010

E063257

PO Box 512 Lutwyche Qld 4030 FREECALL PH 1800 803 481

A.B.N. 89 586 619 186

PART 1 PAYER DETAILS

Has the payer lodged a notification with QLeave previously? Y/N **N** If yes, please insert customer number if known (Contact QLeave) If no, leave blank **0 4 8 5 9 7**

Payers Legal Name **Leda Holdings Pty Ltd**

Payers Trading Name
(if applicable)

Payer ABN **6 7 0 0 1 4 0 4 5 5 7**

Postal Address **GPO Box 2522, SYDNEY**

Postcode **2001**

NOTE: QLeave will typically correspond with the party named as the Payer in this section. Correspondence may include: letters, invoices and returns

PART 2 PROJECT DETAILS

Project Description **REMEDIATION & EARTHWORKS**

Lot **[REDACTED]** Plan No. **[REDACTED]** Local Council **IPSW** Certifier **McCarthy Consulting**

Certifier Phone No.

Site Address **CNR NORTH & HUGHES, NORTH IPSWICH**

Postcode **4305**

Estimate your start date **10/06/2010** Expected completion date **10/11/2010** Your Job No or Reference No

Project Owner **LEDA HOLDINGS PTY LTD**

Principal Contractor (if appointed) - Refer to Instructions for definition

Legal Name **ECOVALE PTY LTD**

Principal Contractor ABN

Phone No. **[REDACTED]**

Place 'X' in appropriate box
(Refer to instructions)

Customer Type:	Australian Gov	State Gov	Local Gov	Other	X
Project Type:	Houses	X Other Res	Commercial	Civil	Minesite

If the work is fully covered by an Owner Builder Permit issued by BSA, QLeave must be notified of the work, but no payment is required with this Form if a VALID OB PERMIT Number is provided on this Form.

OWNER BUILDER PERMIT NUMBER (if applicable): OB

PART 3 LEVY / FEE PAYMENT (ALL AMOUNTS ARE TO BE SHOWN TO THE NEAREST WHOLE DOLLAR)

A Total Cost of Work No payment or form required if work is less than \$ 80000 **\$ 1,500,000**

B Exempted Cost of Work **EXEMPTION CATEGORY** **\$ 0**

C Leviable Cost of Work (C = A - B) **\$ 1,500,000**

D Levies and Fee Payable (D = C x 0.00525) (For Minesites D = C x 0.005, from 1/1/2010 it is 0.004) **\$ 7,875**

OFFICE USE ONLY	WHS 125	\$1,875.00	BCTF 100	\$1,500.00	PLSL 300	\$4,500.00
------------------------	---------	------------	----------	------------	----------	------------

PART 4 DECLARATION (TO BE SIGNED AND DATED)

I declare that the information provided in this form is true and correct to the best of my knowledge and belief.

Name **[REDACTED]**

Date **10/05/2010**

Signature **[REDACTED]**

PART 5 PAYMENT SLIP

Payers Name **Leda Holdings Pty Ltd**

E063257

Phone No. **[REDACTED]**

Make Cheques Payable to QLeave, rounded to nearest dollar

Amount **\$ 7,875**



GREEN - PAYER'S COPY

A U S T R A L I A P O S T 4217
SURFERS PARADISE

Portable LSL Authority Levy Payment \$
Form No E063257 7875.00
TOTAL \$7875.00

Payment Tendered Details :

Cheque 7875.00
11/05/10 05/57282 888/g 444998 15:20

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Appendix 4

**Environmental Management Plan prepared by
VDM Consulting.**



ENVIRONMENTAL MANAGEMENT PLAN

IPSWICH RIVERLINK
SHOPPING CENTRE
RIVERSIDE CENTRAL
STAGE 2 EARTHWORKS

APPLICATION NUMBER



PREPARED FOR

LEDA DEVELOPMENTS PTY LTD
GPO Box 2522
SYDNEY NSW 2001

MARCH 2010

QC00-3754

Document Control Sheet

Ipswich Riverlink Shopping Centre Riverside Central Stage 2 Earthworks Environmental Management Plan

Report Details:

Title:	Environmental Management Plan
Author(s):	[REDACTED]
File reference:	00-3754/Admin/1614.3 March 2010
Project Leader:	[REDACTED]
Phone:	[REDACTED]
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Client:	Leda Developments Pty Ltd
Client Contact:	[REDACTED]
Synopsis:	Environmental Management Plan prepared in response to Terms of Reference as outlined in Ipswich City Council Information request dated 30 November 2009

Revision History:

Issue	Date	Author(s)	Reviewer	Approved
1	March 2010	[REDACTED]		[REDACTED]
		Manager Principal Civil Engineer		Manager Principal Civil Engineer RPEQ

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1. Introduction

Reference is made to three separate applications lodged with Ipswich City Council (Council) seeking approval for Operational Works (Bulk Earthworks) at Riverlinks, North Ipswich. As Council would be aware, the applications have been lodged over land owned by Lipoma Pty Ltd with the proposed works seeking to address the contamination issues associated with the sites. It is also noted that while separate applications have been lodged, the works will occur in a coordinated manner across all three sites. The information requests issued by Council for these applications raised similar issues and separate responses have been provided for each application.

Within all the above RFI's similar issues concerning environmental and operational aspects associated with the remediation and earthworks with the land are raised and therefore the Environmental Management Plan addresses Lots 51, 52, 53, 54 and 55 as discussed at the meeting at Ipswich City Council in February 2010. This EMP has been prepared to guide the future earthworks operations in a coordinated manner and address specific issues raised in Council's information requests.

The following table summarises the individual applications to which this EMP relates:

ICC Ref No	Legal Description	Consultant	Applicable Drawings/Documents	Comments
6291 / 2009		Yeats Consulting Engineers	Response to Council's Information Request Dated March 2010. Drawing No's YC0175-BE00B, BE01B, BE02B, BE03B, BE04-1B, BE04B, BE05B, BE06B, BE07B, BE08B, BE09B, BE10B, BE11B, BE12B, BE13B, BE14B, BE15B, BE16-1A, BE16-2B, BE16-3B, BE17-1A, BE17-2A, BE17-3A, BE18B, BE19B, BE20B, BE21B, BE22B, BE23B and BE24B.	This application relates to the North Street site with works to be completed in the first stage of the coordinated program specified within this EMP.
6294 / 2009		Yeats Consulting Engineers	Response to Council's Information Request Dated March 2010. Drawing No's YC0176-BE00B, BE01B, BE02B, BE03B, BE04-1B, BE04-2A, BE04-3B, BE05-1A, BE05-2A, BE05-3A, BE05-4A, BE06B, BE07B, BE08B, BE09B, BE10B, BE11B, BE12B, BE13B, BE14B and BE15B.	This application relates to the sites at W.M. Hughes Street with works to be completed in the second stage of the coordinated program specified within this EMP.
6670 / 2009		VDM Consulting	Response to Council's Information Request Dated March 2010. Drawing numbers C3754:03:C000, SK03, SK04, SK05, SK06, SK07, SK08, SK09, SK10, SK11, SK12, SK13, SK30, SK31, SK32, SK90, SK91, SK92, SK93, SK94, SK95, SK100, SK101, SK102, SK103, SK104, SK105, SK106, SK200, SK300, SK400, SK500. C3754:04:C000, SK021, SK022, SK023, SK024, SK025, SK026, SK030, SK100, SK101, SK102, SK103, SK500.	This application relates to the site adjacent to the Bremer River with works to be completed in the final stage of the coordinated program specified within this EMP.

It is noted that each application specifies the works to be undertaken within the respective lots and includes details of finished profiles, volumes, stormwater management etc. Regard should be had to the above referenced materials when undertaking earthworks on the individual sites.

Appendix A details the survey plan SP222487 showing the Lots

2. Background

The site was previously one allotment (Lot 39) and was subject to a Site Suitability Statements and Site Management Plan (SMP). Pursuant to this, Environmental Consultants and Third Party Reviewer have developed a Remediation Plan to manage the issues contained within the soils in conformance with DERM requirements.

3. Terms of Reference

The Terms of Reference are mentioned in Item 5 of the Ipswich City Council (ICC) Information Request dated 30th November 2009 for application Number 6670/2009.

The Applicant is requested to submit to Council a site specific Environmental Management Plan for the proposed earthworks that details the safeguards to be employed at the site to minimize environmental harm / nuisance and health impacts. This must include an amended Remediation Plan which has been reviewed and certified by the contaminated land Third party Reviewer (TPR) approved by the Department of Environmental and Resource Management (DERM).

The plan must address but not be limited to the following:-

- a) The site remediation, construction and operational phases of the development.*
- b) The requirements of the DERM approved Site Based Management Plan(s) and the amended Remediation Action Plan(s).*
- c) Water quality objective for stormwater releases to achieve 50mg/l for up to the design storm event for total suspended solids.*
- d) Separation of stormwater as per item 2 above.*
- e) Disposal of wastewater leachate*
- f) A Fire Management Plan for both surface and subterranean occurrences*
- g) A Waste Management Plan that addresses demolition and any other materials discovered during these works.*
- h) A comprehensive health and safety plan that addresses workplace health and safety and public health impacts from the proposed development.*

The above terms of Reference are outlined in the following Sections.

4. Remediation Plan (RP)

The remediation plan has been prepared on the criteria outlined by the department of Environment and Resource management in correspondence issued 14 November 2008. The Remediation Plan has been reviewed and accepted by a Third Party Reviewer.

4.0.1. Remediation Plan

The Remediation Plan for Lots 53 to 55 on survey plan SP222487 prepared by Geo Environmental Consultants dated 9th February 2010 is contained within **Appendix B**. The Remediation Plan supplied incorporates the latest changes as recommended by the Third party Reviewer and outlines how earthworks are to be undertaken in accordance with general environmental protection measures as detailed including ground water monitoring and cessation of works if unexpected conditions occur such as gross contamination or offensive odours. All site works and subsequent reporting is to be reviewed by the DERM appointed Third Party Reviewer prior to submitting to DERM. A public complaints system is to be established

4.0.2. Third Party Review

A Third Party Review of the final Remediation Plan (RP) has been performed by WSP Environmental Pty Ltd. A copy of the report dated 9th February 2010 is contained in **Appendix C**. The TPR agrees that the RP adequately addresses the DERM guidelines.

4.0.3. Earthworks and Staging

The RP requires classification of various soils based on their level of contamination, and ultimately capping with clay obtained from borrow pits in lot 54 established in the site. This process will result in staging, outlined as shown on the attached copy of drawing C3754:03:SK106. Staging Plan Construction Haul Roads and Bio Retention Basins in **Appendix D**

Stage 1 comprises lot 55, stage 2 lots 51, 52 and 53 and stage 3 lot 54. The objectives of each stage is to include the following construction work items.

Stage 1

- Establishment of all sediment control measures, ie Ponds and Treatment areas as detailed on Civil Engineers Plans;
- Establishment of temporary access roads to facilitate safe and orderly movement of materials in and around the site;
- Establishment of Borrow pits to coordinate with stockpiling and classification of materials being won from Lot 55.

The objective of Stage 1 is to achieve the earliest possible completion of a remediated and engineered site for Lot 55.

Stage 2

- Maintenance of all sedimentation control measures, ie Ponds and Treatment areas as detailed on Civil Engineers Plans;
- Earthworks and soil classification as per RP to bring works up to engineering levels as detailed on the drawings.

The objective of Stage 2 to achieve the earliest possible completion of a remediated and engineered site for Lots 51, 52 and 53.

Stage 3

- Maintenance of all sedimentation control measures, ie Ponds and Treatment areas as detailed on civil Engineers plans;
- Demolition works associated with existing buildings;
- Earthworks and soil classification as per RP to bring works up to engineering levels as detailed on the drawings.

The objective of Stage 3 is to achieve the earliest possible completion of a remediated and engineered site for Lot 54.

All earthworks operations are contained within all the sites with material transfer between the sites with the objective to obtain an overall earthworks balance.

5. Site Remediation, Construction and Operational Phase of the Development

An overall earthworks strategy has been developed that addresses the requirements of the Remediation Plan incorporating the development of Lots 51 to 55 on SP222487 involving the transfer of earthworks volumes between the individual sites to achieve the overall staging objective as stated above. Engineering drawings incorporate

- geotechnical recommendations, including soil handling, batter slopes, global stability with analysis
- Requirements of DERM as detailed in the RP
- Flooding analysis from the Bremer River analyzing the finished surface profiles with respect to flood impacts.
- Sediment and Erosion Control measures in accordance with Ipswich City Council requirements. Risk Management strategies involving flood warning procedures and site records.
- Water quality objectives for release to receiving waters
- Separation of Stormwater
- Disposal of leachate
- Fire Management Plan
- Waste Management Plan
- Health & Safety Plan
- Ipswich City Council Engineering Guidelines

Flood analysis reporting has been separately submitted in the response to the Information Request.

Prior to site remediation earthworks activities commencing, a staged approach to the Sediment and Erosion Control has been adopted as per Ipswich City Council requests involving:

1. Predevelopment Stage,
2. Construction Stage,
3. Post Construction Maintenance Stage.

The staged Sediment and Erosion Control measures to be deployed on site prior to construction commencing are detailed on the engineering drawings provided with each Operational Works Application and individual response to the Information Requests. Drawing number C3754:03:SK106 - Staging Plan Construction Haul Roads and Bio Retention Basins in **Appendix D** shows the location of the sediment basins with discharge points. Lots 53 and 54 discharge to the Bremer River and Lot 55 discharges to the existing concrete invert in the wide gully area. .

The summary of the earthworks volumes for stages 1, 2 and 3 are contained within the following **Table 1**

Table 1 Earthworks Volume Summary

Description	Clay	Other
Available Cut	113,370cu.m	93,27cu.m
Solid Cut from Borrow Pits and platforms	113,370cu.m	93,27cu.m
Compaction Loss	85%	85%
Giving Available Fill	113,370cu.m	94,630 cu.m
Volume of Existing Stockpiles (Approx)		130,090cu.m
Compaction Loss		80%
Giving Available Fill		104,070cu.m
Volume of unsuitable From North St, WM Hughes St		49,340 cu.m
Compaction Loss		85%
Giving Available Fill		41,940 cu.m
Total Available Fill	113,370 cu.m	225,290cu.m

Imported Topsoil	10,020 cu.m	
Fill Required	Clay	Other
Compacted Clay Capping Layer	82,020 cu.m	
Compacted Fill Below Capping Including Backfill to Borrow Pits		247,690 cu.m
Replacement Material to north St, Hughes St & Wide Gully Sites	20,210 cu.m	
Total Fill Required	102,230 cu.m	247,690 cu.m
Balance	Surplus 11,940 cu.m to southern Capping	Deficit 22,400 cu.m from Southern Excavation
Note:	Volume Excludes Soil Amendment to Existing Uncontrolled Fill Area Outside of Borrows Areas	

Final earthworks volumes to be removed from each site as derived from the detailed engineering drawings are 20,209 cu.m clean solid fill to be won from borrow pit excavations in lot 54 stage 3 and 49,335 cu.m of contaminated material cut measurement to be deposited in stage 3 from lots 51, 52, 53 and 55.

The engineering design drawings for lot 54 by VDM include earthworks volumes summary and a mass haul calculation for the overall site (i.e. Lots 51-55) as the bulk of material is either won from this site or transferred to this site. Both the earthworks summary and the mass haul calculation have been used to formulate the earthwork staging for the overall site as detailed on the drawings. A total of four phases have been detailed on the engineering drawings commencing at the existing borrow area at the northern end forming the complete construction activities.

It is noted that the engineering design drawings for Lots 51-53 and 55 by Yeats detail the material to be removed, material to be placed and finished profiles for those allotments.

The volume of individual existing stockpiles is shown in the remediation Plan where soils are classified as:

Clean - not contaminated
Class 1 – slightly contaminated
Class 2 – moderately contaminated
Class 3 – Heavily Contaminated
Class 4 – heavily contaminated. Remove off site and
Separated rubble

Within lot 54, Class 3 material is to be placed as deep as possible to achieve a covering layer of clean clay material of greater than 1 metre where practical and Class 2 and 3 materials to be placed where there is at least 1.0 metre of clean materials over the top. Following the excavation of the clay borrow areas and the separation for the rubble, construction and demolition waste and other course material, the remaining materials from the stockpile, is placed in the borrow pits and compacted forming the embankment construction.

6. Requirements of DERM Approved Site Based Management Plan(s) and the Amended Remediation Action Plan(s)

All site works are to be constructed in accordance with general environmental protection measures to avoid unwarranted investigation and deposition of soil and specifically the requirement of the DERM approved Site Based Management Plan.

The site works are to be validated by Geo Environmental and approved by the TPR. All validation requirements must be confirmed by the TPR and any classification issues are to be referred to the TRP prior to DERM.

The TPR must review the proposed validation methodology, pre-validation sampling results, surface and groundwater results (if applicable), Disposal Permit Application and the final site report. The requirements of groundwater and surface monitoring and acceptance criteria for the Lots 51,52, 53 and 55 all as detailed in the RP.

7. Water Quality Objective for Stormwater Release to Achieve 50mg/l to the Design Storm Event for Total Suspended Solids

As indicated above, each application details the stormwater management and sediment and erosion control works proposed for the individual sites. Although designed separately, the proposed arrangements will ensure that the proposed works do not generate impacts on surrounding properties or the natural environment and the water quality objective for stormwater release to achieve 50mg/l to the design storm event for total suspended solids applies to each individual lot. The following section address Lot 54 in particular as this allotment is directly adjacent to the Bremer River, will contain the borrow pits and will also be the final destination for Class 1, 2 and 3 materials.

There are temporary sediment control basins located on the lower portion of the site when excavation for the borrow areas in lot 54 commences. The duration of the basins is short term until the earthworks embankment reached a level that is sufficient to drain into the permanent basin to be located at the finished platform. Initially due to the proposed shallow depth of the excavation it is not anticipated that groundwater will be intercepted during excavation works due to the previous bore holes sampling as part of the geotechnical investigation on site.

Surface water from the site and immediate area that currently discharges to the Bremer River will be diverted into the basins. A pumped outlet is specified for the discharge from these temporary basins on the river flat.

The release of basin water is to only occur when water quality satisfies approved discharge criteria. Water collected within excavations of the borrow areas may be discharged into the Bremer River if the discharge criteria of 50mg/l total suspended solids is met.

Small quantities (<1 m³/day) of water may be discharged to the local (on-site), vegetated environment or utilised for construction purposes, where the discharge criteria is met. This must not result in erosion, loss of sediment or flooding of roads or infrastructure and must be approved by the Environmental Officer.

Where discharge criteria cannot be met, suitable on-site treatment is to be undertaken prior to discharge, which may include accelerated settling suspended particulates in water by dosing with flocculation agents (i.e. alum, gypsum, etc) when and if necessary. Filtration (using geo-textiles) will also be used if necessary.

The environmental officer on site must log all monitoring results. Records are to be kept on-site for inspection and review by council upon request and are to be submitted on completion of the works.

Tabulations and graphs are to be compiled, with brief notes on exceptions, for relevant inspections and are to be included in any site audits.

Where a potential non-conformance event has occurred, the contractor shall immediately notify the Environmental Officer (EO) of the nature of the event, measures implemented to prevent recurrence and any outcomes. Where the EO confirms the occurrence of a non-conformance event with potential environmental impacts and/or harm, the contractor shall notify Council.

Where discharge criteria cannot be achieved corrective action involves retaining water for sufficient time to settle solids or treat with flocculent, filter if necessary. Additional devices are to be provided where and when necessary to prevent recurrence and review management of disturbed areas and management strategies.

8. Separation of Stormwater

The individual information responses detail stormwater management as indicated above and it is noted that lots 51,52,53 and part of 55 have no external stormwater flow entering the sites apart from the southern area of lot 55 that contains a wide gully accepting an external catchment from the east that travels under North Street then into the Bremer River under the Railway line via an existing large culvert. Again, Lot 54 is of particular concern as it adjoins the Bremer River

directly and stormwater is directed to this site from a number of sources and the following section addresses this site.

Lot 54 is approximately rectangular in shape with the longer longitudinal axis orientated in a north south direction. Stormwater surface flow is across the shorter width of the allotment in an east to west direction towards the Bremer River.

The western boundary of the allotment is bounded by the Bremer River. Along the eastern boundary at the southern end, the rail line forms the catchment boundary. The railway track is elevated on ballast with shallow drainage swales either side.

Surface flow from the Colvin Street area that falls towards the railway line is captured in the swale before crossing the rail line into the property. Currently the swale appears to contain a low point with no apparent drainage outlet and a small open drain is being constructed within the railway easement to grade the swale towards the wide gully area to the north. Details of the swale are shown on the engineering drawings. Refer drawing number C3754:04:SK21 as shown in **Appendix D**.

At the northern end of lot 54 the Queensland Railway Museum abuts the site. Detailed survey and site inspection shows that there are a series of stormwater easements running in an east west direction across the Railway Museum site that terminate within Lot 54. Drawing number C3754;03;SK04 as contained in **Appendix D** shows the berm.

Drainage pipes within the easements discharge across the existing bank in Lot 54 and travel via existing gullies into the Bremer River. The design allows that due to the age of the pipes within the Railway Museum, the overall capacity and functionality of the drainage systems diminished and overland flow occurs during the higher intensity occurrences.

To prevent the overland flow entering the site within lot 54, a berm is designed to be constructed along the eastern boundary of lot 54. The berm directs any overland flow towards the wide gully area where there is a large existing culvert under the railway line easement embankment.

9. Disposal Of Wastewater Leachate

Shallow earth drainage swales are to be constructed at the base of the existing bank for the purpose of collecting surface runoff from the slope during the construction period and diverting the runoff into collection basins for treatment prior to release to the Bremer River. In the event that waste water leachate forms in the drains the potential impacts generated include:

- Soil contamination;
- Surface water and groundwater contamination;
- Death or health reduction in flora and fauna;
- Human health impacts;

Ground water monitoring is to be include the inspection and re-establishment of existing monitoring wells along the riverbank as outlined in the Remediation Plan It is not anticipated that large volumes of leachate if any will be encountered and the water quality objectives for the release of discharge to the surrounding environment are detailed in Section 7 on Water Quality

for Stormwater Release. However the detection of any further contamination of the drainage swales by waste water leachate is to be treated separately.

To prevent the release of any wastewater leachate the objectives are:

- To prevent any adverse impacts to the local, social and environmental conditions from any spillage or leakage;
- To ensure the correct transport, storage, containment procedures are adequately in place and implemented;
- Daily visual checks are to be performed on all drainage swales by onsite staff aware of detecting the presence of waste water leachate discharge. Specific runoff control measures diverting any localized clean runoff away from the waste water are to be immediately implemented to contain the wastewater;
- Adequate quantities of emergency response materials such as absorbent materials, sand bags, flocculating agents and pH buffer solutions will be readily kept and stored on site. The implementation of the management measures will ensure that the impacts from waste water do not adversely impact the entire project site.
- Containment measures such as sandbags, booms, earth bunds or cut-off drains will be installed to capture and retain waste water material and prevent it from leaving site, entering any watercourse or impacting on vegetation stands.
- All detection of waste water must be reported to the environmental officer. The waste contained within the bunded area will be collected and disposed of at an approved local government landfill sites, including cleaning materials, absorbents and the immediate surrounding contaminated soils.

10. Fire Management Plan

The Fire Management Plan has been prepared as requested and intended only for the earthworks construction activities on the sites for Lots 51 to 55. The Fire Management Plan is not intended for any future use on the sites following the completion of earthworks and associated activities.

The Fire Management Plan addresses the whole of the earthworks and associated activities on the site. During its preparation, consideration has been given to the site's context within the broader area, particularly in relation to potential off-site sources of increased fire hazard, the impact of the construction activities on fire hazards for surrounding lots, and any implication for the conservation of ecologically significant areas.

The site borders the Bremer River where mature trees extend along the riverbank area. The topography consists of a lower flood plain area, a bank and higher platform area. The east side borders the Queensland Railway Museum and a rail line that connects the museum site with the Riverlink Shopping Centre in a north south orientation.

Further to the east is vacant land beside North Street, to the north residential housing; to the south is the Riverlink Medical Centre under construction.

There is an existing track along the River bank behind the tree line at the front of the batter and a further higher level track at the top of the bank. A copy of drawing No C3754:03:SK300 attached in **Appendix D** shows the location of the tracks that are to be maintained to provide access for fire vehicles and other heavy machinery.

The likely occurrence of a fire is from the existing vegetation beside the river or a subterranean fire as a result of the earthworks operations on the site. There is evidence of a subterranean fire that occurred around 2007 located in the bank towards the southern area. Subterranean fires are difficult to extinguish. The traditional strategy for extinguishing the fire is by saturating the area using large tankers. Alternatively it may be necessary to add more soil in this area and track roll it in. Oxygen starvation is one way to retard combustion but it may not correct the reason it started in the first place.

Where this cannot be achieved, an alternative has been to isolate the area by the installation of a mineral earth fire break commonly installed by using earthmoving machinery. This method would limit the extension of the fire but would not extinguish it, therefore, it should be expected that there will be some smoke in the area from the burning until the fire burns itself out.

Subterranean fires pose particular safety issues for fire fighters. Safety of fire-fighting personnel and the site personnel should be paramount concern during fire fighting.

The existing houses and buildings on the eastern side of the railway line are located away from the most likely direction of a fire front. No new buildings are proposed as part of the Operational Works Application and the only buildings will be temporary portable site buildings (offices) to be used by the subcontractor during the construction period.

Apart from the Bremer River this is currently no available reticulated water supply on the site. At the southern extremity of the site the Medical Centre Building is being constructed in accordance with the Buildings Code of Australia compliant with fire hose / sprinkler equipment.

Vehicle access points to the site and not clearly visible and during construction would be signposted for private access only. As part of the construction equipment for the earthworks, heavy machinery including bulldozers, excavators, compactors, trucks, graders and water trucks would be permanently stationed on site. The earthworks operations and sequence are detailed on the Engineering Drawings and primarily commence at the northern end of the site and progressively moves in a southerly direction.

The confines and linear shape of the site dictates the construction sequence that requires sufficient earthworks to be progressively completed as opposed to the unacceptable alternative of having large areas open at any one time. This is also controlled by the stormwater sediment and erosion and control plans. The outcome being that large areas of exposed earthworks would not be approved as part of the Contractor's Construction Management Plan which minimises the risk of subterranean fires occurring.

The recommended procedures for the contractor to implement on site as part of the fire management strategy include:

- Access for internal roads to be maintained at all times. A copy of the plan showing access points to / from the external public roads at WM Hughes Street and Lowry Street past the Riverlink Medical Centre to be forwarded to the North Ipswich Fire Brigade. Access track with up to 3 metres width to be maintained in a trafficable condition by watering and rolling with gravel surfacing infill as required. Passing bays to be provided at appropriate locations but not greater than 200 metres intervals to allow for a minimum total width of 6 metres for vehicles to pass.

- Fire Wardens to be appointed by the contractors and be skilled in fire fighting subterranean fires
- Site assembly points to be nominated
- Water truck, dozers, excavators and trucks to be made readily available for fire fighting purposes when requested by the fire warden or the fire brigade.
- Site inductions to be carried out in accordance with the contractors Work Place Health and Safety Plan at all times and to include Fire Management procedures
- Emergency numbers for fire brigade, ambulance and police to be located in site office in a clearly visible location.

11. Waste Management Plan

The main materials likely to be salvaged from the existing buildings include timber, concrete, rubble, asbestos, galvanised iron sheeting, steel and possible other materials from site not considered in the stockpiles or the Remediation Plan including asphalt, cement treated gravel, concrete, steel and vegetative matter. Treatment of the various materials is discussed as follows:

- Asphalt. The asphalt should, where possible, be reused for recycled asphalt or if it is not of sufficient quality it should be placed into a material suitable to be used as either select fill or embankment material.
- Gravel. If testing shows that gravel meets all the required standards, it may be used as a lower sub-base material. If testing shows that it does not reach the required standard, it should be used as a select fill material or consequently it may be used as an embankment material.
- Cement treated gravel. Cement related pavements would require a level of rehabilitation prior to being used as a fill material. The cement bonds the material into a bound pavement that is relatively thick. Cement treated gravel should be reduced to a useful size (e.g. < 75mm diameter) prior to use as an embankment materials.
- Concrete. Reinforced concrete structures that require removal could be demolished by the use of excavators with rock breakers. These would produce smaller pieces of reinforced concrete that could be treated to remove the excess steel prior to being used as embankment material. This material could be placed in the lowest layers of the embankments. The excess steel would be recycled.
- Asbestos. Where asbestos is found in the normal course of demolition work, a risk assessment must be completed and submitted to the environmental officer.
- Any person brought onto a site for the purpose of asbestos identification and/or removal must provide details of their qualifications, experience and authorisation (e.g Work Cover license/permit) to the site manager. Asbestos shall only be handled by a licensed operator wearing appropriate protective clothing and shall be disposed of at a waste disposal facility licensed under the Environmental Protection Act 1994 for disposal of that waste.

Structures such as culverts, poles, cables and other structures to be removed or demolished during construction. Structural elements which can possibly be reused on site or used for temporary works should also be identified.

- Steel. Any steel removed as part of the new works, such as guard rails, reinforcing steel, or sign posts, would be removed from site and recycled.
- Timber. Timber framing shall be reused where possible or recycled. Or otherwise disposed of to a licensed land fill.

Vegetative material. The main vegetative materials would be existing grass, shrubs and trees. Where appropriate the grass would be collected with the topsoil and stockpiled separately as a composted material and used for landscaping. Larger vegetation which needs to be cleared should be mulched. The topsoil and mulched material should be stockpiled separately such that it does not create a nuisance in the form of air borne dust by covering and "wetting down" of the stockpiles as appropriate. Stockpiles should also be maintained to prevent the growth of weeds.

The Construction Contractor should:

- Apply any waste minimisation and management strategies as nominated in the drawings and specifications;
- Ensure any wastes generated on site are transported and disposed off site of by an appropriately licensed contractor with permits in covered trucks, as per the provisions of the Environmental Protection Act 1994;
- Consider the reuse of stockpiled structural elements for reuse in the construction or for use in temporary works on site. Prior to reuse, the Construction Supervisor should perform an assessment and testing (if required) of these stockpiled structural elements to ensure they meet the required standards and will perform satisfactorily;
- Ensure that there is the adequate provision of correctly signed waste receptacles made available at convenient locations for the disposal of wastes. If practicable, separate receptacles should be provided for wastes which can be source separated, e.g. steel, paper etc, which will allow easier and more efficient collection and later processing; Ensure adequate toilet and ablution facilities are provided for the duration of the contract. Domestic sewage and grey water from these facilities should be retained on-site and collected by a licensed waste disposal contractor at regular periods. Under no circumstances are wastes to be discharged directly into the environment; Ensure adequate ground surface area is made for the safe storage of wastes prior to collection;
- Ensure that all wastes on site are suitably contained and prevented from escaping into neighbouring bushland, properties, waterways and that the waste contained does not contaminate soil, surface or ground water or create unpleasant odours for neighbours or workers;
- Ensure the site is regularly cleaned and waste materials appropriately removed. Material which can be economically recycled, (e.g. steel, oil etc) should be sent to recyclers. All other waste that cannot be reused on site should be disposed of to a licensed land fill in accordance with Ipswich City Council regulations.

The contractor must not:

- (a) burn waste on the site;
- (b) allow waste to be burned on the site; or
- (c) remove waste from the site for burning elsewhere.

Hazardous materials stored on site such as chemicals for flocculation are to be covered to prevent rainwater entering and subsequent contaminated runoff.

12. Comprehensive Health & Safety Plan

Contaminated land within the project area has the potential during the construction phase to impact on both human health and the environment. Human health impacts have the following potential exposure:

- on-site workers – dermal contact, ingestion and inhalation; and
- off-site workers and members of the public – ingestion and inhalation.

Potential environmental impacts associated with the project construction phase are likely to be the result of the following:

- exposure of existing contaminated material within stockpiles and other subgrade locations as a result of required earthworks, drainage excavation and remediation works;
- spill and releases of hazardous materials used and stored on site for the construction; and
- spills and releases of waste materials generated during the construction.

To eliminate any exposure to the public of human health impacts associated with the excavation of the contaminated land, public access to the site is to be prohibited throughout the construction period. Mitigation measures detailed in the health and safety Plan are designed to manage the risks to on site workers during the construction phase.

The other potential health impacts associated with the development to the public include;

- Dust
- Noise
- Smoke including Airborne particles
- Transport of Hazardous materials including chemicals and asbestos
- Transport and disposal of solid and liquid waste and waste water including leachate.

The Workplace Health and Safety plan developed for the project is included in **Appendix E**. In addition to occupational health and workplace procedures, the plan details remedial measures to mitigate the potential impacts associated with noise and hazards materials such as chemicals and asbestos removal associated with development.

APPENDIX A

Survey Plan: 222487

Appendix B

Remediation Plan (9th February 2010)
Lot 53 – 55 Plan SP222497

Riverlink Project North Ipswich Qld
By Geo Environmental Consultants

REMEDIATION PLAN (9th February 2010)

LOTS: [REDACTED]

PLAN: [REDACTED]

RIVERLINK PROJECT, NORTH IPSWICH, QLD

Prepared for LEDA Developments
By GeoEnvironmental Consultants

1. INTRODUCTION

This Remediation Plan has been prepared for Lots [REDACTED] formerly [REDACTED] on [REDACTED] covering a total area of 26.1165 hectares. The lots are included on the Environmental Management Register (EMR) but not the Contaminated Land Register (CLR). The Remediation Plan presents a classification of existing stockpiles and soil types across [REDACTED] on [REDACTED] and nominates destinations and management requirements for the stockpiles and soil types. The two smaller Lots [REDACTED] located on higher ground in the north east corner of the site are not currently subject to any proposed remediation.

The subject site has been assessed across three areas referred to as Hughes Street [REDACTED] the Riverbank Area [REDACTED] and North Street [REDACTED]. The lot layout is shown on the attached plan [REDACTED] (Page 1 of 4).

1.1 Purpose

This Remediation Plan presents an approach whereby excavation and stockpile movement across the entire site is to be supervised by a Suitably Qualified person in accordance with Section 381 of the Environmental Protection Act 1994 (EP Act) with oversight by the appointed Third Party Reviewer (TPR) to ensure that any suspected or unforeseen contamination issues are appropriately addressed. The purpose of this Remediation Plan is to outline the bulk handling of contaminated soil so that future development can proceed with appropriate controls in place.

1.2 Objective

The objective of the Remediation Plan is to provide a strategy to manage contaminated soils being excavated and moved during site redevelopment in a manner that protects human health and the environment. The intent is to remove contaminated soil and stockpiles from Hughes Street and North Street and to incorporate the material into the bulk earthworks occurring in the Riverbank Area. This approach could result in Hughes Street [REDACTED] and North Street [REDACTED] being removed from the EMR while retaining the Riverbank Area ([REDACTED] on the EMR under an approved Site Management Plan (SMP).

2. BACKGROUND

Lot [REDACTED] (5) has been used in the past for rail purposes and is the subject of an existing SMP (File Ref: BNE10011) effective from 14th November 2008. The Suitability Statement for [REDACTED] lists previous studies and states that the site is suitable for its current use (vacant land).

In the last few years stockpiles of soil have been added to the Riverbank Area, Hughes Street area and at the southern end of the North Street area. The stockpiles have been sourced from excavation works on the southern rail yards during redevelopment by Leda.

This Remediation Plan has been based on the following assessment documents and information:

- GeoEnvironmental Letter Report *Ipswich Riverlink Project – Northern Region, North Street Sampling Results Update* dated 3rd April 2009 Ref: 6062/01;
- GeoEnvironmental Letter Report *Ipswich Riverlink Project – Northern Region, Hughes Street Sampling Results Update* dated 6th April 2009 Ref: 6062/01;
- GeoEnvironmental Letter Report *Results of "SQ" (Medical Centre) Stockpile Soil Sampling, Riverlink Project, North Ipswich, Qld* dated 4th June 2009 Ref: 6062/01;
- GeoEnvironmental Letter *Preliminary Review of Soil Volumes and Classification, Riverlink Project, North Ipswich, Qld* dated 30th July 2009 Ref: 6062/01;

Drawing Nos. 1 and 2 make reference to locations sampled previously by Groundwater Technology (1995), GHD (1996) and Earthtech (2003). The *Ipswich Riverlink Northern Region Summary Report* by Earthtech dated August 2007 has also been referred to in completion of this Remediation Plan. These reports detailing and summarising the completed assessment work have been submitted previously to the Department of Environment & Resource Management (DERM) as confirmed by the list of studies presented in the Suitability Statement for [REDACTED] dated 17th November 2008.

Contamination has been identified mainly within fill and stockpiled material. Maximum concentrations of contaminants of potential concern are as follows.

<u>Analyte</u>	<u>Maximum Concentration (mg/kg)</u>
Cadmium	12
Chromium	79
Copper	20,000
Lead	19,000
Zinc	29,000
Mercury	2.4
Total PAHs	440

<u>Leachable (TCLP)</u>	<u>Maximum Concentration (mg/L)</u>
Lead	59

3. SOIL CLASSIFICATION

The following project specific classifications have been adopted for application to soil that is to be managed at this site:

- Clean** = Not contaminated, suitable for use in any location without capping.
- Class 1** = Slightly contaminated, mostly clay/silt/sand/rock, minor ash, aesthetically good, suitable for use immediately below capping concrete, asphalt and designed landscape areas and below 0.5m depth when covered by clean material in unsealed areas.
- Class 2** = Moderately contaminated, mostly clay/silt/sand/rock, some ash and fine rubble, aesthetically reasonable, suitable for use below 1.0m beneath capping concrete, asphalt and designed landscaped areas.

Class 3 = Heavily contaminated, clay/silt/sand/rock, common ash and/or rubble, aesthetically poor, suitable for use below 1.0m of Clean or Class 1 material in concrete or asphalt capped and designed landscaped areas.

Class 4 = Heavily contaminated, clay/silt/sand/rock, common ash and/or rubble, aesthetically poor, not suitable for retention on site, dispose offsite.

4. VOLUMES

Riverbank Area stockpiles are defined in attached Table No. 1. The following table summarises all contaminated soil, both insitu requiring excavation and in stockpiles across all areas of [REDACTED] and [REDACTED].

Area	Location	Classification					
		Clean m ³ (loose)	Class 1 m ³ (loose)	Class 2 m ³ (loose)	Class 3 m ³ (loose)	Class 4 m ³ (loose)	Separated Rubble
North Street	Stockpile	6,000					
	In situ			15,000	500		
Hughes Street	Stockpiles				5500		
	In situ			22,000			
Riverbank Area	Stockpiles	6,500	87,500	20,000	4,000	0	9,000
	In situ				17,500*		
Totals		12,500	87,500	57,000	27,500	0	9,000

* 17,500 is the estimated volume of fill to be excavated from the Wide Gully steep batter stabilisation.

The total volume of contaminated soil that is to be excavated from North Street and Hughes Street areas and from all stockpiles is estimated to be approximately 190,000 m³ (loose). Differences in volumes between the tables and annotated drawings are due to the application of a bulking factor, generally about 15%.

Separated rubble is material comprising coarse building, construction and demolition waste and other coarse materials such as railway sleepers that can be physically screened, sorted and separated. It is expected that most of this material, with the exception of possibly some concrete will not be suitable for retention on site and will require offsite disposal to landfill or other acceptable destination.

Off-site disposal of contaminated soil must be carried out in accordance with the conditions of a Section 424 *Disposal Permit*, granted under the *Environmental Protection Act 1994*. Contaminated soil must not be removed off-site without a *Disposal Permit*. The *Disposal Permit* application must be agreed and approved by the TPR prior to submission to the DERM for issue.

4. BULK EARTHWORKS PRELIMINARY PLAN

The bulk earthworks preliminary plan broadly involves the creation of an extended platform along the upper riverbank by placement and compaction of fill up to between RL 19.5m AHD and RL 20.5 mAHD. The current plan for each Lot is discussed in more detail below.

There is scope to win clean clay material from borrow pits along the lower riverbank terraces for use in areas where clean clay capping is required and to make up any shortfall in required fill quantities. Engineering estimates indicate that up to 79,000m³ (compacted) of clean clay will be required in selected areas including the batter stabilisation program along the Wide Gully area towards the new Medical Centre development at the south end.

Old "QR Fill" located beneath Stockpiles SA to SQ along the Riverbank Area and in the southern Wide Gully area is considered to be contaminated and by default it is to be allocated to Class 3.

In accordance with the soil classes specified above in Section 3, there will be no Class 4 material retained on site. Class 2 and Class 3 material will be placed in areas where there will be at least 1.0m of Clean or Class 1 material placed over the top.

Class 1 material will be placed in areas that are to be covered with concrete, asphalt or designed landscape areas. Designed landscaping can include a minimum 0.5m of clean soil cover or contained planter boxes of lesser depth. In areas without concrete, asphalt or designed landscape areas, Class 1 material will be placed so that there will be a minimum cover of at least 0.5m of Clean material. This will apply on stabilised batter areas.

Remedial goals for soil are presented below. These goals will ensure that the remediated soil does not pose a risk to human health or the environment.

Soil Remediation Goals

Compound	Remediation Criteria mg/kg
Heavy Metals	
Cadmium	3
Chromium VI	100
Copper	200
Lead	300
Zinc	400
Mercury	1
PAH	
Total PAH	20
Benzo (a) pyrene	1

4.1 [REDACTED] Hughes Street

The existing contaminated material (27,500 m³ approx) will be removed / scraped off the site with the resultant uncontaminated surface being validated prior to filling back (using Clean material) to the finished earthworks levels. Remediation areas are shown on attached Drawing No. 1. Validation testing is to be completed across the base of excavated areas on an approximate 25m x 25m grid pattern. Excavation walls within the lot boundaries are to be sampled at approximate 25m intervals with multiple samples where excavations are deeper than 0.5m. Validation sampling densities will take into account past sampling results for natural soil where tested and considered valid. Parameters to be tested include metals arsenic (As), copper (Cu), lead (Pb), zinc (Zn), total petroleum hydrocarbons (TPH) and polycyclic aromatic hydrocarbons (PAH). TPH and PAH tests will be conducted in areas of staining, odour and/or ash occurrence.

The contaminated material (predominantly Class 2 and some Class 3) will be removed and compacted into the "extended Riverbank Platform" on [REDACTED] at depths set out in the "Soil Classification" section of this Remediation Plan.

4.2 [REDACTED] Part) – Southern Area and Wide Gully/Riverbank area.

The existing river bank is to be re-profiled in accordance with engineering designs by removing contaminated material and placing it in the “extended Riverbank Platform”. The resultant exposed surface will then be capped with at least 0.5m of Clean or Class 1 material with a minimum cover of at least 0.5m Clean Clay. The southern area is shown on attached Drawing No. 3.

These remediation works will achieve the “Remediation Plan objectives” by capping the old QR Fill Class 3 material with a minimum 1.0m of Class 1 and Clean material.

4.3 [REDACTED] (Part) – “Extended River Platform”.

These works including Borrow Pit locations are shown on VDM Bulk Earthworks Plans C3754:03 – SK04B and SK05A. It is proposed to expand the existing borrow pit on the lower river terraces to win the required Clean clay capping material. This borrow area and the base of the extended Terrace will be filled with compacted Class 2 and Class 3 contaminated material to create the sub-profile shown on the VDM drawings. The Class 3 material will be placed as deep as possible with progressively cleaner material placed higher (closer to the surface) in the fill area. This sub profile will then be capped by the Clean material in accordance with the VDM drawings. The central and northern parts of the River bank area are shown on attached Drawing Nos. 4 and 5.

The material to be placed in the excavated borrow pits is of low leaching potential and hence low risk to both the underlying groundwater and the Bremer River. Should relatively impermeable material (silty or sandy) be encountered in excavated borrow pit areas then the suitability of the excavated material for use as capping will be assessed. The suitability of the borrow pit to provide a relatively impermeable containment area for placed contaminated soil will be assessed.

4.4 [REDACTED] – North Street

The existing contaminated material (21,500 m³ approx) will be removed / scraped off the site with the resultant uncontaminated surface being validated prior to filling back (using Clean material) to the finished earthworks levels. Remediation areas are shown on attached Drawing No. 2. Validation testing is to be completed across the base of excavated areas on an approximate 25m x 25m grid pattern. Excavation walls within the lot boundaries are to be sampled at approximate 25m intervals with multiple samples where excavations are deeper than 0.5m. Validation sampling densities will take into account past sampling results for natural soil where tested and considered valid. Parameters to be tested include metals (As, Cu, Pb, Zn), total petroleum hydrocarbons (TPH) and polycyclic aromatic hydrocarbons (PAH). TPH and PAH tests will be conducted in areas of staining, odour and/or ash occurrence.

The contaminated material (predominantly Class 2 and some Class 3) will be removed and compacted into the “extended Riverbank Platform” on Lot 54 at depths set out in the “Soil Classification” section of this Remediation Plan.

4.5 Underground Services

The objective for Hughes Street [REDACTED] and North Street [REDACTED] is to remove contaminated soil and achieve removal of the lots from the EMR. In the event that removal from the EMR is achieved, underground services will be located within validated clean soil. Should some areas such as the existing electricity easement (Emt M) along the western side of Lot 55 not be fully remediated, management of any shallow and deep service trenches in these areas will be managed under a revised Site Management Plan (SMP) for the relevant Lots once design details are defined.

In the Riverbank Area [REDACTED] the implemented Remediation Plan will enable future shallow underground services to be placed in Clean or Class 1 material in the top 1.0m. Where underground services are required to be installed below 1.0m depth, Class 2 and/or Class 3 material may be intersected. The management of shallow and deep service trenches will be managed under a revised SMP for [REDACTED] once design details are defined.

4.6 Environmental Protection

All earthworks are to be undertaken in accordance with general environmental protection measures to avoid unwanted migration and deposition of soil. These measures include the control of dust, noise, stormwater or sediment runoff, erosion, spillage from haulage trucks and odour releases involving the handling or movement of contaminated material.

Any stockpile on site must be managed as to prevent contamination of surrounding environment through leachate seepage, erosion, dust generation, runoff or any other mechanism.

Groundwater monitoring is to include the inspection and re-establishment of existing monitoring wells along the riverbank. Unserviceable wells located in appropriate locations relevant to the proposed riverbank earthworks will be replaced. Depending on the coverage provided by existing wells new wells may be installed.

If during any site earthworks or excavation, offensive or noxious odours and/or evidence of gross contamination not previously detected is observed, site works are to cease in that area and action taken to immediately abate the environmental harm. The administering authority is to be notified in writing within two (2) business days of detection and advised of appropriate remedial action.

A Workplace Health and Safety Plan (WH&S plan), which conforms to the requirements of the *Workplace Health and Safety Act 1995*, is to be developed for any excavation works at the site. The WH&S plan must address site-specific contaminants of concern identified in Section 1.0 of this SMP.

The site work and subsequent reporting is to be reviewed by a DERM appointed Third Party Reviewer (TPR). All validation requirements will first be confirmed by the TPR and any clarification issues will be referred to the TPR prior to DERM. The TPR will review the proposed validation methodology, pre-validation sampling results, surface and groundwater results (if applicable), Disposal Permit applications and the final report.

A public complaints system will be established prior to the commencement of the remedial works, to address any issues that may arise in the community as a result of works on the site. Rapid, pro-active response to any complaints received will be provided.

5. CLOSING

All works will be validated by GeoEnvironmental Consultants and approved by the TPR.

All remediation works will be completed in conjunction with other works and control plans, including the Erosion and Sediment Management plan prepared by Yeats Engineers. The Erosion and Sediment Management Plan addresses transport routes, designed gravel pads or other devices, vegetated areas and grass filter strips, sediment fences, dust control, runoff chutes and temporary bunds, and monitoring requirements.

All check dams and sediment basins will be located in non-contaminated areas where possible or otherwise designed to prevent the spread of contaminated soil. Landscaping and revegetation in accordance with the Landscape Plan will be conducted to achieve the objectives of the Remediation Plan. Works will be conducted under a site specific Health and Safety Plan.

Post-development management of Lots that remain on the EMR due to the presence of retained contaminated material will be achieved through a Site Management Plan (SMP) to be approved by the TPR and DERM. The SMP will specify monitoring and cap maintenance requirements.

Attachments:

1. Ipswich Riverlink -- Northern Region, Riverbank Stockpile Classification Table
2. Plan SP222487 (Page 1 to 4)
3. Drawing No. 1. Hughes Street Remediation Plan
4. Drawing No. 2. North Street Remediation Plan
5. Drawing No. 3. River South Remediation Plan
6. Drawing No. 4. River Central Remediation Plan
7. Drawing No. 5. River North Remediation Plan
8. Yeats Drawing No. YC0176-BE03 Rev A 23/07/09 Hughes Street
9. Yeats Drawing No. YC0175-BE02 Rev A 05/08/09 North Street
10. VDM Drawing No. C3754:03 SK04B - Finished Surface Levels
11. VDM Drawing No. C3754:03 SK05A - Borrow Pits

IPSWICH RIVERLINK - NORTHERN REGION

For LEDA Developments

2-Oct-09

RIVERBANK STOCKPILE CLASSIFICATION

by GeoEnvironmental Consultants

Stockpile Name	Length ~m	Width ~m	Max Height ~m	Average Height ~m	Approx Volume m3	Characteristics/Comments	Fines Content %	Fines Volume m3	Sampling Results	Class Clean, 1, 2, 3, 4
SA	80	6	3	2	960	Recently crushed concrete	NA	NA	Not sampled	Clean
SB	22	10	2.2	2	440	Silt, clay, ash, old slag, rubble, metal	100	440	Relatively high total copper, lead, zinc. TCLP lead leachable, ASLP lead not readily leachable	3
SC	25	6	3	2.5	375	Recently crushed concrete	NA	NA	Not sampled	Clean
SD	120	20	2.5	1.8	4320	Clay, silt, sand, ash, slag, metal, concrete, rubble ~30% screen out ~1300m3.	70	3024	Moderate to low total copper, lead, zinc. TCLP lead leachable, ASLP lead not readily leachable	2
SE	70	25	3	2	3500	Placed by QR as cap over underground fire. Clay, silt, ash, metal, fine rubble	100	3500	Relatively high total PAH, copper, lead, zinc. TCLP lead readily leachable, ASLP lead not readily leachable	3
SF	40	20	3.5	2	1600	Silt, sand, gravel, ash, rubble ~20% screen out ~320m3.	80	1280	South end (SF1, SF2) with elevated total copper, lead, zinc. TCLP and ASLP lead not readily leachable.	2
SG	80	20	1.5	1	1600	Clay, sand, gravel and reworked concrete rubble, some scrap metal. Appears to have been disturbed recently as weed growth is new. Concrete/rubble ~30% screen out ~480m3. Most of 480m3 should be larger concrete.	70	1120	Moderate to low total copper, lead, zinc. TCLP and ASLP expected to have low leachability	2
SH	60	20	3.5	2.5	3000	clay, silt, sand, ash, concrete, steel, pipes, sleepers, <50% fines, old fill in steep grass covered pile. Rubble >50% screen out ~1500m3	50	1500	Moderate to low total copper, lead, zinc. TCLP metals not readily leachable, ASLP metals not readily leachable	2
SI	95	15	3.5	2	2850	Concrete, soil, ash, rubble, timber, >50% fines, centre ridge to 3.5m high. Rubble ~30% or more screen out ~855m3.	70	1995	Moderate to low total copper, lead, zinc. TCLP metals not readily leachable, ASLP metals not readily leachable.	2

SJ	220	50	6	5.5	60500	"Ayers Rock" commercial fill, soil, sand, some asphalt, minor ash and some rubble.	100	60500	Low total copper, lead, zinc. TCLP and ASLP metals not readily leachable.	1
SK	105	40	3	2	8400	Large flat topped pile, soil, concrete, plastic, rubble, asphalt, Rubble ~20% screen out ~1680m3	80	6720	Generally low total copper, lead, zinc with north east corner (SK16 to SK19) higher. TCLP and ASLP metals not readily leachable.	2 large proportion could be Category 1
SL	40	25	3	1.5	1500	Former stockpile that appears to have been pushed westwards down the embankment creating an area level with the road. Soil and rubble in embankment. Volume estimate is a best guess as underlying contours unknown.	100	1500	Moderate to low total copper, lead, zinc. TCLP lead leachable, ASLP metals not readily leachable	2
SM	85	35	4	2	5950	Sand, silt, clay, rubble, bricks, concrete, steel, not screened, large pieces, Steep west face to ~ 4m high. Volume estimate is a best guess as underlying contours unknown. Rubble ~50% screen out ~ 2975m3	50	2975	Moderate to low total copper, lead, zinc. TCLP and ASLP metals not readily leachable	2
SN	70	50	2	1.5	5250	Large concrete blocks, steel, not screened or sorted, minor fines. Rubble concrete ~100% or 5250m3	NA	NA	Not sampled	clean
SO	90	40	5	4	14400	Clay,silt, sand, gravel with minor ash and minor rubble, crest to ~5m above road level, Steep west face. Volume estimate is a best guess as underlying contours unknown. Separate out small percentage of rubble.	100	14400	Moderate to low total copper, lead, zinc. TCLP and ASLP metals not readily leachable	1

SP	50	40	4	4	8000	Clay, silt, sand, gravel with minor ash and minor rubble metal bricks, crest to ~4m above road level, Steep west face. Volume estimate is a best guess as underlying contours unknown. Separate out small percentage of rubble.	100	8000	Low to negligible total copper, lead, zinc. TCLP and ASLP metals not readily leachable	1
SQ	65	20	4	3.5	4550	Clay, silt with minor ash and minor metal rubble, on top of Stockpile SJ. Recently sourced from Medical Centre excavations in southern shopping centre area. Separate out small percentage of rubble.	100	4550	Low to negligible total copper and lead. TCLP and ASLP leachable metals expected to be low, not analysed.	1
Borrow						From natural riverbank unfilled areas				Clean
Old QR Fill						From old filled areas typified by ash, slag, metal				3

~ TOTAL 127195

111504

NOTES:

Clean = Not contaminated, suitable for use in any location without capping.

Class 1 - Slightly contaminated, mostly clay/silt/sand/rock, minor ash, aesthetically good, suitable for use immediately below capping concrete, asphalt and designed landscaped areas and below 0.5m depth when covered by clean material in unsealed areas.

Class 2 - Moderately contaminated, mostly clay/silt/sand/rock, some ash and fine rubble, aesthetically reasonable, suitable for use below 1.0m depth beneath capping concrete, asphalt and designed landscaped areas.

Class 3 - Heavily contaminated, clay, silt, sand, rock, common ash and fine rubble, aesthetically poor, suitable for use below 1.0m of Clean or Category 1 material in concrete or asphalt capped and designed landscaped areas.

Class 4 - Heavily contaminated, clay, silt, sand, rock, common ash and/or rubble, aesthetically poor, not suitable for retention on site, dispose offsite.

VOLUMES (Estimated)

	m3	
Clean	6585	Clean includes the concrete stockpiles SA, SC and SN.
Class 1	87450	
Class 2	20114	
Class 3	3940	
Class 4	0	
Separated Rubble	9110	Rubble would include some proportion requiring offsite disposal to landfill and some suitable for retention onsite.
Total	127199	

SURVEY PLAN

W.M. HUGHES STREET

County of Churchill
Parish of Brassell
Mini Creek
Orig H.M. Vide SL3927

Bremer River

EMT.T

53

51

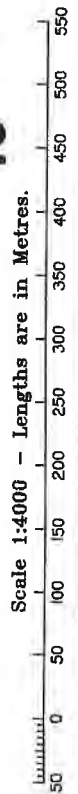
52

NORTH STREET

54

16.24 ha Bal

55



Original information compiled from
SL3927 & SP203402 in the Department
of Environment & Resource Management.

No mark placed at stations 49d-49f
(under stockpiles)

Drill hole in brick placed at station 14.

Nail in concrete placed at station 29a.

Drill hole in conc placed at all corners
between stations 48 & 49 inclusive
and at station 39a.

GI Nail in bitumen placed at stations
15a, 15b, 39b, 39c, 47, 49a-49c & 49g.

Peg placed at all other new corners.

See Sheet 4 for Permanent Marks Table

REFERENCE MARKS

STN	TO	ORIGIN	BEARING	DIST
1	O.Screw	12/DP170533	93°13'	33.445
2	OIP	11/DP170533	154°10'	0.937
3	O.Screw	7/DP216929	329°38'10"	13.73
4	OIP gone	SL3927	98°33'10"	1.006
4	O.Screw	6/DP216929	221°23'10"	7.225
4	Nail in Conc		327°43'30"	18.422
6	OIP gone	4/SL20186	6°33'10"	1.006
6	O.Screw	3/DP216929	37°36'10"	6.542
6	Nail in Conc		60°32'30"	6.315
7	Nail in Conc		80°27'10"	6.434
8	O.Spike	2/DP212631	20°18'35"	13.515
9	O.Bolt (not searched)	8/RP807126	43°33'10"	2.0
10	O.GI Pipe (not searched)	7/RP807126	319°10'10"	1.56
11	D/H in Conc		83°46'	21.65
12	OIP not fd (Under Conc)	SL3927	341°26'10"	1.131
13	Nail in Kb		67°31'30"	16.937
13b	O.Nail gone	1/SP151433	114°37'	3.937
14	D/H in Kb		87°29'	6.356
15	Pin		65°16'36"	6.356
16	GI Nail in Bit		48°20'10"	15.425
17	O.GI Nail	8/SP151433	82°13'	2.806
20	Pin		158°16'10"	14.982
20	Pin		265°22'30"	31.807
21	Pin		185°07'20"	9.697
24	Pin		94°39'10"	27.82
25	Pin		34°40'50"	13.49
26	O.Nail hole	2/DP170533	77°34'	3.636
27	O.Nail	2/SP151433	104°06'	3.892
28	O.Nail	1/SP175172	13°24'55"	23.392
28	OIP gone	7/DP170534	343°30'30"	1.08
29	Pin		227°09'	38.805
30	OIP	2/SP175172	170°43'	1.834
31	O.Screw	16/SL20186	280°14'	1.765
31	Pin		96°58'	8.325
32	OIP	4/SP203402	234°24'	1.78
33	OIP	37/SP203402	260°49'	4.058
34	OIP not fd	6/DP170534	343°06'30"	1.165
35	OIP	6a/DP170534	265°22'35"	0.82
38	OIP gone	7/DP170534	343°30'30"	1.08
41	OIP gone	8/DP170534	253°13'30"	0.72
42	OIP	8a/DP170534	76°34'30"	0.777
43	O.Nail	14/SP222470	245°13'10"	11.019
44	OIP	17/SP196038	288°05'45"	0.996
45	OIP gone	15/SP196038	347°05'	0.858
46	OIP	16/SP196038	199°55'50"	12.314
49	D/H in Conc		178°01'10"	12.444
50	GI Nail in Bit		84°39'20"	10.63
50a	OIP	14/SL3927	199°21'50"	0.604
51	GI Nail in Bit		248°44'15"	11.647
52	OIP	12/SL20186	110°28'	1.0
53	GI Nail in Bit		229°30'25"	27.245

85°37' ~ 3.51
49°26' ~ 5.525



Amendments by Michel Group Services
Cadastral Surveyor or Director

MICHEL GROUP SERVICES PTY. LTD. (ABN 53 841 801 835) hereby certify that the land comprised in this plan was surveyed by the corporation, by Geoffrey Scott GREEN, Cadastral Surveyor, for whose work the corporation accepts responsibility, and that the plan is accurate, that the said survey was performed in accordance with the Survey and Mapping Infrastructure Act 2003 and Surveyors Act 2003 and associated Regulations and Standards and that the said survey was completed on 16/07/2009.

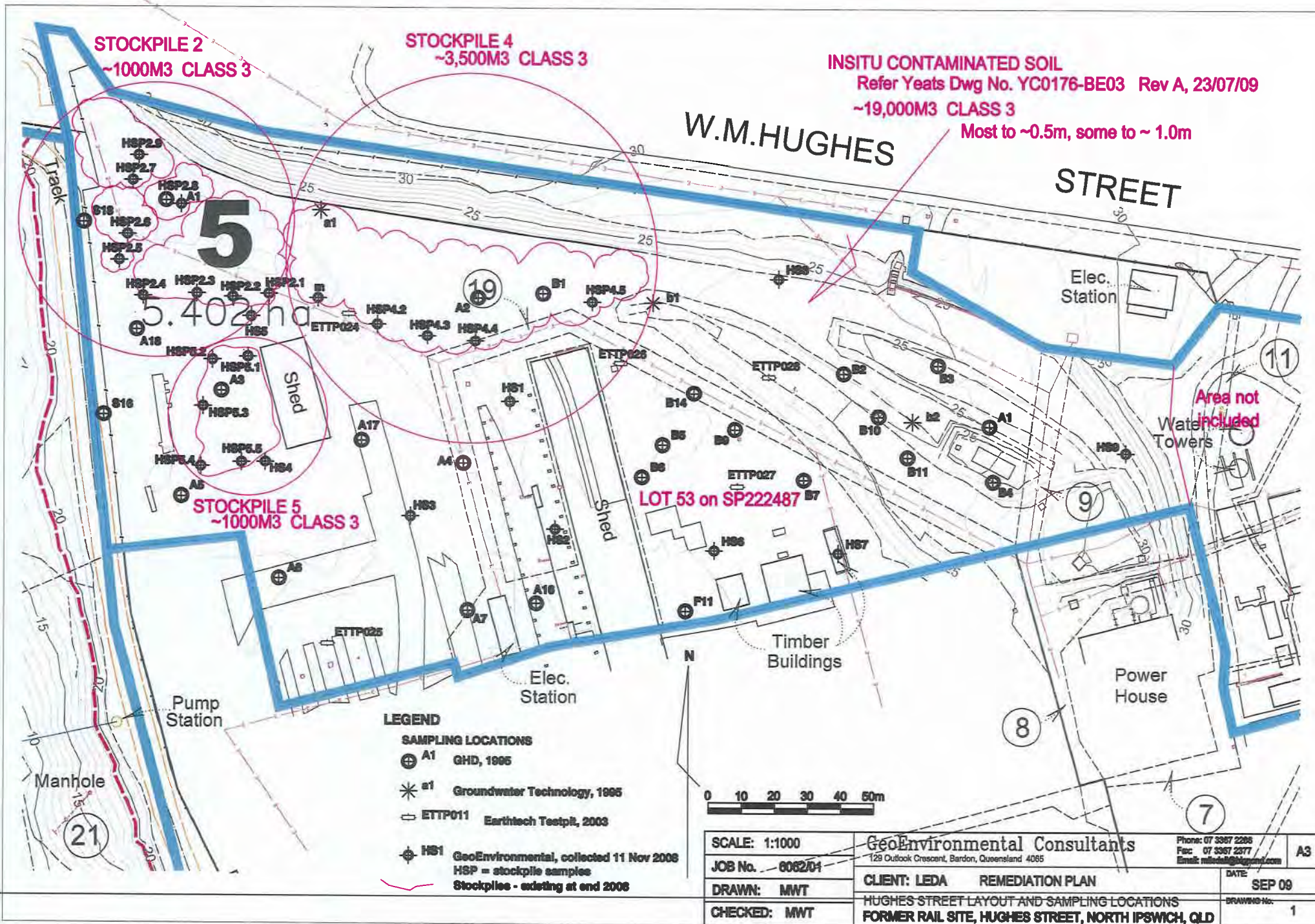
MICHEL GROUP SERVICES PTY. LTD. A.C.N. 061 760 132
COMMON SEAL
Director
Director
Date 13/7/2009

Plan of Lots 51-55, Easement T in Lot 53 & Easement F in Lot 38 on SP203402

Cancelling Lot [Redacted]
PARISH: CHUWAR COUNTY: Stanley
Meridian: SP196038 F/N's:

Scale: 1:4000
Format: STANDARD
SP222487
Plan Status:

8742-02.A5



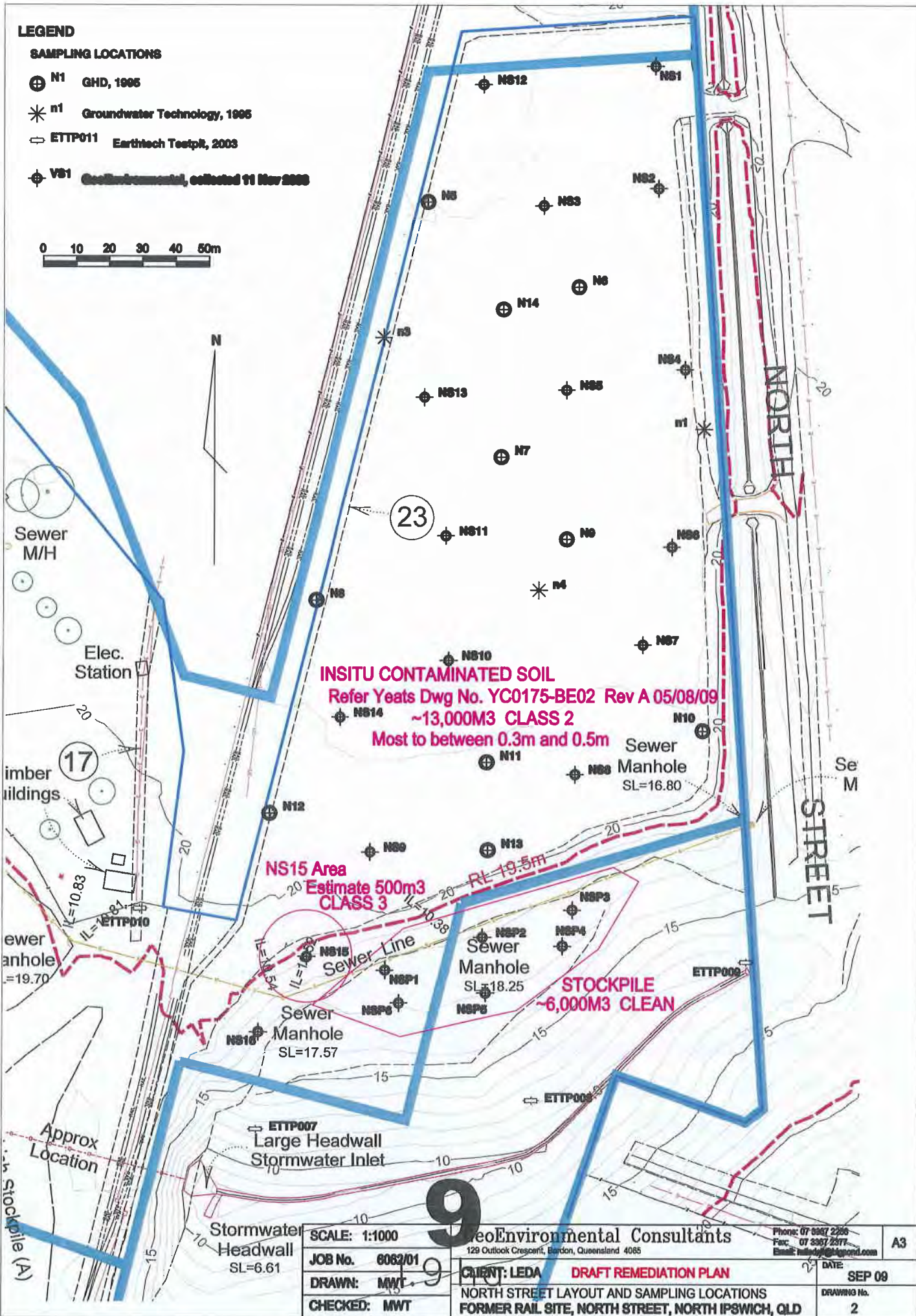
LEGEND

SAMPLING LOCATIONS

- ⊕ N1 GHD, 1995
- * n1 Groundwater Technology, 1995
- ETPP011 Earthtech Testpit, 2003
- ⊕ VS1 GeoEnvironmental, collected 11 Nov 2008



N



INSITU CONTAMINATED SOIL
 Refer Yeats Dwg No. YC0175-BE02 Rev A 05/08/09
 ~13,000M3 CLASS 2
 Most to between 0.3m and 0.5m

NS15 Area
 Estimate 500m3
 CLASS 3

STOCKPILE
 ~6,000M3 CLEAN

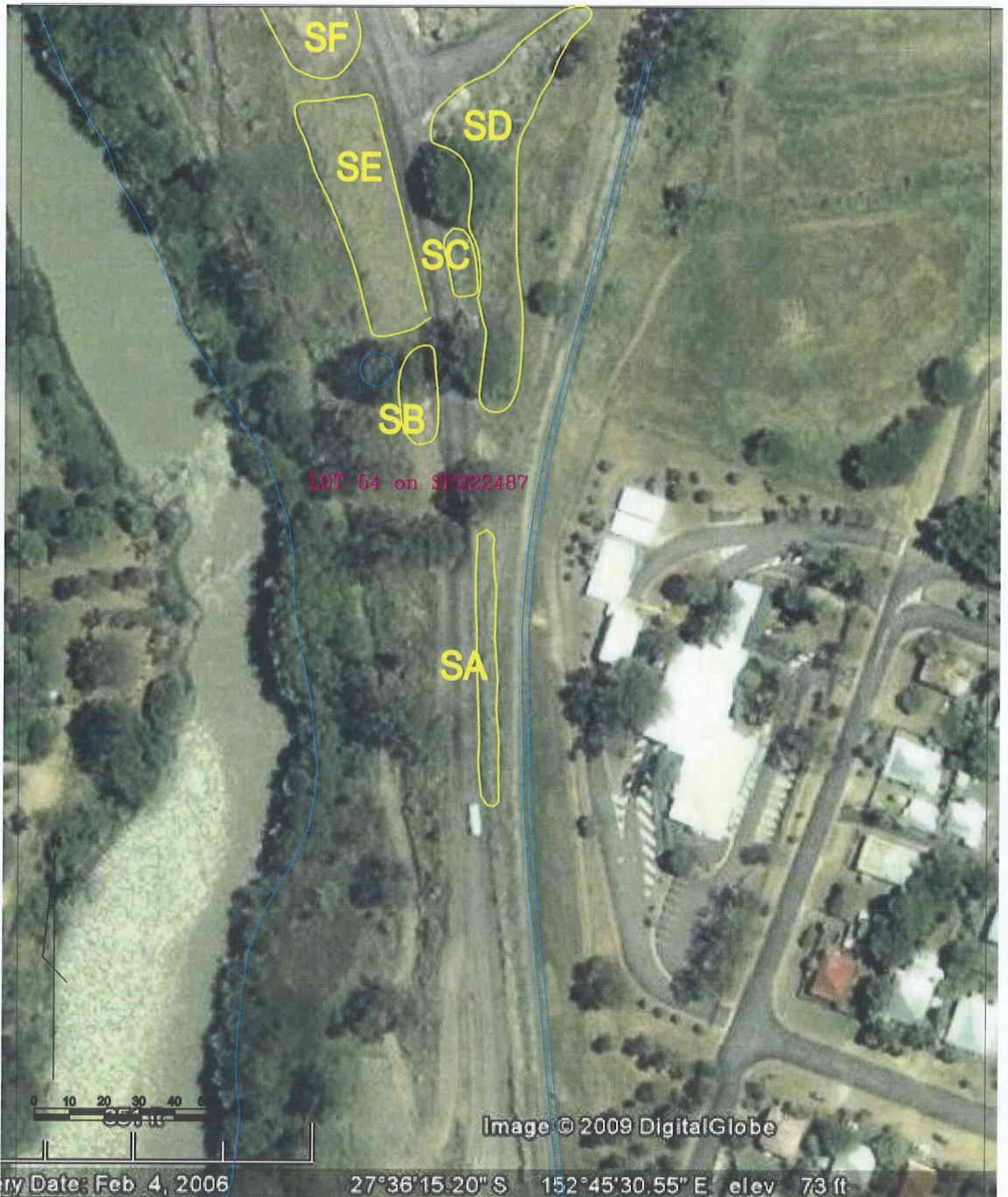
SCALE: 1:1000
 JOB No. 6062/01
 DRAWN: MWT
 CHECKED: MWT

9

GeoEnvironmental Consultants
 129 Outlook Crescent, Barton, Queensland 4065
 CLIENT: LEDA **DRAFT REMEDIATION PLAN**
 NORTH STREET LAYOUT AND SAMPLING LOCATIONS
 FORMER RAIL SITE, NORTH STREET, NORTH IPSWICH, QLD

Phone: 07 5567 2266
 Fax: 07 5567 2577
 Email: info@geoenvironmental.com.au
 DATE: SEP 08
 DRAWING No. 2

A3



ry Date: Feb 4, 2006

27°36'15.20" S 152°45'30.55" E elev 73 ft

LEGEND

SAMPLING LOCATIONS

- ⊕ N1 GHD, 1995
- * n1 Groundwater Technology, 1995
- ⇨ ETPP011 Earthtech Testpit, 2003
- ⊕ V81 GeoEnvironmental

SCALE: 1:1000
 JOB No. 6062/01
 DRAWN: MWT
 CHECKED: MWT

GeoEnvironmental Consultants
 129 Outlook Crescent, Bardon, Queensland 4065
 CLIENT: LEDA REMEDIATION PLAN
 RIVER SOUTH LAYOUT
 FORMER RAIL SITE, NORTH STREET, NORTH IPSWICH, QLD

Phone: 07 3367 2266
 Fax: 07 3367 2377
 Email: info@leda.com.au

A3
 DATE: SEP 09
 DRAWING No. 3

LOT 54 on SP222487



0 10 20 30 40 50m

335 ft

SAMPLING LOCATIONS

Image © 2009 DigitalGlobe

DATE: FEB 4, 2008

27°35'55.96" S 152°45'21.90" E elev 63 ft

* n1 Groundwater Technology, 1995

⊕ EITP011 Earthtech Testpit, 2003

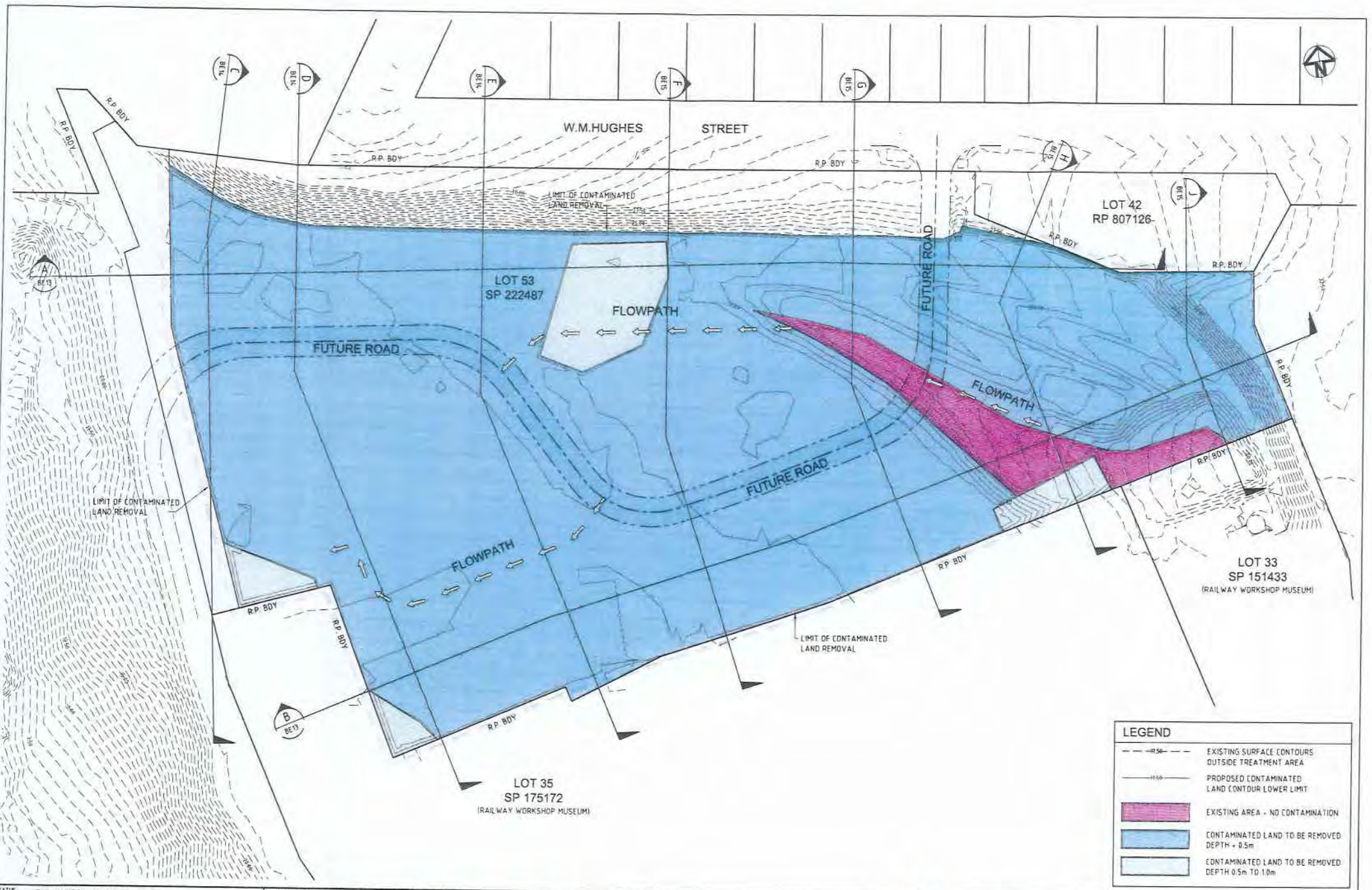
⊕ VS1 GeoEnvironmental

SL

SCALE: 1:1000
 JOB No. 6062/01
 DRAWN: MWT
 CHECKED: MWT

GeoEnvironmental Consultants
 129 Outlook Crescent, Bardonia, Queensland 4065
 CLIENT: LEDA
 RIVER NORTH LAYOUT
 FORMER RAIL SITE, NORTH STREET, NORTH IPSWICH, QLD

Phone: 07 3387 2288
 Fax: 07 3387 2377
 Email: info@leda.com.au
 REMEDIATION PLAN
 DATE: SEP 09
 DRAWING No. 5
 A3



LEGEND	
	EXISTING SURFACE CONTOURS OUTSIDE TREATMENT AREA
	PROPOSED CONTAMINATED LAND CONTOUR LOWER LIMIT
	EXISTING AREA - NO CONTAMINATION
	CONTAMINATED LAND TO BE REMOVED DEPTH = 0.5m
	CONTAMINATED LAND TO BE REMOVED DEPTH 0.5m TO 1.0m

STATUS		COUNCIL APPROVED	
REV	DESCRIPTION	DRAWN	DATE
B	COUNCIL RFI AMENDMENTS	S.S	19.03.10
A	ORIGINAL ISSUE	N.M.	23.07.09

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DRAWING IS NOT TO BE SCALED

SCALE (AT ORIGINAL SHEET SIZE)

ORIGINAL SHEET SIZE

SCALE 1:1500

A1

CLIENT

LEDA
Developments Pty Ltd

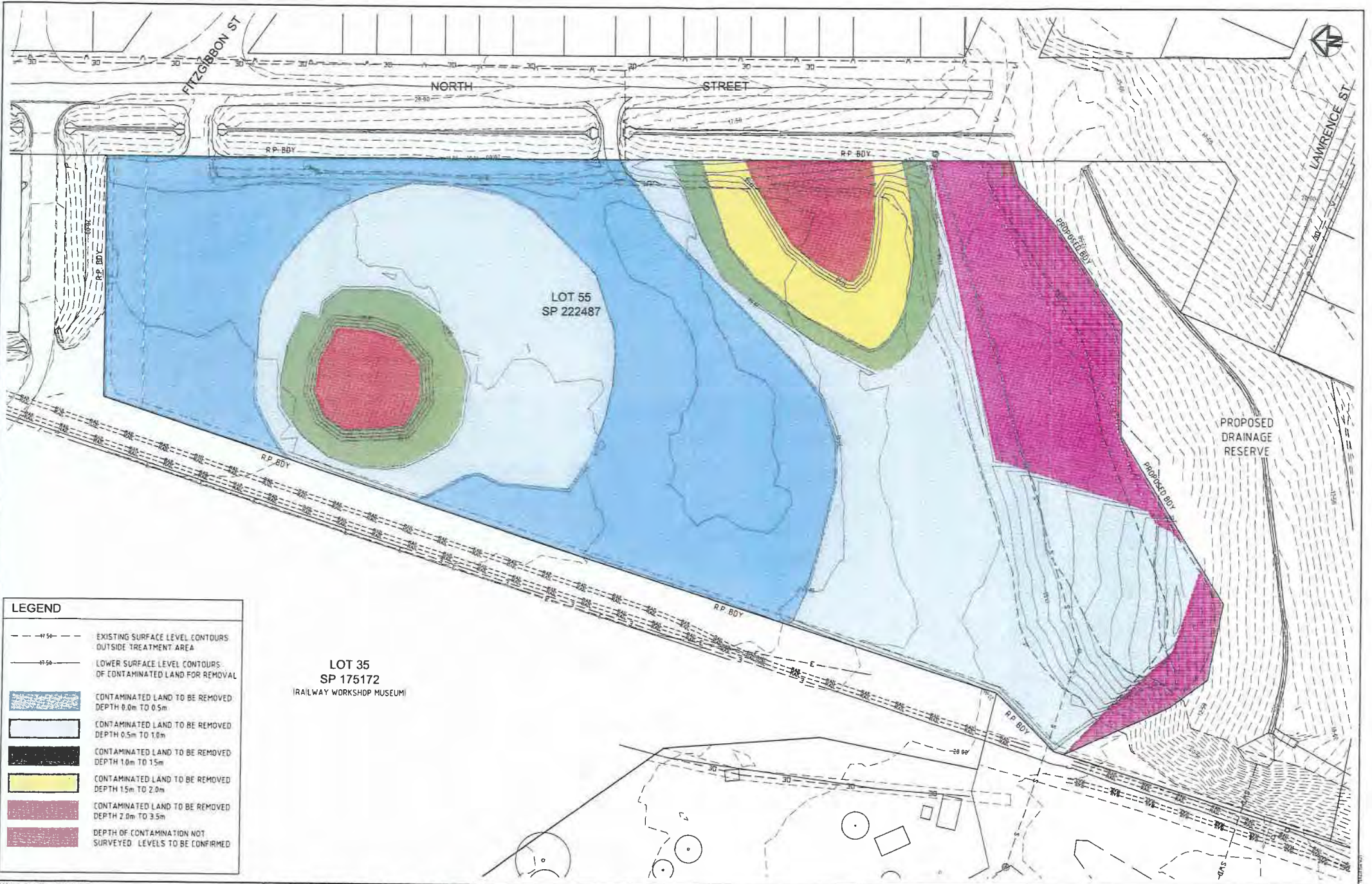
PROJECT

RIVER LINK DEVELOPMENT SITE
BULK EARTHWORKS
WM HUGHES ST & NORTH ST, IPSWICH

YEATS
CONSULTING ENGINEERS

LEVEL 2, 9 OYAN STREET BUNDALL QLD 4217 AUSTRALIA

TITLE						BULK EARTHWORKS CONTAMINATED LAND REMOVAL PLAN	
TASK	BY	INITIAL	DATE	APPROVED	RPED No	7825	
REVIEW	B.Y.		23.07.09				
DESIGN	N.M.		23.07.09				



LEGEND

	EXISTING SURFACE LEVEL CONTOURS OUTSIDE TREATMENT AREA
	LOWER SURFACE LEVEL CONTOURS OF CONTAMINATED LAND FOR REMOVAL
	CONTAMINATED LAND TO BE REMOVED DEPTH 0.0m TO 0.5m
	CONTAMINATED LAND TO BE REMOVED DEPTH 0.5m TO 1.0m
	CONTAMINATED LAND TO BE REMOVED DEPTH 1.0m TO 1.5m
	CONTAMINATED LAND TO BE REMOVED DEPTH 1.5m TO 2.0m
	CONTAMINATED LAND TO BE REMOVED DEPTH 2.0m TO 3.5m
	DEPTH OF CONTAMINATION NOT SURVEYED LEVELS TO BE CONFIRMED

LOT 35
SP 175172
(RAILWAY WORKSHOP MUSEUM)

STATUS FOR ISSUE

B	RFL AMENDMENTS AND BOUNDARY ADJUSTMENT	T.W.	7/9/11
A	ORIGINAL ISSUE	N.M.	05/08/09

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DRAWING IS NOT TO BE SCALED

SCALE: (AT ORIGINAL SHEET SIZE)

ORIGINAL SHEET SIZE

SCALE: 1:1500

CLIENT

LEDA
Developments Pty Ltd

PROJECT

RIVERLINK - PROPOSED RESIDENTIAL UNIT DEVELOPMENT AT NORTH STREET, NORTH IPSWICH

YEATS
CONSULTING ENGINEERS

1 FVPL 2 9 CUYAN STREET BUNDALL QLD 4217 AUSTRALIA

TITLE

CONTAMINATED LAND REMOVAL LAYOUT PLAN

TASK	BY	INITIAL	DATE	APPROVED	RFD No	7825
REVIEW	E.W.		05/09			
DESIGN	N.H.		05/08			

REVISION



RIVERSIDE CENTRAL

for
LEDA DEVELOPMENTS PTY LTD

ASSOCIATED CONSULTANTS

AMEND	DATE	DESCRIPTION	APPD
A	27.07.07	BORROW PITS AMENDED	

AMENDMENTS

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DRAWING TITLE
**REVISED
 BULK EARTHWORKS
 BORROW
 PITS**

B BURCHILL VDM
 PTY LIMITED
 ACN 020 140 400
 CIVIL & STRUCTURAL CONSULTING ENGINEERS & PLANNERS
 142 Bursill Road, Surfers Paradise, Qld 4217
 Phone: (07) 5574 0511 Member of the
 Fax: (07) 5574 0511
 Fax: Structural (07) 5574 0505
 Email: info@burchillvdm.com.au
VDM GROUP

DESIGNED: P.A.C. DRAWN: P.A.C.
 CHECKED: DATE: 23.07.07
 FILENAME: D:\C3754\03\ACB\SK05\3154-03-SK05A.dwg

APPROVED FOR AND ON BEHALF OF
 BURCHILL VDM PTY LIMITED
 DRAWING No. AMENDMENT
C3754:03:SK05 A

PUBLISHED: 03 SEP 2007

Appendix C

Queensland Government Department of Environment Resources and Management (DERM) Appointed
Third party Reviewer (TPR)

Prepared by
WSP Environmental Pty Ltd
Date: 9th February 2010



WSP Environmental Pty Ltd
1 Gardner Close
Milton Qld 4064
PO Box 2261 Milton Qld 4064

ABN: 82 119 251 179

Tel: +61(0)7 3367 4300
Fax: +61(0)7 3367 4399
<http://www.wspenvironmental.com>

9 February 2010

██████████
LEDA Developments
PO Box 1914
Surfers Paradise,
QLD, 4217


Our Reference: 2-08-112

Dear ██████████

Re: TPR Review of Remediation Plan– Ipswich Riverlink

As the Queensland Government Department of Environment Resources and Management (DERM) appointed Third Party Reviewer (TPR) for the above site, I have reviewed the following documents:

- Current approved Site Management Plan (SMP).
- GeoEnvironmental Consultants Pty Ltd (GeoEnvironmental) "Proposed Scope for Contamination Related Services Ipswich Riverlink Project – Northern Region Lot ██████████ letter dated 4th September 2008 Ref 6908/25.
- Earth Tech Engineering Pty Ltd (EarthTech) "Ipswich Riverlink Northern Region Summary" report dated October 2007 Ref REP001-B Project No. 101371 (brief review).
- GeoEnvironmental Letter Report "Ipswich Riverlink Project – Northern Region North Street Sampling Results Update" dated 3rd April 2009 Ref 6062/01.
- GeoEnvironmental Letter Report "Ipswich Riverlink Project – Northern Region Hughes Street Sampling Results Update" dated 3rd April 2009 Ref 6062/01.
- GeoEnvironmental Email "Ipswich Data Update" dated 21st December 2008.
- GeoEnvironmental Email "Ipswich Riverlink Remediation – EarthTech stockpile details" including RAP figures dated 4th February 2009.
- GeoEnvironmental Email "Ipswich Riverlink Stockpiles" dated 20th April 2008.

- 
- GeoEnvironmental Email – “Hugh Street Data” dated 6 April 2009.
 - GeoEnvironmental draft Remediation Plan (RP) dated 1 October 2009.
 - GeoEnvironmental Reviewed draft RP dated 17 December 2009.
 - GeoEnvironmental Final RP dated 4 February 2010.

1 INTRODUCTION

Robin Wagland of WSP Environmental Pty Ltd (WSP) was commissioned by LEDA Developments (LEDA) to undertake a Third Party Reviewer role to review the soil and groundwater investigations and remedial activities undertaken at the Ipswich Riverlink site, formerly described as Lot 39 on SP203402 now reconfigured to include Lot 51-55 on SP222487. It should be noted that the RP only covers the Lots 53, 54 and 55 on SP222487.


The comments and advice outlined below are provided for the benefit of the Department of Environmental Resources and Management (DERM) to confirm the TPR's agreement of the final Remediation Plan prepared by GeoEnvironmental dated 4 February 2010.

2 REVIEW OF REMEDIAL PLAN

The TPR has reviewed the final Remedial Plan (RP) put forward by GeoEnvironmental in their report (4 February 2010).

The TPR recommendations should be noted with the following comments:

- It is noted that the previous reports for the site have been received and assessed to have been reviewed by DERM and as such will not require further TPR review. It is also noted that there is an existing Site Management Plan (SMP) for the site (referenced to the former [REDACTED] dated 14/11/2008. More recent work undertaken by GE is recognised to supersede the previous investigations in relation to the stockpiles on site. This work has been previously assessed and approved by the TPR.
- It is also noted that a requirement of the SMP was to provide a groundwater monitoring program by the end of September 2008 based on additional groundwater assessment to be undertaken at the site (also by the end of September 2008). The groundwater monitoring program requirements have been included in the RP.
- It should be noted that copies of previous reports have not been provided to the TPR with the exception of the Groundwater Technology Stage 1 assessment dated July 1995 (in part) and the Earth Tech Summary Report dated October 2007. Data from all the reports relevant to the former Lot 39, have been assumed to have been utilised by GE in production of their RP.
- It is assumed, at this stage, that no statutory outcome is required from DERM, but the RP will form the basis of the remediation strategy for the newly created Lots. Further upon completion of a Remediation and Validation report, a Certification Report will be provided (as appropriate). At this future stage, it would be suggested that the SMP is updated.

- 
- The TPR agrees that the final Remediation Plan, prepared by GeoEnvironmental, adequately addresses DERM guidelines for the remediation and validation of the portion of the Ipswich Riverlink site in question (Lots 53-55).

3 CONCLUSION

It is assumed at this stage, that the RP, will form the basis of the management of the future site works including options for the previously noted stockpiles material. The TPR approves the final Remediation Plan dated 4 February 2010. In addition, it is noted that a construction Environmental Management Plan will be developed as part of the Operational Works approval and forms a requirement of the RP.

It is also noted that there will be the future requirements for groundwater monitoring as part of the ongoing management of the site. In addition, the SMP will be reviewed upon completion of the remedial work.

I trust the above review and advice is self explanatory, however, feel free to call to discuss any queries you may have.

Yours sincerely,



.....

Third Party Reviewer
MACH1Environmental

CC 
Department of Environment and Resource Management

Appendix D

VDM Drawing

C3754:03:SK106 – Staging Plan Construction Haul Roads and Bio Retention Basins

C3754:04-SK21 - Bulk Earthworks Finished Surface Levels

C3754:03-SK04 - Bulk Earthworks Finished Surface Levels

C3754:03:SK300 - Fire Management Plan Vehicle Access Tracks

RIVERSIDE CENTRAL

for
LEDA DEVELOPMENTS PTY LTD

G	LEVELS AND VOLUMES AMENDED, BORROW PIT #2 ADDED	19.03.10
F	BERM NOTE ADDED	19.11.09
E	INTERIM ISSUE TO CLIENT	03.11.09
D	NOTE ADDED	10.10.09
C	LEVELS AND VOLUMES AMENDED, TEMP SEDIMENT BASIN AMENDED	08.10.09
B	LEVELS AND VOLUMES AMENDED, TEMP SEDIMENT BASIN ADDED	05.08.09
A	VOLUMES ADDED	27.07.07
REV.	DESCRIPTION	APPR. DATE

VDM CONSULTING
BURCHILL
Consulting Engineers & Planners
Evandale Place, 142 Bundall Road
Surfers Paradise QLD 4217
Phone +61 7 5574 0511
Fax Civil +61 7 5574 0011
Fax Structural +61 7 5574 0505
Email burchill@vdmgroup.com.au

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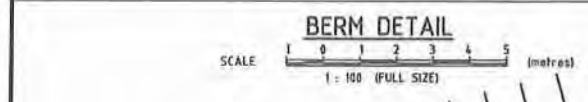
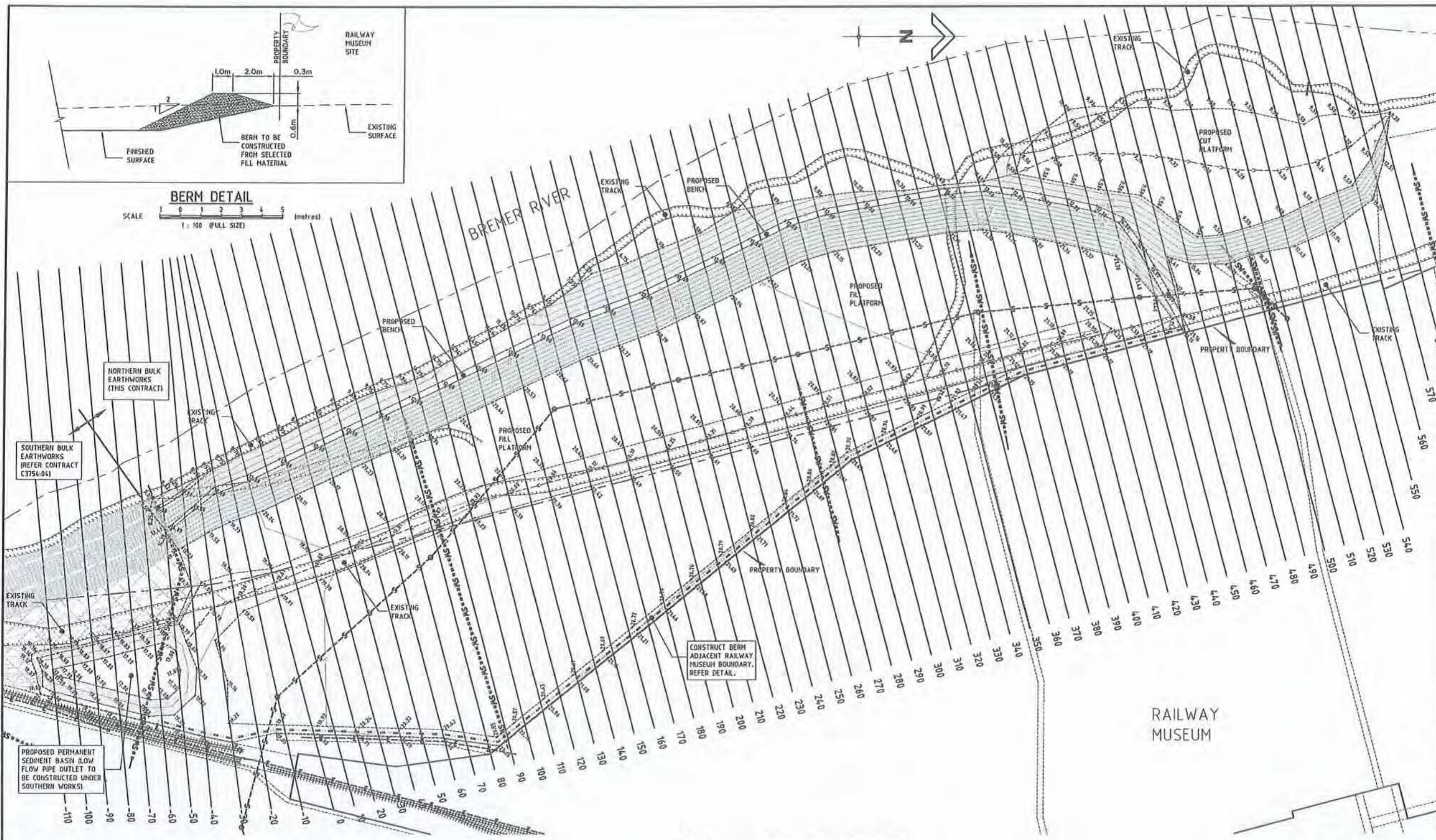
PROJECT:
**RIVERSIDE CENTRAL
NORTHERN
BULK EARTHWORKS**

DRAWING TITLE:
**BULK
EARTHWORKS

FINISHED
SURFACE LEVELS**

DEVEL. APPLIC. No.:	DATE: 23.07.07
PROJECT LEADER:	
DESIGNER:	
DRAFTSPERSON:	
CHECKED:	
APPROVED FOR AND ON BEHALF OF BURCHILL VDM PTY LIMITED	

SCALE: AS SHOWN	DATUM: AHD	FULL SIZE: A1
PROJECT No.: C3754:03	DRAWING No.: SK04	REVISION: G



LEGEND - EXISTING FEATURES

- EXISTING TRACK/PATH
- EXISTING RAILWAY LINE
- EXISTING ELECTRICITY (INDICATIVE LOCATION ONLY)
- EXISTING GRAVITY SEWER MAIN (INDICATIVE LOCATION ONLY)
- EXISTING UNDERGROUND STORMWATER CULVERT (INDICATIVE LOCATION ONLY)

EARTHWORK VOLUMES (PROVISIONAL):

AVAILABLE CUT	CLAY	OTHER
SOLID CUT FROM BORROW PITS AND PLATFORMS:	133,370 cu.m.	93,270 cu.m.
COMPACTION LOSS:	85%	85%
GIVING AVAILABLE FILL:	113,370 cu.m.	79,280 cu.m.
VOLUME OF EXISTING STOCKPILES (APPROX):	-	130,090 cu.m.
COMPACTION LOSS:	-	80%
GIVING AVAILABLE FILL:	-	104,070 cu.m.
VOLUME OF UNSUITABLE FROM NORTH ST, HUGHES ST & WIDE GULLY SITES:	-	49,340 cu.m.
COMPACTION LOSS:	-	85%
GIVING AVAILABLE FILL:	-	41,940 cu.m.
TOTAL AVAILABLE FILL:	113,370 cu.m.	225,290 cu.m.

IMPORTED TOPSOIL:	10,020 cu.m.	
FILL REQUIRED	CLAY	OTHER
COMPACTED CLAY CAPPING LAYER:	82,020 cu.m.	-
COMPACTED FILL BELOW CAPPING (INCLUDING BACKFILL TO BORROW PITS):	-	247,690 cu.m.
REPLACEMENT MATERIAL TO NORTH ST, HUGHES ST & WIDE GULLY SITES:	20,210 cu.m.	-
TOTAL FILL REQUIRED:	102,230 cu.m.	247,690 cu.m.
BALANCE:	SURPLUS	DEFICIT
	11,940 cu.m. TO SOUTHERN CAPPING	22,400 cu.m. FROM SOUTHERN EXCAVATION

NOTE:
VOLUME EXCLUDES SOIL AMENDMENT TO EXISTING UNCONTROLLED FILL AREA OUTSIDE OF BORROW AREAS.

LEGEND - PROPOSED WORKS

- FINISHED SURFACE CONTOUR (0.2m INTERVAL)
- FINISHED SURFACE LEVEL AND LOCATION
- STRING LINE
- SWALE DRAIN
- EXTENT OF SOUTHERN BULK EARTHWORKS (REFER CONTRACT C3754:04)

NOTES:

- BATTER PROFILE SUBJECT TO FINAL GEOTECHNICAL ANALYSIS
- REFER DWG C3754:03:SK30 FOR SERVICES ALTERATION DETAILS
- REFER DWG C3754:03:SK100 FOR EROSION AND SEDIMENT CONTROL DETAILS

PLOTTED: 18 Nov 2010



LEGEND

LOCATION OF EXISTING ACCESS TRACKS CONNECTIONS TO WH HUGHES STREET AND LOWRY STREET.



SHUTDOWN AREAS



NOTES:

- EXISTING VEHICULAR ACCESS TRACKS EXIST AT THE LOWER TERRACE LEVEL ADJACENT TO THE BREMER RIVER AND ROUGHLY PARRALLEL UPPER LEVEL TRACK RUNNING NORTH SOUTH.
- THROUGHOUT CONSTRUCTION PERIOD EXISTING ACCESS TRACKS INCLUDING CONNECTIONS TO WH HUGHES STREET AND LOWRY STREETS TO BE MAINTAINED AND TRAFFICABLE BY FIRE TENDER VEHICLES.
- SHUTDOWN AREAS LOCATED AT ENTRANCES TO PUBLIC ROAD AND NETWORK.

SCALE 0 20 40 60 80 100
1 : 2000 (FULL SIZE) (metres)

Ipswich
Riverlink
Shopping Centre

RIVERSIDE CENTRAL
for
LEDA DEVELOPMENTS PTY L'D

REV.	DESCRIPTION	APPV.	DATE

VDM
CONSULTING

BURCHILL
Consulting Engineers & Planners

Level 8, Australia Fair Office Tower
42 Marina Parade, Southport QLD 4215
PO Box 3768, Australia Fair, Southport QLD 4215

Phone 181 7 6509 6100
Fax 181 7 6509 6111
Email qld@east.vdmgroup.com.au

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PROJECT:

**RIVERSIDE CENTRAL
NORTHERN
BULK EARTHWORKS**

DRAWING TITLE:

**FIRE MANAGEMENT PLAN
VEHICLE ACCESS TRACKS**

DEVELOPMENT No.:	DATE: 12.03.2010
PROJECT LEADER:	
DRAWN BY:	
SCALE:	DWTN: JHD FULL SIZE: A1
PROJECT No.:	DRAWING No.:
C3754:03	SK300
REVISION:	

REVISED: 27 Aug 2010

Appendix E

Comprehensive Health & Safety Plan

Purpose

This WH&S details the procedures, policies and working practices to be followed to ensure a safe completion of the Works associated with the Contract. It addresses the safety requirements associated with legislation. The procedures contained herein do not prejudice any statutory requirements and guidelines that may be in force at any time during the contract life.

Scope

This plan applies to all sites within lots [REDACTED] and to all Contractors / Subcontractors and their employees working collectively known as Ipswich Riverlink Stage 2.

This plan must be strictly adhered to as a minimum requirement and should not be confused with any other site specific Safe Work Procedures/Instructions. Safe Work Procedures/Instructions are to be developed by construction management in consultation with their employees, by adopting Risk Management techniques (e.g. JSA methods).

Acts and Regulations

OHS Acts and Regulations are minimum requirements. Queensland legislation will be the basis for all operational Occupational Health and Safety requirements unless specifically proscribed by Commonwealth legislation.

The present approach of OHS Legislation is increasingly one of risk management of hazards. One of the main objectives of all Australian OHS legislation is for employers to provide a safe and healthy work environment that protects employees and others from injury and illness, while at work.

It is a requirement for all managers and supervisors to obtain or at least have access to copies of the principal applicable to OHS Acts and any associated legislation and regulations, pertaining to their specific areas of responsibility. All managers and supervisors must be familiar with these requirements.

Project Safety Representative

The Project Safety Representative has a functional reporting line to the Safety Manager and an independent reporting line to the Project Manager for all Health and Safety matters.

The Project Safety Representative will:

ensure that all:

- Relevant aspects of WH&S, required by the Queensland legislation and
- System Safety is implemented throughout the project;
- Incidents regarding health and safety are reported initially to the Project Manager who will ensure it is recorded and will detail any remedial action that is required supported by the Contractors Health & Safety Manager.
- Provide a monthly report formally to the Project Manager; and
- Attend such meetings as may be called by the Project Manager to review all safety related items.

In addition as outlined in the Remediation Plan the site work and subsequent reporting is to be reviewed by a DERM appointed Third Party Reviewer (TPR). All validation requirements is to be confirmed by the TRP and any clarification issues will be referred to the TRP prior to DERM.

Code of Conduct

- No employee is to be permitted to work whilst under the influence of alcohol or non- prescription drugs.
- Safety handrails, warning signs and machine guards must not be removed without the permission of the appropriate manager/supervisor and only then after all hazards have been assessed and controlled.
- Fire fighting and life saving equipment must not be interfered with. It must only be used for its intended purpose.
- Personal protective equipment (PPE) and specialised OHS equipment must be maintained, worn and used as instructed and directed.
- Tools must be kept in good condition and must only be used for their intended purpose.
- No passengers are permitted to ride on any plant unless special arrangements make transportation legal and safe. Passengers must remain wholly within the vehicle.

Codes of Practice

Codes of practice are approved under a State or Territory government's principal OHS Act. They describe the preferred methods or courses of action for achieving the required OHS standards.

Induction

The Project Manager must ensure all new employees attend a safety induction, covering all identified risks, hazards and safety aspects of the job;

It is the responsibility of the new employee's Supervisor/Manager, to ensure that appropriate records are kept for all completed inductions.

Personal Protective Equipment (PPE) Standards

Hazards at each site must first be identified in order to be controlled. Requirements for PPE are to be determined as part of hazard recognition and reduction practices. Identification requires detailed knowledge of the following, without limitation:

- Work processes.
- Materials present, their physical form and properties.
- Degree of exposure, or anticipated exposure.
- The following are minimum requirements for the use of personal protection at all production, workshop and construction areas throughout
- Coveralls, by way of long trousers, long sleeved shirts or overalls
- Safety hard hats (in all construction work and other designated production areas)
- Steel-toed safety footwear (in all construction work, workshops and other designated production areas)
- Eye protection (in all construction work, workshops and other designated production areas)
- Full face shields over top of safety glasses during grinding, chipping etc

- Hearing protection (on all designated areas workshops and construction work)

Ensuring Safe Work Premises

Prior to occupying a work place the following factors will be considered or undertaken:

- identification and review of all legislation applying to the site and the tasks to be undertaken on the site;
- initial site inspection to identify existing health, safety and environmental hazards and any existing non-compliances related to the relevant legislation;
- preparation of a site plan to address all legislative requirements with respect to the location of:
 - offices, workshops, stores and flammable liquids and hazardous substances storage;
 - fire fighting equipment;
 - site service isolation points;
 - evacuation routes;
 - parking areas;
 - quarantine areas; and
 - security fences.
- Safety at operating sites will be maintained by relevant and effective induction training programs;
- reinforcing a safety awareness culture by regular briefings and specific training for new situations;
- taking immediate action to rectify non-conformances;
- conducting safety risk assessments prior to the introduction of new materials, plant and equipment and processes;
- continually monitoring the introduction of new materials, plant and equipment and processes;
- maintaining up to date and properly configured technical documentation including operation and maintenance manuals;
- maintaining currency awareness of all legislation and standards that apply to the contracted scope of work;
- properly maintaining all plant, equipment, buildings and signage; and
- maintaining a process and culture of workplace consultation and continuous improvement.

Proper and Safe Use of Plant and Substances

The proper and safe use of plant and substances will be assured by:

- consulting the regulations and standards and handling/operating instructions that apply to the plant or substance;
- implementing a JSA and completing a Safe Work Method Statement (SWMS) before development/approval of procedures and processes;
- placing a hold on tasks until the JSA has been completed and processes approved;
- implementing training and mentoring to ensure employees are:
 - aware of the requirement to use the correct process,
 - informed and understand all the hazards associated with the materials or process, and
 - competent to safely undertake the task. maintaining a culture of safety awareness throughout the organisation.

Provision of Adequate Instruction

The Supervisor is a key part of the induction process. After an introduction to the Site the supervisor must:

- reinforce the importance of OHS;
- reinforce the necessity for PPE requirements;
- indicate the location of the nearest telephone, emergency number, and fire extinguisher;
- explain operating instructions for machinery;
- explain procedures for handling dangerous or hazardous materials;
- indicate no smoking and restricted areas;
- stress the need for good housekeeping;
- provide close supervision and follow up to ascertain problems or difficulties in performing the task;
- provide familiarisation with locations of evacuation means, lunch facilities, toilets, Medical Centre, Supervisor's and Manager's office; and
- provide introductions to Managers, Union Delegate, Workplace H&S committees and HSR.

OHS information will be disseminated to all levels. The General Safety Induction Handbook for Employees and Contractors shall be issued to all employees and subcontractors as part of the induction program. Site H&S placarding and signage shall conform to applicable legislation and standards.

Health and Safety Inspections

Site safety inspections are conducted on a regular basis and must include, but not be limited to, the following:

- housekeeping;
- work practices and personnel behaviour;
- condition of equipment and tools;
- access and egress;
- First aid boxes;
- emergency equipment;
- use of PPE;
- safety placarding and signs;
- Notice-boards;
- the display of OHS Policies; and
- availability of relevant documentation such as MSDS, Standard Operating Procedures (SOP) & JSA Reports.

Site inspection teams will be guided by specific checklists based on the preceding list. Corrective Action Reports (CAR) must be completed by the inspection team and a copy forwarded to the QHS&E Coordinator who will initiate corrective action. Site Inspections conducted by safety personnel are also to be documented and forwarded to the QHS&E Coordinator with recommended corrective action.

Non-Conformance Reports

H&S Management System non-conformances will normally be detected during a site inspection conducted using Safety Inspection Sheets (Weekly), formal audit or as a result of an incident.

These non conformances will be documented in CAR completed by the inspection team and a copy forwarded to the Site Manager who will initiate corrective action.

A copy of the CAR will also be forwarded to the QHS&E Coordinator. Employee/contractor non conformance with H&S instructions and procedures is managed through verbal warnings and for repeated and more serious breaches through the issue of a Non Compliance Notice. This notice includes:

- employee, supervisor, and issuing authority details;
- details of the Hazard and the Rectification required; and
- details of disciplinary action to be taken.
- All Audit, Review and Inspection Forms are to be retained on file at the Site for audit purposes.

Audits

For the purpose of compliance with the OHS Program, the site will be subject to OHS audits. The appropriate managers will be advised of the planned audit in advance. Notification must include details of the areas or functions to be audited.

Planning for the audit must include a thorough familiarisation with relevant practices, and the site specific OHS Plan prior to conducting the audit. Post audit interviews will be conducted with site representatives at the conclusion of each audit to provide a summary of the audit findings.

Unscheduled OHS audits may also be initiated as required.

Incident Reporting

Employees are to be instructed to report all incidents to their immediate Supervisor. Incidents are to be acted upon as an integral part of the systematic identification of hazards.

Where applicable, incidents are to be reported to the relevant Statutory Authority in accordance with the OHS Legislation.

An Incident Register is to be maintained at all sites and details of all OHS related incidents are to be included in the monthly reporting of Safety Performance.

Working Hours

All working hours must be in accordance with the Ipswich City Council working hours for construction sites within an urban area.

First Aid

As detailed in the Remediation Plan contaminants exist on site and all employees who come in direct contact with any contaminate must seek first aid advice. All incidents (no matter how small) requiring the treatment of first aid must be reported to the supervisor/manager in charge of the work at the time of the incident.

In accordance with each State Legislation requirements, provision must be made for the appropriate number of first aiders to be trained and allocated at each facility/site and appropriate first aid related facilities, equipment and supplies to be available. Refer to incident reporting section.

Hazard and Risk Management

The hierarchy of controls are:

- elimination of the hazard by design and engineering;
- substitution of the hazard;
- enclosure or isolation of the hazard;
- use of engineering controls;
- use of administrative controls including training;
- provision of personal protective equipment PPE; and
- good housekeeping.

As detailed in the Remediation Plan if during earthworks evidence of gross contamination not previously detected is present, site works within the immediate area are to cease and action taken to abate any environment harm.

Job Safety Analysis (JSA)

In compliance with risk management and the control of hazards, managers and supervisors must ensure that a JSA is completed for every job/task by the supervisor/team leader in charge of the work.

It is recommended that the OHS Manager/Adviser, OHS Representative, a trained supervisor, or the OHS committee select which job/task should be targeted for a JSA. It is recommended that hazards identified with a high risk potential, i.e. work at heights, confined space work, use of chemicals etc., which have considerable potential for serious injury/illness are good examples for JSA priorities.

In accordance with the relevant State Regulations, risk assessments may need to be done on old plant and equipment existing or brought onto the site.

Public health impacts from the proposed development.

Hazardous Substances Dangerous Goods and Other Chemicals

Hazardous Substances, Dangerous Goods and some other chemicals have the potential to cause short term and/or long term damage to people and the environment and can contribute to plant and equipment damage.

Management at the site are to ensure that:

- Current, legally compliant Material Safety Data Sheets (MSDS) are held for all Hazardous Substances, Dangerous Goods and other chemicals under their control.
- All applicable legislative requirements for the safe manufacture, transport, handling, storage, use and disposal of all Hazardous Substances, Dangerous Goods and other chemicals, including associated documentation, are met in full.
- The safety of these materials is to be evaluated, preferably prior to purchase, and where practicable, the safest material will be selected.
- Adequate information, instruction, training and supervision is provided to ensure safety during all activities where these materials are used.

Asbestos

The Project Managers must ensure that where a substance, suspected of being asbestos, is found in the normal course of work, a risk assessment is completed and submitted to the environmental officer.

Any person brought onto a site for the purpose of asbestos identification and/or removal must provide details of their qualifications, experience and authorisation (e.g. a Work Cover license/permit) to the Facility/Project Manager.

Material Safety Data Sheets (MSDS)

An MSDS is a document that describes the properties and safe use of a substance, i.e. its toxicity, chemical and physical properties, health hazard information, precautions for use and safe handling information.

A Register of MSDS's must be maintained at each site and made available for use by all employees on site.

Movement of Materials by Mechanical Means

Facility/project managers must ensure that hazards associated with the movement of materials at their site by mechanical means (e.g. use of cranes, forklifts etc.) are identified, the risks to health and safety are assessed and that appropriate control measures are developed to eliminate or minimise such risk.

These systems of work must also ensure the safety of employees and others in the vicinity of materials being moved.

Noise Management

In accordance with the relevant State Noise Regulations. The Project Manager must ensure that appropriate control measures are taken if an employee is exposed to noise levels that exceed an 8 hour noise level equivalent of 85 dB(A), or peak at more than 140 dB(Lin).

Noise levels should be determined according to the Australian Standard AS 1269 'Acoustics - Hearing Conservation' for the 8 hour equivalent noise level, and according to the Australian Standard AS 1259 (Part 1) "Sound Level Meters - Part 1: Non-integrating" for the peak sound level. Noise monitoring equipment to be established around the perimeter of the noise generating equipment within the site of deemed necessary by the DERM representative.

Working Near Overhead Power Lines

In accordance with the relevant state electrical regulations work must not be undertaken close to an overhead power line unless approval has been obtained from the Local Electricity Supply Authority and the Electrical OHS Act has been complied with.

Working Over or Near Traffic

In accordance with the relevant state traffic regulations when working over or near traffic, effective means must be taken to prevent the fall of objects onto traffic.

Works adjacent to traffic lanes must be protected in such a manner that employees working within the area are not at risk of injury from passing vehicles.

Working With or Near Compressed Gas Equipment

In accordance with the relevant state regulations, managers and supervisors must ensure that employees who use compressed gas in the performance of any work are aware of the hazards associated with the use of the compressed gas and be competent in its use.

Appropriate equipment must be provided to control the supply of gas effectively and to ensure that the gas pressure is appropriate for its particular use. Any equipment used in connection with the supply of the compressed gas (including hoses, connections, gauges and pneumatic tools or machinery) must be maintained in proper working order.

A person must not use the compressed gas for any purpose that could endanger their own health or safety, or the health or the safety of another person.

Dust Monitoring

If deemed necessary by the DERM representative dust monitoring equipment to be installed around the perimeter of the work area to record and monitor dust readings. Work to cease if readings exceed critical levels in accordance with Councils requirements. Observations and complaints to be used to guide implementation of additional measures.

Appendix 5

Flood Report prepared by Cardno.



RIVERLINKS CENTRAL

Flood Study

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Document Control					
Version	Date	Author		Reviewer	
		Name	Initials	Name	Initials
1	1 October 2009				
2	6 October 2009				
3	7 October 2009				

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**RIVERLINKS CENTRAL
FLOOD STUDY**

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APPENDIX B Bremer River Flood Levels

1. INTRODUCTION

The Riverlinks Central residential development is located between North Street and the Bremer River in North Ipswich, as shown on Figure 1. Works proposed on the site include the development of two residential subdivision areas with some slight associated works within the existing gully to the south east of the development.

The proposed development layout is shown on Bristow Architects drawing number 2009.12 DA02A, attached in the reference drawing section of this report.

Runoff from the site and the surrounding catchment drains to the Bremer River via a culvert under the existing railway that forms the south-western boundary of the site. The site is therefore subject to both local flooding and regional flooding from the Bremer River.

This report investigates any hydraulic impact the proposed development may have on local flooding. In addition, a regional flooding assessment has been undertaken to verify that the proposed works will not have an impact on Bremer River flood levels.

2. SITE CHARACTERISTICS

2.1 Existing

The Riverlink Central subdivision is located in North Ipswich adjacent to North Street, as shown on Figure 1. The development site is approximately 5.42 ha and is bounded by neighbouring lots to the south-east, the Bremer River to the West; and the Queensland Railway Museum site to the north. Access to the existing site is via North Street.

The site is predominately open grassland with native vegetation in the steeper sections of the site.

The ultimate receiving waters for the site are that of the Bremer River via the gully that runs through the site and the culvert under the existing railway. A 1200mm Ipswich City Council stormwater pipeline discharges into the gully approximately 180 metres upstream of the railway culvert. The catchment extents for the existing gully are shown in Figure 2. The catchment that drains to the existing gully is predominately external to the site.

The site varies from relatively flat terrain to the north of the existing gully, to steeper terrain adjacent to and within the existing gully.

2.2 Proposed Development

The proposed development layout has been provided by Leda Holdings. This layout plan indicates that the overall proposed development will consist of two areas of residential development and some slight modification of the open space area containing the gully.

The proposed site plan including the gully redesign is included in the reference section of this report.

3. DATA

The hydraulic assessment has been based on site specific data as follows:

- Topographic Survey (2005), used to delineate the surrounding catchments;
- Contour and stormwater drainage information supplied by Council; and
- Proposed development layout Information supplied by Yeats Consulting and Leda Developments.

4. WATER QUANTITY (HYDROLOGY AND HYDRAULICS)

4.1 General

A hydrologic and hydraulic assessment was undertaken to determine peak flood levels within the gully that runs through the proposed development site. The details and results of the hydrologic and hydraulic assessment are presented below.

4.2 Hydrologic Assessment

The hydrologic analysis was undertaken using the hydrologic module of XP-SWMM Version 2009 in accordance with 'Australian Rainfall and Runoff' (1998) and the 'Queensland Urban Drainage Manual' (2007).

The hydrologic assessment considered the following scenarios:

- **Pre-Development Case:** The site and external sub-catchment land uses and areas are based on the existing survey data, aerial photos and two site visits. This model is calibrated to Rational Method Calculations for the site.
- **Post-Development Case:** The post-development model utilises the calibrated pre-development case and modifies the percentage of fraction impervious and catchment areas in catchments that includes the site, in accordance with the proposed layout for the entire site.

It can be noted that the post development case considered the full urbanisation of the site without detention basins in place.

The hydrologic model was set up for the existing gully catchment covering an approximate area of 36.14 ha and the extents are shown on Figure 2. The catchment extents were defined based on existing survey and contour data.

The XP-SWMM model was used to generate the local catchment hydrographs for the 100 year Average Recurrence Interval (ARI) and for the full range of storm durations from 10 to 360 minutes.

The initial and continuing losses adopted for the 100 year ARI event in the hydrologic component of the XP-SWMM model are shown in Table 4-1.

Table 4-1 Adopted XP-SWMM Parameters

Pervious		Impervious	
Initial Loss (mm)	Continuing Loss (mm/hr)	Initial Loss (mm)	Continuing Loss (mm/hr)
5	2.5	0	0

The adopted fraction imperviousness for the developed land use is listed in Table 4-2. The fraction impervious values were assumed based on the table of fraction impervious vs. development category provided in QUDM (2007). The existing railway and open space including roadway fraction impervious percentages were estimated based on aerial photos and site visits.

Table 4-2 Fraction Impervious for Site Land Uses

Land Use Category	Fraction Impervious
Commercial	90%
Residential	65%
Railway	10%
Open Space including Roadway	5%
Open Space	0%

4.3 Hydraulic Assessment

The hydraulic assessment was undertaken using the hydrodynamic component of XP-SWMM (v2009). The XP-SWMM model was run for the 100 year ARI flood event, for durations ranging from 10 to 360 minutes.

The intensity-frequency-duration (IFD) data and temporal patterns utilised in the XP-SWMM models were created using AR&R (1998) and AusIFD version 2.0 for Ipswich.

4.3.1 Pre-Development Case Model

The XP-SWMM model cross sections were extracted from the Triangular Interpolated Network (TIN) constructed from the existing topographic survey. A Manning's 'n' of 0.05 was adopted for the gully and main overland flow path, based on a site visit which identified generally grass with some scattered shrubs. A Manning's n of 0.015 was adopted for the culverts and pipework.

The gully, roadside channel and upper reach have been modelled based on the existing survey data. A 1,200 mm diameter stormwater pipe discharges into the gully approximately 180 metres upstream of the railway culvert.

Inflows to the model were adopted from the hydrologic component of the XP-SWMM model. The obvert was adopted as the fixed tail water depth at the downstream boundary condition at cross-section 'OUT'.

4.3.2 Post-Developed Case Model

Yeats Consulting Engineers provided updated cross sections in digital format. The updated cross sections have been integrated into the XP-SWMM model. The developed case has modified the existing cross section from MAIN 11 to MAIN 16. The modification includes some filling in the upper sections of each cross section along the northern edge of the channel down to the stream center line for cross sections MAIN11 to MAIN 14 and includes some modification on the south side of the stream center line for cross sections MAIN 15 and MAIN 16.

Flow boundary conditions are based on post developed flows from the hydrologic component of XP-SWMM as discussed in Section 4.2.

4.3.3 Hydraulic Results

Table 4-3 summarises the predicted existing and development peak 100 year ARI flood levels. Cross-section locations are shown on Figure 3.

Table 4-3 Peak Flood Levels, 100 Year Event

Cross Section I.D.	Existing Peak WSL (mAHD)	Developed Peak WSL (mAHD)
Main 3	19.68	19.68
Main 4	17.78	17.78
Main 5	17.37	17.37
Main 6	17.37	17.37
Main 7	17.36	17.36
Main 8	17.34	17.34
Main 9	17.11	17.11
Main 10	14.89	14.90
Channel 4	19.86	19.85
Channel 5	19.85	19.85
Channel 6	21.15	21.15
Channel 7	20.93	20.93
Channel 8	20.85	20.85
Channel 9	19.81	19.81
Channel 10	19.53	19.49
Channel 11	18.04	17.95
Channel 12	17.50	17.43
Main 11	11.98	12.04
Main 12	11.67	11.87
Main 13	11.03	11.49
Main 14	9.76	10.11
Main 15	9.52	10.09
Main 16	8.76	9.35
Culvert Inlet	7.98	8.25

The results presented in Table 4-3 indicate that the proposed development (both in terms of the impact of development upon hydrology and changes to ground levels) will not adversely impact the flood levels upstream of the proposed development. The impacts at Main 11 through Main 16 are all contained within the site and will not significantly impact any adjacent properties. The decrease in peak flood level at Channel 12 reflects the reduction in catchment area discharging to the roadside channel due to the proposed development.

As noted in Section 4.2, the analysis for the developed case did not include a detention basin to ameliorate the impact of development. Although the peak discharge from the site will increase as a result of development, it will occur more rapidly than previously. The peak runoff from the site therefore has the opportunity to drain to the river prior to the peak occurring from the remainder of the catchment.

As part of the analysis, the flood levels produced by lesser events were modelled. The calculated flood levels for the lesser events (2 to 50 years) are shown in Appendix A.

As per the 100 year case, an increase in level was obtained in the open space area upstream of the culvert (i.e. MAIN 16 to MAIN 11). The resultant levels will not result in the flooding of any private property and are considerably lower than the corresponding Bremer River flood level (18.41 mAHD- refer Section 4.4).

It can be noted that an increase in flood level is also predicted at location MAIN10 (located immediately upstream of the open space area) for events less than the 100 year event. Although an increase is predicted, it is important to note that the resultant levels do not impact on any existing properties.

4.4 Hydraulic Sensitivity Assessment

The sensitivity of the calculated flood levels for local catchment flooding was assessed by the consideration of two scenarios.

- **Tailwater Level Variation and Coincident Bremer River Flooding**

As noted in Section 4.3.1, A tailwater level equal to the obvert of the pipe beneath the railway was adopted. This was considered to be reasonable given the relatively short response time of the local catchment compared to that of the Bremer River. At the time that the local catchment peaks, the level in the river would be expected to be relatively low.

As a sensitivity analysis, the flooding in the local catchment produced by the critical storm duration for the flooding of Bremer River (the Bremer River 1,080 minute duration storm) was modelled. The stage hydrograph estimated by the MIKE-11 model of the Bremer River was applied as the tailwater condition for the analysis.

Table 4-4 summarises the flood levels predicted for the 100 year event for this scenario. With reference to the table, the proposed development will have no impact on local flood levels for this scenario.

- **Blockage**

Drainage of the local catchment is achieved by a large culvert beneath the railway. If the culvert were to be blocked, an increase in flood level could occur. Consideration was given to the reasonable extent of blockage that could be foreseen. Given the size of the culvert and the level of development within the catchment, the potential for the culvert to be blocked (for instance by branches) was assessed as relatively low. Certainly, a scenario involving the complete blockage of the culvert was considered to be overly conservative.

As a sensitivity analysis, the impact of 50 percent blockage of the culvert was modelled. The resultant flood levels for the 100 year event are listed in Table 4-4. With reference to the table, it can be noted that a localised increase in flood level occurs within the existing gully. However, the increase and resultant levels occur in a region where flooding is dominated by regional river flooding (18.41 mAHD) and therefore do not affect the reclamation levels applicable to the development. Given this outcome, it can be concluded that no change is required with respect to the flood levels adopted for the development to account for potential blockage effects.

Table 4-4 Peak 1080 Minute Duration and 50 percent blockage Storm Flood Levels

Cross Section I.D.	1,080 Minute (Bremer River) Storm Event		50 Percent Blockage of Downstream Culvert	
	Existing Case Peak Flood Level (mAHD)	Developed Case Peak Flood Level (mAHD)	Developed Case Peak Flood Level, No Blockage (mAHD)	Developed Case Peak Flood Level with 50 Percent Blockage (mAHD)
Main 3	19.60	19.60	19.68	19.68
Main 4	18.41	18.41	17.78	17.78
Main 5	18.41	18.41	17.37	17.37
Main 6	18.41	18.41	17.37	17.37
Main 7	18.41	18.41	17.36	17.36
Main 8	18.41	18.41	17.34	17.34
Main 9	18.41	18.41	17.11	17.11
Main 10	18.41	18.41	14.90	14.90
Channel 4	19.44	19.44	19.85	19.85
Channel 5	19.44	19.44	19.85	19.85
Channel 6	20.97	20.97	21.15	21.15
Channel 7	20.78	20.77	20.93	20.93
Channel 8	20.71	20.71	20.85	20.85
Channel 9	19.36	19.36	19.81	19.81
Channel 10	19.25	19.25	19.49	19.49
Channel 11	18.41	18.41	17.95	17.95
Channel 12	18.41	18.41	17.43	17.43
Main 11	18.41	18.41	12.04	12.04
Main 12	18.41	18.41	11.87	11.87
Main 13	18.41	18.41	11.49	11.49
Main 14	18.41	18.41	10.11	10.14
Main 15	18.41	18.41	10.09	10.13
Main 16	18.41	18.41	9.35	9.94
Culvert Invert	18.41	18.41	8.25	9.96

5. REGIONAL FLOODING IMPACT

Some minor earthworks are proposed within the existing gully area at levels less than the regional Bremer River flood level.

A regional flood assessment was performed to analyse the impact of filling the gully on regional flood levels in the Bremer River. For the analysis, it was conservatively assumed that the entire gully was filled to above flood level. The analysis was completed using the Ipswich City Council Ipswich Rivers MIKE-11 Model.

As the gully is not part of the existing case model, the existing case model was modified to reflect the storage available in the gully. The storage differential between existing conditions and post development conditions was established and applied as additional storage at the Mike 11 branch adjacent to the gully in the base case hydraulic model.

For the developed case, the storage was removed from the model. Further, the developed case considered the bank profile modelled as part of the Cardno report *Riverside Central Flood Study* (August 2009).

For the analysis, the following events in the Bremer River were considered:

- Bremer River: 2, 5, 10, 20, 50 and 100 year; and
- Brisbane: 5, 10, 20, 50 year.

It can be noted that following the revision of rainfall intensities, the 50 year event is considered to have a recurrence interval similar to the 100 year event.

The results of the analysis are presented in Appendix B. With reference to Appendix B, it can be noted that the loss of the entire storage area would not result in an increase in flood level in the Bremer River.

6. CONCLUSION

A detailed flood assessment of the proposed Riverlinks Central residential development has been undertaken.

The assessment considered the following:

- the increase in runoff produced by the development; and
- the proposed earthworks in the open space area adjacent to the development.

The assessment has indicated that the proposed development and associated earthworks will create no adverse impact on peak flood levels in existing developed areas upstream of the development. The analysis has therefore determined that the development can occur without the need for the construction of a detention basin to offset the impact of development.

A regional flooding assessment has also been undertaken. The assessment indicated that the proposed works will have no discernable adverse impact on flood levels in the Bremer and Brisbane Rivers.

7. REFERENCES

Institution of Engineers Australia, 1998, 'Australian Rainfall and Runoff, A guide to Flood Estimation'.

Department of Natural Resources and Water, 2007, "*Queensland Urban Drainage Manual*".

FIGURES

- Figure 1** Site Location
- Figure 2** Hydrologic Catchment Extents
- Figure 3** XP-SWMM Hydraulic Model



LEGEND

— Site Boundary

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Scale 1:4000 (A3)
FIGURE 1
SITE LOCATION
 Project No.: 3503-70
 PRINT DATE: 07 October, 2009 - 103pp



LEGEND

- Site Boundary
- Catchment Boundary
- Existing Major Contour
- Existing Minor Contour

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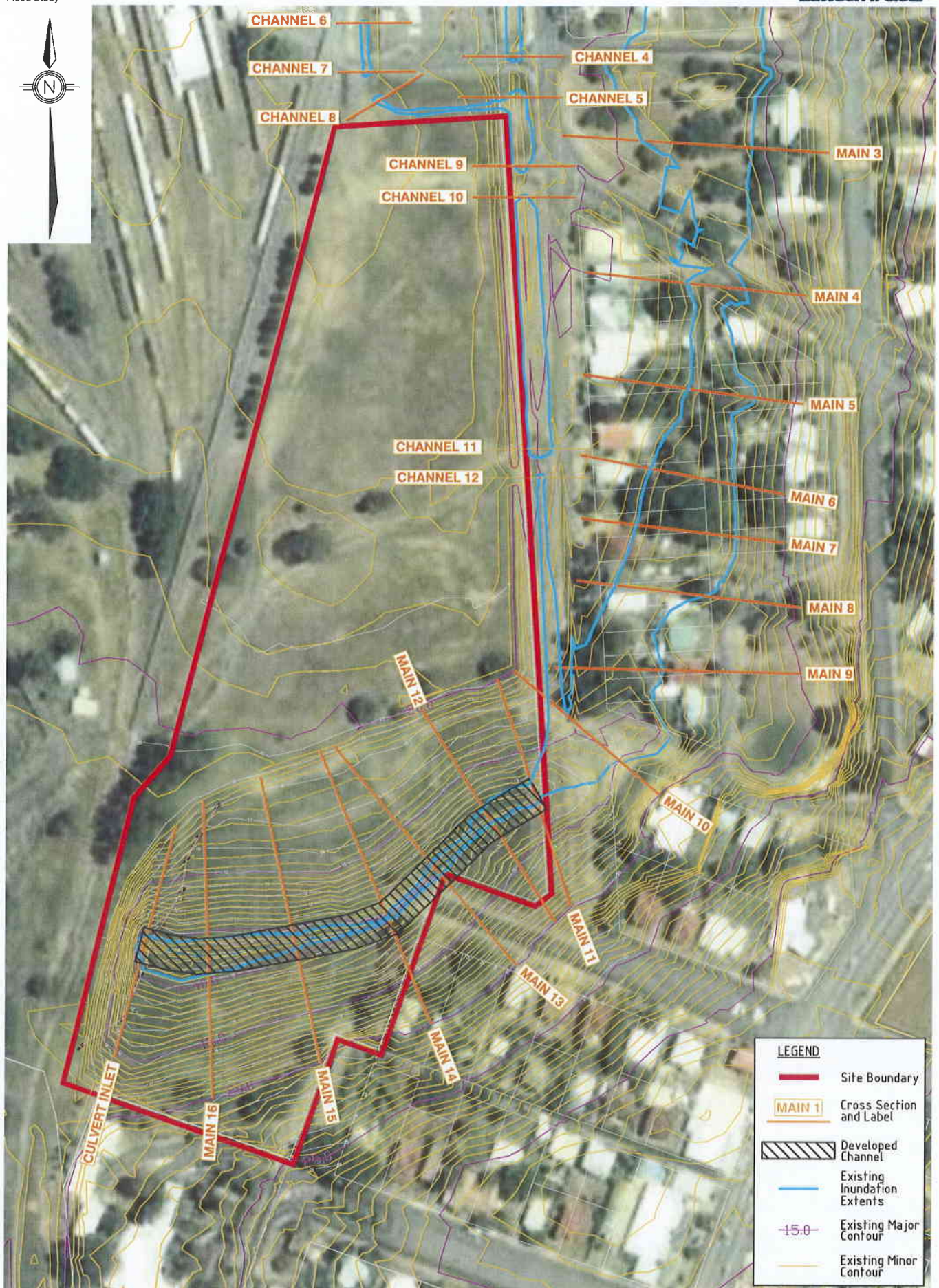


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**FIGURE 2
HYDRAULIC CATCHMENT EXTENTS**

Project No.: 3503-70

PRINT DATE: 05 October, 2009 - 10:58pm



LEGEND

- Site Boundary
- MAIN 1 Cross Section and Label
- Developed Channel
- Existing Inundation Extents
- -15.0 Existing Major Contour
- Existing Minor Contour

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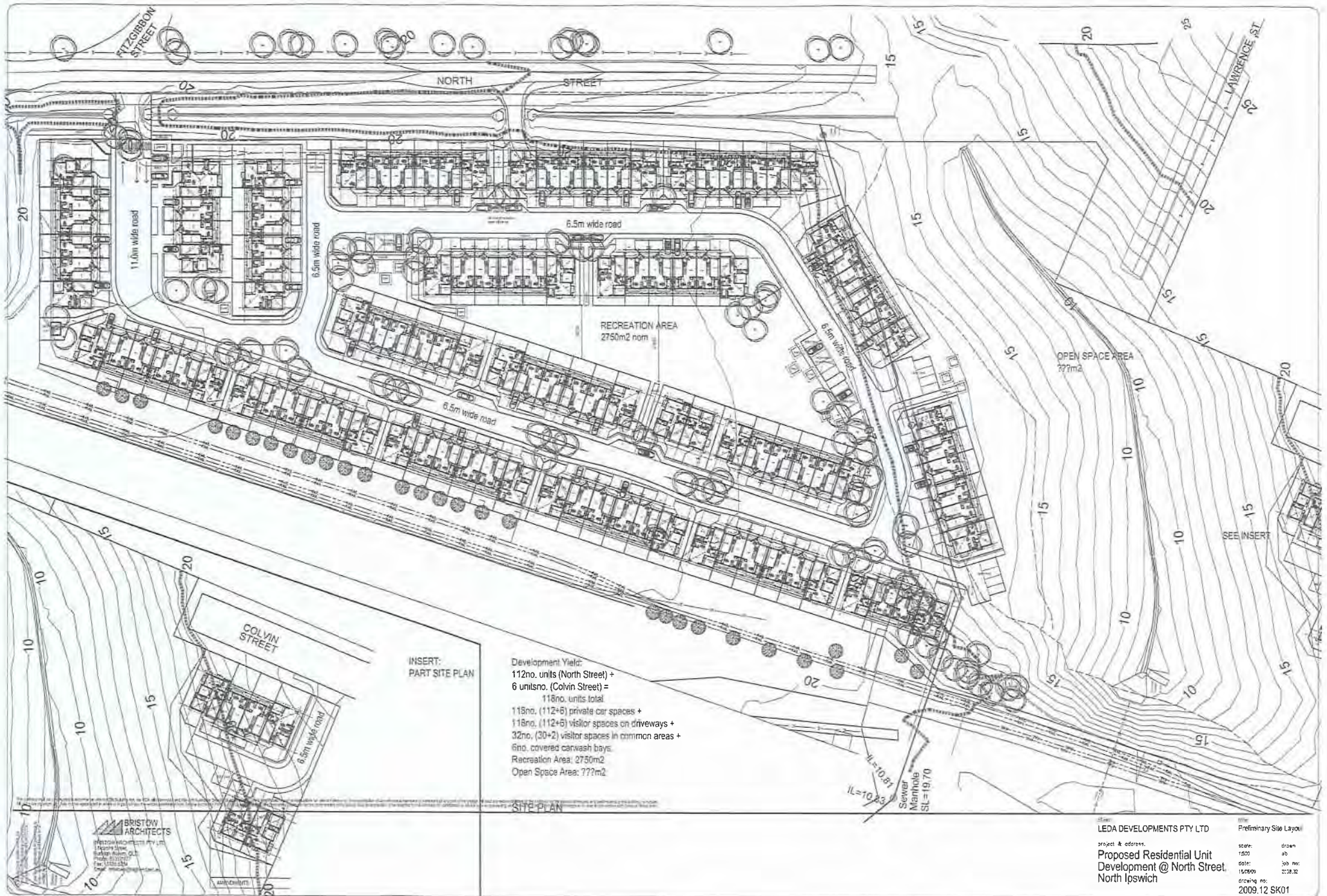
Scale 1:1500 (A3)

**FIGURE 3
XP-SWMM HYDRAULIC MODEL**

Project No.: 3503-70

PRINT DATE: 17 October, 2009 - 12:58pm

Reference Drawings



Development Yield:
 112no. units (North Street) +
 6 unitsno. (Colvin Street) =
 118no. units total
 118no. (112+6) private car spaces +
 118no. (112+6) visitor spaces on driveways +
 32no. (30+2) visitor spaces in common areas +
 6no. covered carwash bays.
 Recreation Area: 2750m2
 Open Space Area: 777m2

SITE PLAN

BRISTOW ARCHITECTS
 BRISTOW ARCHITECTS PTY LTD
 15/200 Colvin Street
 Ipswich QLD 4700
 Phone: 07 5522 2277
 Fax: 07 5522 2278
 www.bristowarchitects.com.au

Client: LEDA DEVELOPMENTS PTY LTD
 Project & address: Proposed Residential Unit Development @ North Street, North Ipswich
 Scale: 1:500
 Date: 15/09/09
 Drawing no.: 2009.12 SK01
 Title: Preliminary Site Layout
 Scale: drawn
 Date: job no.
 Drawing no.: 2009.12 SK01



LEGEND	
	PROPOSED MAJOR FINISHED SURFACE CONTOURS
	PROPOSED MINOR FINISHED SURFACE CONTOURS (0.25m INTERVAL)
	EXISTING SURFACE CONTOURS
	LIMIT OF BULK EARTHWORKS
	STAGE BOUNDARY
	STORMWATER SWALE DRAIN

STATUS FOR ISSUE

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CLIENT

PROJECT

LEVEL 2 8 GUYAN STREET BUNDALL QLD 4217 AUSTRALIA
 T 07 5570 4877 F 07 5570 4977 info@yeats.com.au www.yeats.com.au

TITLE BULK EARTHWORKS
CENTRAL GULLY LAYOUT PLAN

REV	DESCRIPTION	DRAWN	DATE
A	ORIGINAL ISSUE	D.S.	25.09.09

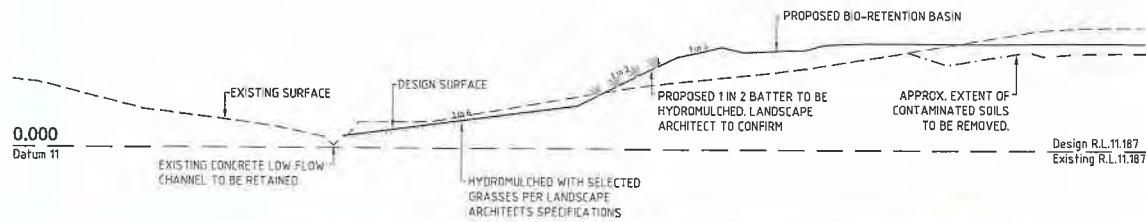
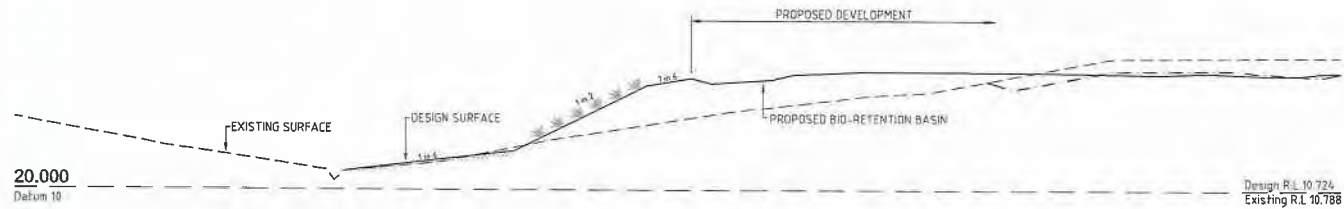
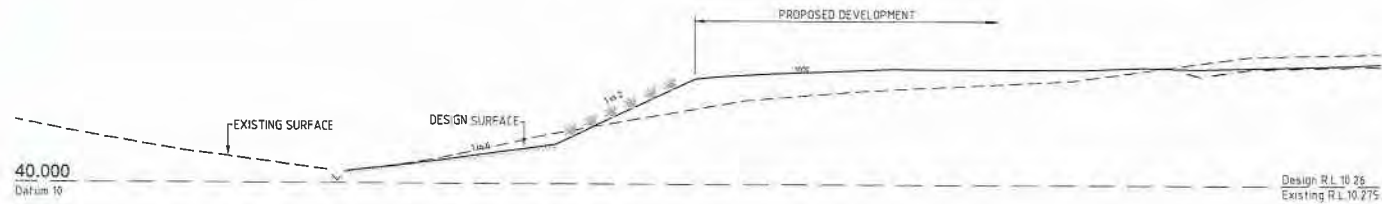
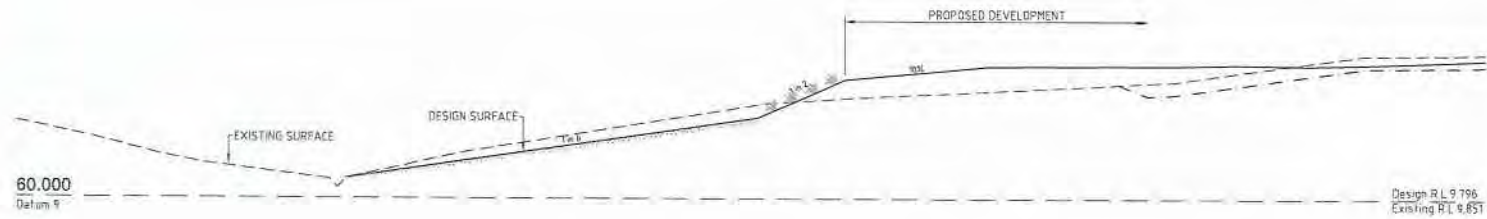
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 SCALE (AT ORIGINAL SHEET SIZE)

 ORIGINAL SHEET SIZE
 A1

RIVERLINK - PROPOSED RESIDENTIAL UNIT DEVELOPMENT AT NORTH STREET, NORTH IPSWICH

TASK	BY	INITIAL	DATE	APPROVED	WPD No.
REVIEW			25.09.09		7825
DESIGN			25.09.09		
DRAWN			25.09.09		

DRAWING NUMBER YC0175-BE18



STATUS FOR ISSUE			
REV	DESCRIPTION	DATE	
A	ORIGINAL ISSUE	25.09.09	

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SCALE (A1 ORIGINAL SHEET SIZE)

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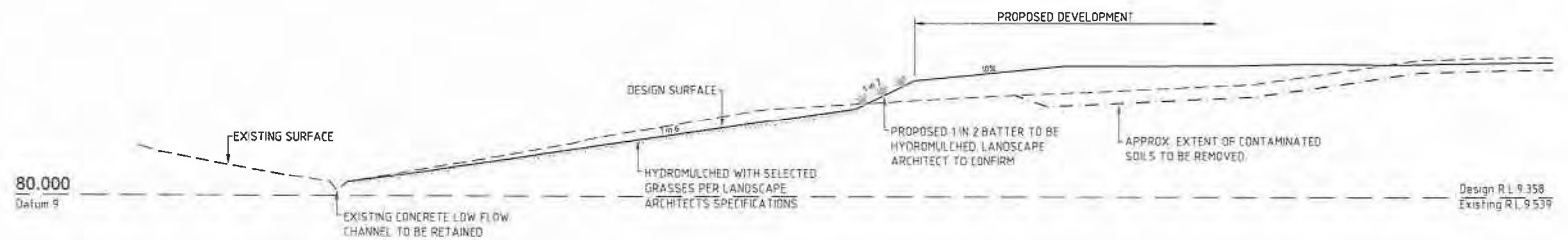
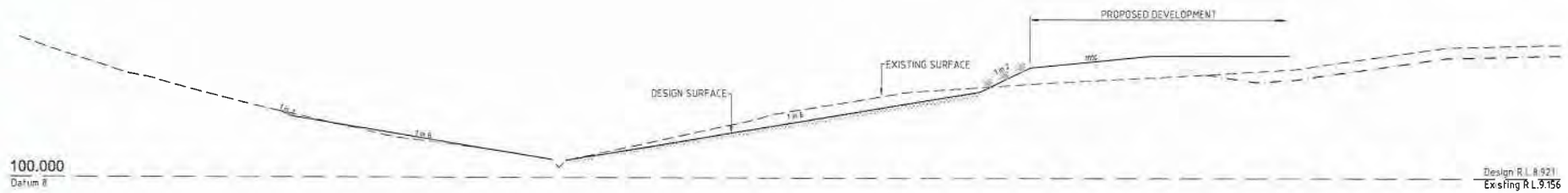
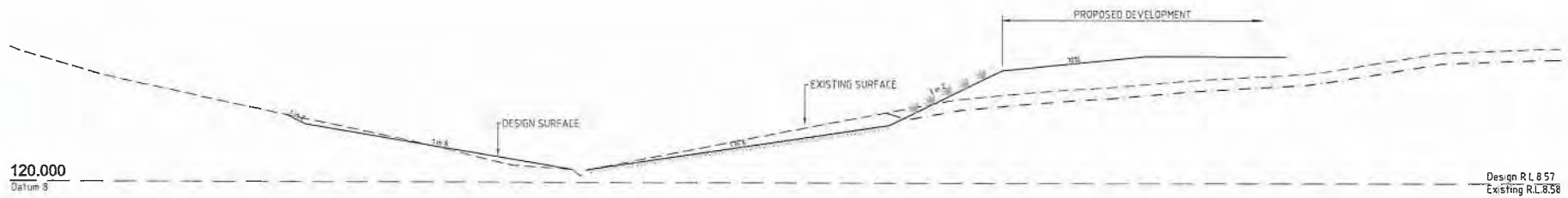
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PROJECT RIVERLINK - PROPOSED RESIDENTIAL UNIT DEVELOPMENT AT NORTH STREET, NORTH IPSWICH



TITLE BULK EARTHWORKS CENTRAL GULLY CROSS SECTIONS SHEET 1 OF 3				REFD No 7825	
TASK	BY	INITIAL	DATE	APPROVED	REVISION
REVIEW			25.09.09		
DESIGN			25.09.09		
DRAWN			25.09.09		
DRAWING NUMBER YC0175-BE19				REVISION A	



STATUS FOR ISSUE

REV	DESCRIPTION	DRAWN	DATE
A	ORIGINAL ISSUE	D.S.	25.09.09

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SCALE 1/4" ORIGINAL SHEET SIZE

ORIGINAL SHEET SIZE A1

SCALE 70 00 0 20 40 60 80 100 12000

CLIENT

LEDA
Developments Pty Ltd

PROJECT

RIVERLINK - PROPOSED RESIDENTIAL UNIT DEVELOPMENT AT NORTH STREET, NORTH IPSWICH

YEATS
CONSULTING ENGINEERS

LEVEL 2, 9 DRYAN STREET BUNDALL QLD 4211 AUSTRALIA
T 07 5570 4877 F 07 5570 4977 info@yeats.com.au www.yeats.com.au

TITLE

BULK EARTHWORKS
CENTRAL GULLY CROSS SECTIONS
SHEET 2 OF 3

TASK	INITIAL	DATE	APPROVED	ISSUE No
REVIEW		25.09.09		7825
DESIGN		25.09.09		
DRAWN		25.09.09		

DRAWING NUMBER YC0175-BE20

REVISION A

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APPENDIX A

50 Year-2 Year Peak Flood Levels- Local Flooding

Appendix A - 50 Year ARI Peak Flood Level

Cross Section I.D.	Existing Peak WSL (mAHD)	Developed Peak WSL (mAHD)
Main 3	19.67	19.67
Main 4	17.75	17.75
Main 5	17.33	17.33
Main 6	17.33	17.33
Main 7	17.32	17.32
Main 8	17.31	17.31
Main 9	17.09	17.09
Main 10	14.81	14.85
Channel 4	19.80	19.79
Channel 5	19.79	19.79
Channel 6	21.13	21.13
Channel 7	20.91	20.91
Channel 8	20.84	20.84
Channel 9	19.75	19.74
Channel 10	19.49	19.45
Channel 11	17.96	17.89
Channel 12	17.48	17.42
Main 11	11.93	11.98
Main 12	11.62	11.81
Main 13	10.99	11.45
Main 14	9.73	10.04
Main 15	9.46	10.02
Main 16	8.70	9.27
Culvert Invert	7.80	8.03

Appendix A - 20 Year ARI Peak Flood Level

Cross Section I.D.	Existing Peak WSL (mAHD)	Developed Peak WSL (mAHD)
Main 3	19.64	19.64
Main 4	17.72	17.72
Main 5	17.27	17.27
Main 6	17.27	17.27
Main 7	17.27	17.27
Main 8	17.26	17.26
Main 9	17.02	17.02
Main 10	14.65	14.78
Channel 4	19.74	19.74
Channel 5	19.74	19.74
Channel 6	21.12	21.12
Channel 7	20.90	20.90
Channel 8	20.83	20.83
Channel 9	19.69	19.69
Channel 10	19.45	19.41
Channel 11	17.89	17.83
Channel 12	17.46	17.41
Main 11	11.87	11.91
Main 12	11.56	11.74
Main 13	10.94	11.39
Main 14	9.70	9.95
Main 15	9.36	9.92
Main 16	8.63	9.18
Culvert Invert	7.58	7.75

Appendix A - 10 Year ARI Peak Flood Level

Cross Section I.D.	Existing Peak WSL (mAHD)	Developed Peak WSL (mAHD)
Main 3	19.63	19.63
Main 4	17.69	17.69
Main 5	17.23	17.23
Main 6	17.23	17.23
Main 7	17.22	17.22
Main 8	17.21	17.21
Main 9	16.94	16.94
Main 10	14.17	14.70
Channel 4	19.68	19.68
Channel 5	19.68	19.67
Channel 6	21.10	21.10
Channel 7	20.88	20.88
Channel 8	20.81	20.81
Channel 9	19.62	19.62
Channel 10	19.41	19.38
Channel 11	17.82	17.76
Channel 12	17.43	17.39
Main 11	11.82	11.85
Main 12	11.52	11.68
Main 13	10.91	11.34
Main 14	9.67	9.88
Main 15	9.29	9.83
Main 16	8.59	9.12
Culvert Invert	7.42	7.55

Appendix A - 5 Year ARI Peak Flood Level

Cross Section I.D.	Existing Peak WSL (mAHD)	Developed Peak WSL (mAHD)
Main 3	19.61	19.61
Main 4	17.66	17.66
Main 5	17.19	17.19
Main 6	17.19	17.19
Main 7	17.19	17.19
Main 8	17.18	17.18
Main 9	16.89	16.89
Main 10	13.45	13.94
Channel 4	19.63	19.63
Channel 5	19.63	19.63
Channel 6	21.08	21.08
Channel 7	20.87	20.87
Channel 8	20.80	20.80
Channel 9	19.57	19.56
Channel 10	19.37	19.34
Channel 11	17.76	17.71
Channel 12	17.41	17.37
Main 11	11.78	11.80
Main 12	11.47	11.62
Main 13	10.87	11.31
Main 14	9.65	9.79
Main 15	9.21	9.74
Main 16	8.55	9.09
Culvert Invert	7.28	7.39

Appendix A - 2 Year ARI Peak Flood Level

Cross Section I.D.	Existing Peak WSL (mAHD)	Developed Peak WSL (mAHD)
Main 3	19.58	19.58
Main 4	17.61	17.61
Main 5	17.13	17.13
Main 6	17.13	17.13
Main 7	17.13	17.13
Main 8	17.13	17.13
Main 9	16.79	16.79
Main 10	12.76	12.85
Channel 4	19.54	19.54
Channel 5	19.54	19.53
Channel 6	21.05	21.05
Channel 7	20.84	20.84
Channel 8	20.77	20.77
Channel 9	19.46	19.46
Channel 10	19.30	19.28
Channel 11	17.65	17.61
Channel 12	17.36	17.33
Main 11	11.69	11.71
Main 12	11.39	11.50
Main 13	10.77	11.21
Main 14	9.61	9.70
Main 15	9.07	9.58
Main 16	8.50	8.99
Culvert Invert	7.03	7.16

APPENDIX B

Bremer River Flood Levels

BREMER RIVER FLOODS - Predicted Impacts to Peak Flood Levels Due to RiverLinks Development combined with Loss of Valley Storage

M11 XS BREM	BREM 100 year ARI Flood			BREM 50 year ARI Flood			BREM 20 year ARI Flood			BREM 10 year ARI Flood			BREM5 year ARI Flood			BREM 2 year ARI Flood		
	Exist mAHD	Dev mAHD	Afflux (mm)	Exist mAHD	Dev mAHD	Afflux (mm)	Exist mAHD	Dev mAHD	Afflux (mm)	Exist mAHD	Dev mAHD	Afflux (mm)	Exist mAHD	Dev mAHD	Afflux (mm)	Exist mAHD	Dev mAHD	Afflux (mm)
1010020	19.12	19.07	-51	17.17	17.13	-46	12.68	12.59	-100	12.68	12.59	-100	8.29	8.25	-46	4.52	4.52	0
1010090	19.06	19.01	-53	17.11	17.06	-47	12.54	12.43	-105	12.54	12.43	-105	8.17	8.12	-49	4.52	4.52	0
1010150	19.00	18.96	-35	17.05	17.02	-29	12.43	12.37	-67	12.43	12.37	-67	8.07	8.02	-51	4.52	4.52	0
1010250	18.99	18.97	-25	17.05	17.03	-20	12.42	12.37	-53	12.42	12.37	-53	8.06	8.01	-51	4.52	4.52	0
1010340	18.93	18.85	-76	16.98	16.92	-57	12.37	12.36	-3	12.37	12.36	-3	7.96	7.90	-53	4.52	4.52	0
1010430	18.87	18.78	-91	16.93	16.87	-64	12.36	12.36	-3	12.36	12.36	-3	7.91	7.85	-54	4.52	4.52	0
1010510	18.78	18.70	-75	16.84	16.80	-48	12.36	12.36	-2	12.36	12.36	-2	7.80	7.76	-45	4.52	4.52	0
1010590	18.57	18.53	-45	16.67	16.65	-21	12.35	12.35	-1	12.35	12.35	-1	7.65	7.65	0	4.52	4.52	0
1010645	18.60	18.57	-25	16.67	16.66	-8	12.35	12.35	-1	12.35	12.35	-1	7.65	7.65	0	4.52	4.52	0
1010700	18.45	18.43	-21	16.55	16.55	-5	12.35	12.35	-1	12.35	12.35	-1	7.65	7.65	0	4.52	4.52	0
1010890	18.16	18.14	-23	16.31	16.30	-6	12.34	12.34	-1	12.34	12.34	-1	7.65	7.65	0	4.52	4.52	0
1010915	18.06	18.04	-25	16.22	16.21	-6	12.34	12.34	-1	12.34	12.34	-1	7.65	7.65	0	4.52	4.52	0
1010950	17.99	17.98	-8	16.16	16.17	8	12.34	12.34	-1	12.34	12.34	-1	7.65	7.65	0	4.52	4.52	0
1010985	17.99	17.98	-11	16.16	16.16	6	12.34	12.33	-1	12.34	12.33	-1	7.65	7.65	0	4.52	4.52	0
1011040	17.98	17.95	-35	16.15	16.13	-13	12.33	12.33	-1	12.33	12.33	-1	7.64	7.64	0	4.52	4.52	0
1011090	17.93	17.90	-27	16.10	16.10	-6	12.33	12.33	-1	12.33	12.33	-1	7.64	7.64	0	4.52	4.52	0
1011185	17.86	17.81	-46	16.04	16.01	-25	12.33	12.33	-1	12.33	12.33	-1	7.64	7.64	0	4.52	4.52	0
1011320	17.81	17.78	-29	15.98	15.97	-13	12.33	12.33	0	12.33	12.33	0	7.64	7.64	0	4.52	4.52	0
1011465	17.66	17.65	-17	15.85	15.84	-2	12.32	12.32	0	12.32	12.32	0	7.64	7.64	0	4.52	4.52	0
1011575	17.49	17.49	5	15.69	15.69	-4	12.32	12.32	0	12.32	12.32	0	7.64	7.64	0	4.52	4.52	0
1011700	17.26	17.28	25	15.50	15.50	5	12.32	12.32	0	12.32	12.32	0	7.64	7.64	0	4.52	4.52	0
1011790	17.11	17.09	-23	15.36	15.34	-21	12.31	12.31	-1	12.31	12.31	-1	7.64	7.64	0	4.52	4.52	0
1011810	17.04	17.02	-14	15.31	15.29	-18	12.30	12.30	-1	12.30	12.30	-1	7.64	7.64	0	4.51	4.51	0
1011930	16.88	16.86	-27	15.16	15.14	-20	12.30	12.30	0	12.30	12.30	0	7.64	7.64	0	4.51	4.51	0
1012045	16.79	16.79	0	15.08	15.08	0	12.30	12.30	0	12.30	12.30	0	7.64	7.64	0	4.51	4.51	0
1012050	16.84	16.84	0	15.13	15.12	0	12.30	12.30	0	12.30	12.30	0	7.64	7.64	0	4.51	4.51	0
1012070	16.82	16.82	0	15.10	15.10	0	12.29	12.29	0	12.29	12.29	0	7.64	7.64	0	4.51	4.51	0
1012200	16.75	16.75	0	15.04	15.04	0	12.29	12.29	0	12.29	12.29	0	7.64	7.64	0	4.51	4.51	0
1012870	16.71	16.71	0	15.01	15.01	0	12.29	12.29	0	12.29	12.29	0	7.64	7.64	0	4.51	4.51	0
1013380	16.66	16.66	0	14.95	14.95	0	12.28	12.28	0	12.28	12.28	0	7.64	7.64	0	4.51	4.51	0
1013700	16.62	16.62	0	14.92	14.92	0	12.28	12.28	0	12.28	12.28	0	7.64	7.64	0	4.51	4.51	0
1014220	16.43	16.43	0	14.74	14.74	0	12.28	12.28	0	12.28	12.28	0	7.63	7.63	0	4.51	4.51	0

BRISBANE RIVER FLOODS - Predicted Impacts to Peak Flood Levels Due to RiverLinks Development combined with Loss of Valley Storage

M11 XS BREM	BRIS 50 year ARI Flood			BRIS 20 year ARI Flood			BRIS 10 year ARI Flood			BRIS 5 year ARI Flood		
	Exist mAHD	Dev mAHD	Afflux (mm)	Exist mAHD	Dev mAHD	Afflux (mm)	Exist mAHD	Dev mAHD	Afflux (mm)	Exist mAHD	Dev mAHD	Afflux (mm)
1010020	18.42	18.38	-37	16.39	16.34	-51	13.72	13.66	-61	11.23	11.17	-51
1010090	18.37	18.33	-37	16.33	16.28	-52	13.65	13.59	-62	11.15	11.10	-53
1010150	18.32	18.30	-23	16.29	16.25	-37	13.61	13.56	-48	11.09	11.05	-42
1010250	18.32	18.30	-15	16.28	16.25	-30	13.60	13.56	-42	11.09	11.05	-39
1010340	18.26	18.21	-52	16.23	16.17	-57	13.53	13.48	-54	11.01	10.97	-42
1010430	18.22	18.16	-61	16.19	16.13	-62	13.51	13.45	-58	10.99	10.95	-44
1010510	18.15	18.10	-47	16.12	16.07	-49	13.44	13.40	-48	10.93	10.89	-37
1010590	17.99	17.97	-23	15.99	15.96	-29	13.32	13.29	-31	10.82	10.79	-22
1010645	18.01	18.00	-9	15.98	15.96	-21	13.30	13.28	-28	10.79	10.77	-21
1010700	17.90	17.89	-6	15.90	15.88	-18	13.24	13.21	-27	10.73	10.71	-20
1010890	17.69	17.68	-8	15.71	15.69	-19	13.07	13.04	-28	10.57	10.55	-21
1010915	17.61	17.60	-9	15.64	15.62	-20	13.01	12.98	-28	10.51	10.49	-20
1010950	17.56	17.57	3	15.60	15.59	-9	12.97	12.95	-21	10.48	10.46	-18
1010985	17.56	17.57	1	15.60	15.59	-11	12.97	12.95	-21	10.47	10.46	-17
1011040	17.56	17.54	-16	15.59	15.57	-25	12.95	12.92	-31	10.45	10.43	-21
1011090	17.52	17.51	-10	15.56	15.54	-19	12.93	12.90	-27	10.44	10.42	-20
1011185	17.47	17.44	-24	15.51	15.47	-32	12.87	12.84	-30	10.38	10.36	-21
1011320	17.43	17.42	-12	15.46	15.44	-22	12.82	12.80	-15	10.32	10.31	-4
1011465	17.33	17.32	-4	15.36	15.35	-12	12.74	12.73	-8	10.25	10.25	-3
1011575	17.20	17.21	7	15.25	15.24	-14	12.64	12.63	-11	10.16	10.16	-3
1011700	17.05	17.07	18	15.10	15.10	-8	12.51	12.50	-8	10.05	10.04	-5
1011790	16.96	16.94	-12	15.00	14.98	-26	12.42	12.40	-18	9.95	9.95	-7
1011810	16.91	16.90	-9	14.97	14.95	-14	12.38	12.36	-11	9.91	9.90	-3
1011930	16.82	16.80	-16	14.86	14.85	-14	12.26	12.25	-2	9.78	9.79	6
1012045	16.77	16.77	0	14.81	14.81	0	12.21	12.21	0	9.73	9.73	0
1012050	16.80	16.80	0	14.84	14.84	0	12.24	12.23	0	9.76	9.76	0
1012070	16.79	16.79	0	14.82	14.82	0	12.15	12.15	0	9.68	9.68	0
1012200	16.75	16.75	0	14.78	14.78	0	12.11	12.11	0	9.64	9.64	0
1012870	16.73	16.73	0	14.76	14.76	0	12.09	12.09	0	9.61	9.61	0
1013380	16.70	16.70	0	14.72	14.72	0	12.03	12.03	0	9.55	9.55	0
1013700	16.68	16.68	0	14.69	14.69	0	12.00	12.00	0	9.52	9.52	0
1014220	16.58	16.58	0	14.56	14.56	0	11.88	11.88	0	9.41	9.41	0

Appendix 6

DERM Demolition Approval.

Notice
Decision notice

	Aerial Photograph annotated to show buildings to be removed.	19 July 2005
Unnumbered	Engineers' drawings showing lines of retention: Page 1, plan view, views from the west, north and east Page 2, plan view, north elevation Page 3, east elevation, west elevation	Received Feb 2007
Unnumbered	Removal of Structures, Wm Morris Hughes Site no 2., North Ipswich, Heritage Impact Report prepared by Buchanan Architects	Feb 2007

3. General advice to assessment manager

Pursuant to sections 334 and 363 of the Act, a copy of a decision notice or negotiated decision notice issued by the assessment manager must be forwarded to DERM as a referral agency for the relevant application at South East Regional Office – Land Services, GPO Box 2771, Brisbane, Qld 4001 and an electronic copy to eco.access@derm.qld.gov.au.

The State's Native Title Work Procedures provide that responsibility for assessment of native title issues for an IDAS application rests with the assessment manager. Therefore, DERM as a referral agency for the relevant application has not provided notification to native title parties.

4. Additional comments or advice about the application

Nil

Enquiries:

Department of Environment and Resource Management
Southeast Regional Office, Land Services
Landcentre, Level 3, Corner Main & Vulture Streets, Woolloongabba, Qld, 4021
GPO Box 2771, Brisbane, Qld 400
Phone: [REDACTED]
Email: [REDACTED]

[REDACTED]
Delegate

Delegate, Chief Executive administering the
Department of Environment and Resource Management

Date: 27 April 2010

Attachments

DERM Permit Number SPCH00250210 - conditions

Appendix 7

Correspondence sent to adjoining owners.



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PROJECT DELIVERY

URBAN DEVELOPMENT

16 March 2010

Shared Services QR Limited
Rail Centre 2
309 Edward Street
Brisbane 4000

Our Ref: YC0176

Attention: [REDACTED]

Dear Sir

[REDACTED] North Ipswich – Proposed Bulk Earthworks on Neighboring Lot

Further to our letter dated 15th March 2010, an Operational Works Application for Bulk Earthworks has also been made to Ipswich City Council by Lipoma Pty Ltd, for works proposed on [REDACTED] North Ipswich. Lot [REDACTED] is located adjacent to Queensland Rail land, namely [REDACTED], generally fronting the southern boundary of [REDACTED].

In accordance with the Earthworks Code (Part 12, Division 15 of the Ipswich Planning Scheme), neighboring property owners shall be consulted should any earthworks be undertaken within 3 metres of an adjoining property boundary.

Please find attached the relevant OPW Earthworks drawings showing the nature and extent of the proposed works.

The proposed earthworks involves the excavation and removal of the existing contaminated soil. After the removal of the contaminated soil, imported fill is required to lift finished ground levels generally back to pre-development levels, generally tying into the existing ground levels surrounding the site and providing finished surface levels to accommodate future development across the site.

All earthworks will be undertaken in accordance with the relevant Australian Standards and Ipswich City Council Design and Construction Guidelines.

This advice is provided for notification purposes. Should you have any specific requirements or comment, these should be provided by Friday 26th March 2010. No response by this time will be deemed as acceptance of the proposed works as shown.

Should you require any further information please do not hesitate to contact the undersigned.

Yours faithfully
YEATS CONSULTING PTY LTD

[REDACTED]

Civil Engineer

BRISBANE

GLADSTONE

MACKAY

SUNSHINE COAST

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BUNDALL QLD 4217

PO Box 9122
GOLD COAST MC
QLD 9726

ABN 99 282 106 832



Our Job No: QC00-3754
Enquiries: [REDACTED]
Our Reference: B:\0000\00-3754_Ipswich Riverlink\Admin\1606_Local Authority\1606 - 15 March 2010.docx

16th March 2010

Shared Services QR Limited
Rail Centre 2
309 Edward Street
Brisbane 4000

Attention: [REDACTED]

Dear Sir

REF: [REDACTED] HUGHES STREET, NORTH IPSWICH
PROPOSED BULK EARTHWORKS ON NEIGHBOURING LOT

An Operational Works Application for Bulk Earthworks has been made to Ipswich City Council by Lipoma Pty Ltd, for works proposed on [REDACTED] North Ipswich. [REDACTED] is located adjacent to Queensland Rail land, namely [REDACTED] generally fronting the eastern boundary of [REDACTED]. Also an easement in favour of Queensland Rail traverses [REDACTED] in a North South direction.

In accordance with the Earthworks Code (Part 12, Division 15 of the Ipswich Planning Scheme), neighbouring property owners shall be consulted should any earthworks be undertaken within 3 metres of an adjoining property boundary.

Please find attached the relevant OPW Earthworks drawings showing the nature and extent of the proposed works.

The proposed earthworks involves rehabilitation of the existing contaminated soil in accordance with an approved Remediation Plan. All earthworks will be undertaken in accordance with the relevant Australian Standards and Ipswich City Council Design and Construction Guidelines. Drainage works are also proposed that extend the existing drain lines from the workshop museum site further west as detailed on the Engineering Drawings.

This advice is provided for notification purposes. Should you have any specific requirements or comment, these should be provided by Friday 26th March 2010. No response by this time will be deemed as acceptance of the proposed works as shown.

Should you require any further information please do not hesitate to contact the undersigned.

Yours faithfully
VDM CONSULTING

[REDACTED]
Manager
Principal Civil Engineer

encl

cc: Leda Holdings Pty Ltd – Attention [REDACTED]
Michel Group Services – Attention [REDACTED]





Our Job No: OC00-3754
Enquiries: [REDACTED]
Our Reference: B:\0000\00-3754_Ipswich Riverlink\Admin\1611_Other Authorities\1611 2_DMR\1611 2 - 15 March 2010.docx

16th March 2010

Department of Transport and Main Roads
Colvin Street
NORTH IPSWICH QLD 4305

Attention: Property Manager

Dear Sir

REF: [REDACTED] WM HUGHES STREET, NORTH IPSWICH
PROPOSED BULK EARTHWORKS ON NEIGHBOURING LOT

An Operational Works Application for Bulk Earthworks has been made to Ipswich City Council by Linema Pty Ltd, for works proposed on [REDACTED] Hughes Street, North Ipswich. [REDACTED] is located adjacent to Transport and Main Roads land, namely [REDACTED] generally fronting the eastern boundary of [REDACTED]

In accordance with the Earthworks Code (Part 12, Division 15 of the Ipswich Planning Scheme), neighboring property owners shall be consulted should any earthworks be undertaken within 3 metres of an adjoining property boundary.

Please find attached the relevant OPW Earthworks drawings showing the nature and extent of the proposed works. The proposed earthworks involve widening the existing drain beside the railway line. All earthworks will be undertaken in accordance with the relevant Australian Standards and Ipswich City Council Design and Construction Guidelines.

This advice is provided for notification purposes. Should you have any specific requirements or comment, these should be provided by Friday 26th March 2010. No response by this time will be deemed as acceptance of the proposed works as shown.

Should you require any further information please do not hesitate to contact the undersigned.

Yours faithfully
VDM CONSULTING

[REDACTED]
Manager
Principal Civil Engineer

encl: Drawing Number SK021 & SK024

cc: Leda Holdings Pty Ltd – Attention [REDACTED]
Michel Group Services – Attention [REDACTED]



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URBAN DEVELOPMENT

15 March 2010

Shared Services QR Limited
Rail Centre 2
309 Edward Street
Brisbane 4000

Our Ref: YC0175

Attention: [REDACTED]

Dear Sir

[REDACTED] # 21a North Street, North Ipswich – Proposed Bulk Earthworks on Neighboring Lot

An Operational Works Application for Bulk Earthworks has been made to Ipswich City Council by Lipoma Pty Ltd, for works proposed on [REDACTED] at [REDACTED] North Street North Ipswich. [REDACTED] is located adjacent to Queensland Rail land, namely [REDACTED] generally fronting the northern and north-eastern boundaries of [REDACTED]

In accordance with the Earthworks Code (Part 12, Division 15 of the Ipswich Planning Scheme), neighboring property owners shall be consulted should any earthworks be undertaken within 3 metres of an adjoining property boundary.

Please find attached the relevant OPW Earthworks drawings showing the nature and extent of the proposed works.

The proposed earthworks involves the excavation and removal of the existing contaminated soil. After the removal of the contaminated soil, imported fill is required to lift finished ground levels generally back to pre-development levels, generally tying into the existing ground levels surrounding the site, providing drainage towards the main gully in the south and elevate building pads above flood levels.

All earthworks will be undertaken in accordance with the relevant Australian Standards and Ipswich City Council Design and Construction Guidelines.

This advice is provided for notification purposes. Should you have any specific requirements or comment, these should be provided by Friday 26th March 2010. No response by this time will be deemed as acceptance of the proposed works as shown.

Should you require any further information please do not hesitate to contact the undersigned.

Yours faithfully
YEATS CONSULTING PTY LTD

[REDACTED]
Civil Engineer

BRISBANE

GLADSTONE

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PO Box 9122
GOLD COAST MC
QLD 9726

ABN 99 282 106 832

15 March 2010

Queensland Transport
PO Box 631
Ipswich QLD 4305

Our Ref: YC0175

Dear Sir

North Street, North Ipswich – Proposed Bulk Earthworks on Neighboring Lot

An Operational Works Application for Bulk Earthworks has been made to Ipswich City Council by Lipoma Pty Ltd. for works proposed on [REDACTED] North Street North Ipswich. [REDACTED] is located adjacent to Queensland Transport land located at [REDACTED] Colvin Street, North Ipswich ([REDACTED] Reserve 3817), generally fronting the southern boundary of [REDACTED].

In accordance with the Earthworks Code (Part 12, Division 15 of the Ipswich Planning Scheme), neighboring property owners shall be consulted should any earthworks be undertaken within 3 metres of an adjoining property boundary.

Please find attached the relevant OPW Earthworks drawings showing the nature and extent of the proposed works adjacent to your land.

The proposed earthworks generally involves benching of the slope to form a level platform on the southern side of the existing gully to accommodate a future 6 unit development and access road from Colvin Street.

All earthworks will be undertaken in accordance with the relevant Australian Standards and Ipswich City Council Design and Construction Guidelines.

This advice is provided for notification purposes. Should you have any specific requirements or comment, these should be provided by Friday 26th March 2010. No response by this time will be deemed as acceptance of the proposed works as shown.

Should you require any further information please do not hesitate to contact the undersigned.

Yours faithfully
YEATS CONSULTING PTY LTD

[REDACTED]
Civil Engineer

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ABN 99 282 106 832

Appendix 8

Assessment against Planning Scheme Codes.

EARTHWORKS CODE

Lipoma Pty Ltd – OPW.
W M Hughes Street, Lawrence Street & North Street, North Ipswich.
Our Ref. 874206.

Specific Outcomes	Probable Solutions	Development Response
<p>12.15.3 Overall Outcomes for the Earthworks Code The overall outcomes are the purpose of the Earthworks Code.</p> <p>The overall outcomes sought for the Earthworks Code are the following—</p> <p>(a) Earthworks ensure—</p> <p>(i) there is no adverse impact to adjoining properties;</p> <p>(ii) there is no adverse impact on flooding of upstream, downstream and adjoining land;</p> <p>(iii) the visual character and amenity of the site and the surrounding area is not adversely affected;</p> <p>(iv) there is no adverse impact to infrastructure or public utilities easements;</p> <p>(v) natural landforms and drainage lines are maintained, where possible;</p> <p>(vi) that land or water is not contaminated;</p> <p>(vii) that the site is stable;</p> <p>(viii) appropriate site access is provided from the road reserve to existing or future building envelopes; and</p> <p>(ix) there is no environmental harm or nuisance created by way of the release of air pollutants, noise or removal of</p>	<p>N/A.</p>	<p>The following points address the specific issues raised:</p> <p>(i) The proposed works will not generate impacts on adjoining properties.</p> <p>(ii) The proposed works will not generate flooding impacts upstream or downstream (it is noted that minor increases in flood levels will occur within the site itself).</p> <p>(iii) The visual character and amenity of the site and the surrounding area will be maintained.</p> <p>(iv) The proposed works are not expected to impact on infrastructure and the works will comply with conditions of existing easements.</p> <p>(v) The proposed works maintain the existing landform and drainage lines.</p> <p>(vi) Sediment and erosion control measures have been designed to ensure that land or water is not contaminated as a result of the proposed works.</p> <p>(vii) The proposed works will be undertaken in accordance with the recommendations of the site specific geotechnical studies.</p> <p>(viii) Access to the site will not be impacted upon by the proposed works.</p> <p>(ix) The Environmental Management Plan address the release of air pollutants and noise to ensure that impacts are not generated. It is also noted that removal of significant vegetation is not required.</p>

EARTHWORKS CODE

Lipoma Pty Ltd – OPW.
W M Hughes Street, Lawrence Street & North Street, North Ipswich.
Our Ref. 874206.

Specific Outcomes	Probable Solutions	Development Response
<p>significant vegetation.</p> <p>12.15.4 Effects of Development – General</p> <p>Effects on Surrounding Land</p> <p>(1) Specific Outcomes</p> <p>(a) Earthworks do not have an adverse impact on the visual amenity or privacy of surrounding land.</p> <p>(b) Earthworks are appropriately placed, retained and treated.</p> <p>(c) Earthwork activity does not cause vibrations which could damage nearby structures whether directly (owing to vibration transmitted to the structure), or indirectly (e.g. by causing settlement of the foundations).</p> <p>(d) Retaining structures are constructed of materials that are of a high quality appearance and compatible with that of surrounding uses and works.</p> <p>(e) Where fencing occurs above the retaining structure, it is designed where possible, to—</p> <p>(i) reduce the bulk of the entire structure; and</p> <p>(ii) use appropriate materials and colours to provide visual compatibility.</p> <p>(f) Earthworks do not extend onto adjoining land or a road reserve, unless the prior approval of the respective</p>	<p>N/A.</p>	<p>The following points address the specific issues raised:</p> <p>(a) The visual character and amenity of the site and the surrounding area will be maintained.</p> <p>(b) Earthworks are appropriately placed, retained and treated.</p> <p>(c) It is anticipated that the proposed works will not damage nearby structures.</p> <p>(d) Retaining walls are not required for the proposed works.</p> <p>(e) Fencing is not proposed.</p> <p>(f) The earthworks are to be constrained to the subject site.</p>

EARTHWORKS CODE

Lipoma Pty Ltd – OPW.
 W M Hughes Street, Lawrence Street & North Street, North Ipswich.
 Our Ref. 874206.

Specific Outcomes	Probable Solutions	Development Response
owner or responsible government entity has been obtained.		
<p>Stability of Land (2) Specific Outcomes</p> <p>a) Batters are provided to ensure the stability of the earthworks.</p> <p>(b) Retaining structures are stable and structurally sound.</p>	<p>(3) Probable Solutions – for sub-section (2)</p> <p>(a) The proposed cut or fill is no deeper than 1m in relation to natural ground level.</p> <p>(b) Any cut embankment is no steeper than—</p> <p>(i) for sand – 2 horizontal to 1 vertical;</p> <p>(ii) for silt – 4 horizontal to 1 vertical;</p> <p>(iii) for firm clay – 1 horizontal to 1 vertical; or</p> <p>(iv) for soft clay – 3 horizontal to 2 vertical.</p> <p>(c) Any fill embankment is no steeper than 4 horizontal to 1 vertical.</p> <p>(d) Any compacted fill embankment is no steeper than—</p> <p>(i) for sand – 3 horizontal to 2 vertical;</p> <p>(ii) for silt – 4 horizontal to 1 vertical; or</p> <p>(iii) for firm clay – 2 horizontal to 1 vertical.</p> <p>(e) Where earthworks involve cut or fill deeper than 1.0m, a retaining structure is provided, in accordance with the requirements of the Standard Building Regulation.</p> <p>(f) If the earthworks include a retaining</p>	<p>The design of fill batters has been undertaken in accordance with the site specific geotechnical investigations.</p>

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Specific Outcomes	Probable Solutions	Development Response
	wall greater than 1000mm in height, the retaining wall is to be certified by a Registered Professional Engineer as being structurally sound.	
Nature of Fill (4) Specific Outcome Earthworks do not result in land or water contamination, or the harbourage of vermin.	(5) Probable Solution – for sub-section (4) Earthworks involve only the controlled use of clean, dry, solid, inert building material as per Section 4 (Materials) of AS 3798 – 1996, "Guidelines on earthworks for commercial and residential developments".	The Environmental Management Plan details the materials to be placed on the site.
Degree of Compaction 6) Specific Outcome Earthworks are appropriately compacted.	(7) Probable Solutions – for sub-section (6) (a) The degree of compaction accords with Section 5 (Compaction Criteria) of AS 3798 – 1996, "Guidelines on earthworks for commercial and residential developments". (b) Geotechnical testing— (i) Commercial, Industrial or Multiple Residential Uses— (A) Geotechnical testing is undertaken in accordance with Appendix B of AS3798. (B) If building works are proposed for commercial, industrial or multiple residential uses, geotechnical testing takes place to the equivalent of Level 1, which involves a full-time inspection service and testing of all earthworks by a geotechnical testing authority, including determination of the location and timing of	It is anticipated that conditions of approval will reflect Council's requirements with regard to ongoing certification of the proposed works.

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Specific Outcomes	Probable Solutions	Development Response
	<p>the sampling and testing operations.</p> <p>C) Upon completion, a report is prepared by the testing authority setting out the inspections, location, sampling and testing and the results.</p> <p>(D) The testing authority is to provide an opinion in respect to compliance of the earthworks with the specified requirements.</p> <p>(ii) Reconfiguration of a Lot for Single Residential, Dual Occupancy or Multiple Residential Uses—</p> <p>(A) Geotechnical testing is undertaken to determine a site classification for each lot in accordance with AS2870- "Residential Slabs and Footings – Construction".</p> <p>(B) Site classification in the Category of "E" or "P" (E – Subject to extreme soil movement; P – Problem sites including poorly compacted fill), is generally not acceptable.</p> <p>C) Where such site classification of "E" or "P" occurs, further detailed analysis demonstrating site suitability for the intended use is to be undertaken.</p> <p>(D) Controlled filling to satisfy Level 1 testing in accordance with AS3798 may be required in order to achieve an appropriate site classification.</p> <p>(iii) Single Residential, Dual Occupancy or</p>	

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Specific Outcomes	Probable Solutions	Development Response
	<p>Multiple Residential Uses on an Existing Lot—</p> <p>(A) Level 1 testing is not required for building works for the purpose of a Single Residential, Dual Occupancy or Multiple Residential use on an existing lot.</p> <p>(A) Geotechnical testing is undertaken to determine a site classification for each lot in accordance with AS2870- "Residential Slabs and Footings – Construction".</p> <p>(B) Site classification in the Category of "E" or "P" (E – Subject to extreme soil movement; P – Problem sites including poorly compacted fill), is generally not acceptable.</p> <p>(B) In these situations, where a site classification has not been established at the time of creation of the lot, the site is treated and tested to achieve a site classification of A, S, M or H, in accordance with AS2870 – "Residential Slabs and Footings – Construction".</p> <p>(C) Site classification in the Category of "E" or "P" (E – Subject to extreme soil movement; P – Problem sites including poorly compacted fill) is generally not acceptable.</p> <p>(D) Where such site classification of "E" or "P" occurs, further detailed analysis demonstrating site suitability for the intended use is to be undertaken.</p>	

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Specific Outcomes	Probable Solutions	Development Response
<p>Flooding and Drainage (8) Specific Outcomes</p> <p>(a) Earthworks are avoided below the adopted flood level.</p> <p>(b) Earthworks —</p> <p>(i) do not cause any increase in flooding or drainage problems;</p> <p>(ii) do not cause an impediment to flood waters; or</p> <p>(iii) do not adversely impact adjoining, upstream or down stream properties.</p> <p>(c) Earthworks are avoided in natural gullies and overland flow paths.</p>	<p>N/A.</p>	<p>The proposed earthworks have been designed in accordance with the attached Flood Study by Cardno. This report concludes that the proposed works will not generate impacts on external properties.</p>
<p>Sediment and Erosion Control (9) Specific Outcome</p> <p>Earthworks do not result in sediment runoff or erosion of property.</p>	<p>(10) Probable Solutions – for sub-section (9)</p> <p>(a) Drainage, erosion and sedimentation control measures are installed to control erosion and sediment run off from the site (e.g. siltation retention devices such as earth bunds, hay bales and silt fences).</p> <p>(b) Earthworks are avoided within 100 metres of any waterway or wetland.</p>	<p>Sediment and erosion control has been designed for the 3 separate work areas within the site and the Environmental Management Plan details the overall management of sediment and erosion control issues. It is anticipated that conditions of approval will require the implementation of sediment and erosion control measures as per the submitted documentation.</p>
<p>Site Access (11) Specific Outcome</p> <p>The grade of slope between the road reserve and any existing or future building envelope enables convenient physical access to the building envelope.</p>	<p>(12) Probable Solutions – for sub-section (11)</p> <p>Where earthworks affect access to the site, the grades of slope between the road reserve and any existing or future building envelope, following the earthworks, do not exceed—</p>	<p>The earthworks will not impact on future access arrangements.</p>

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Specific Outcomes	Probable Solutions	Development Response
	(a) 1 in 6 (with an absolute maximum of 1 in 4) for residential use; and (b) 1 in 10 (with an absolute maximum of 1 in 6) for commercial or industrial uses.	
Air Pollutants (13) Specific Outcome Air pollutants, particularly dust and odour, do not cause significant environmental harm or nuisance.	N/A.	The attached Environmental Management Plan addresses issues surrounding air pollutants.
Noise Emissions (14) Specific Outcome Noise emissions do not cause significant environmental harm or nuisance.	(15) Probable Solutions – for sub-section (14) (a) Hours of construction are Monday to Saturday from 6.30 a.m. to 6.30 p.m. (b) Work or business is not conducted from or on the premises outside the above hours or on Sundays or Public Holidays.	It is anticipated that conditions of approval will reflect Council's requirements with regard to construction hours.
Traffic (16) Specific Outcome (a) Traffic generated by earthworks activity does not adversely affect the amenity of the surrounding area, particularly residences and other sensitive receptors. (b) Where possible, trucks avoid residential streets and use major roads. (c) Temporary access is provided to the site to avoid residential areas.	N/A.	In this case construction traffic will remain on the site itself and therefore impacts on the surrounding road network will not be generated.
Vegetation (17) Specific Outcomes	N/A.	The proposed works will not impact on any significant vegetation and it is anticipated that conditions of approval will reflect Council's requirements for

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Specific Outcomes	Probable Solutions	Development Response
<p>(a) The location and treatment of earthworks maximises the practicable retention of significant vegetation.</p> <p>(b) Cleared vegetation is not burnt on the site and is removed to an approved off-site location.</p>		disposal of vegetation that is removed.
<p>Easements and Infrastructure (18) Specific Outcomes Where earthworks occur—</p> <p>(a) within a public utilities easement; or</p> <p>(b) within 3 metres of Local Government infrastructure (e.g. stormwater/sewerage/water mains);</p> <p>it does not—</p> <p>(c) cause damage to the integrity of the infrastructure;</p> <p>(d) impede access to the infrastructure for maintenance purposes; or</p> <p>(e) prejudice the functioning of the easement for its intended purpose.</p>	N/A.	<p>All work shall comply with the terms and conditions of all existing easements located within the subject site. It is anticipated that a condition will be included within the approval to ensure that the obligations of all easements are maintained throughout the construction and operational phases of the proposed development.</p> <p>With regard to impacts on infrastructure, the only relevant infrastructure is the sewer main that traverses the site. No works with regard to this sewer main are proposed as part of the current application and it is noted that based on geotechnical advice and a structural assessment, the structural integrity of the line during the proposed earthworks is considered to be adequate for the following reasons:</p> <ul style="list-style-type: none"> - The line is approximately 6-7m below the earthworks subgrade level providing sufficient cover. - Loads limited to earthmoving equipment - No material stockpiles are proposed over the sewer line - Adequate strength of in-situ soils <p>It is also anticipated that a condition of approval will require that any damages caused to the line as a result of the earthworks be remedied at the developer's expense.</p>
<p>Notification of Adjoining Owners (19) Specific Outcome Affected property owners are notified in writing if earthworks are—</p> <p>(a) within 3 metres of an adjoining property boundary; or</p>	N/A.	<p>Adjoining owners were notified of the proposed works as part of the previous 3 OPW Applications. As the works being contemplated under this application is the same, it is argued that further notification is unnecessary (note that Council Officer's agreed with this position). Copies of the correspondence sent is attached in Appendix 7 and it is noted that no responses have been received to date.</p>

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Specific Outcomes	Probable Solutions	Development Response
(b) greater than 2 metres in height; or (c) likely to cause drainage or flooding impacts on adjoining land.		

Appendix 9

Assessment of Fill Batter Support Requirements by Morrison Geotechnic.

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Darra Office
Job No. 207E/186-Site 2
Ref: 13165B/sw
Author: [REDACTED]

21st November, 2007

LEDA Developments Pty Ltd
P O Box 1914
Surfers Paradise Qld 4217

ATTENTION [REDACTED]

FAX NO. 5570 5050

Dear Sir,

**RE: ASSESSMENT OF FILL BATTER SUPPORT REQUIREMENTS
SITE 2 (SOUTHERN SITE) – RIVERLINK STAGE 2
NORTH STREET, NORTH IPSWICH**

1.0 INTRODUCTION

We are pleased to present our report on the support requirements and treatment for the existing fill batter slopes adjacent to the Bremer River at Site 2 (South Site) of the Riverlink Stage 2 Project, North Street, North Ipswich. The work was commissioned by Mr P O'Callaghan representing the Client, LEDA Developments Pty Ltd, with the issue of Purchase Order 0032, Code H2066, 300-360 dated 20th September, 2007.

Site 2, termed the southern site, lies between the Riverlink Shopping Centre to the south and Site 1 to the north. The site comprises a narrow strip of steep sloping land, which slopes downwards from a relatively level platform at RL20.0m towards the Bremer River in the west, involving a relief of some 18.0m. An access track at about RL6.0m to RL9.0m has been formed along the toe of the main slope, providing a flat bench in the overall cross-sectional profile.

The site is underlain by significant quantities of fill materials, which have been progressively pushed over the natural river bank and terrace to form the existing steep fill batter and platform which presently exists. These fill materials are associated with the adjacent activities of the railway facilities and comprise a mixture of coke ash, coal, metal shavings and numerous other constituents associated with the operation and maintenance of the railway infrastructure. The deeper fill materials tend towards clays and clayey sands mixed with various amounts of ash and other contaminants. The narrow fill platform has been heavily trafficked during past activities and appears to be well compacted and consolidated.

The steep fill batter between the narrow flat platform and the access track is visually loose and only marginally stable. There is widespread evidence of shallow slumping, indicating that the batter is in a state of limiting equilibrium. The batter slopes are variable, ranging between about 30° in the northern transition section and 41° further to the south where the site is narrowest.

The development proposal for Site 1 requires an access corridor between the Retail Centre to the south and Site 1 to the north. This access will be constructed over the existing flat narrow platform, whereby treatment or stabilization of the existing unstable fill batters is required.

Options for this treatment include:-

- Flattening the batters to a stable slope, which has the disadvantage of reducing the overall access route width, or
- Construction of a gravity retaining wall along the access track and reshaping the batter above the top of the wall to a stable configuration.

The assessment presented in this report has been carried out to assess the design requirements for a stable, reprofiled, battered slope and the requirements for a gravity retaining wall such as the Rockblock Wall produced by South East Excavations Pty Ltd.

2.0 METHOD OF ASSESSMENT

The assessment methodology involves:-

- Walk-over surveys by an Engineering Geologist and Principal Engineer from this office.
- Borehole drilling and sampling.
- Laboratory testing of collected samples.
- Slope modeling and analysis.
- Retaining wall analysis

Fifteen (15) boreholes were drilled at widespread locations on the site, which included five (5) sets of two (2) boreholes along the narrow flat section of the filled site and five (5) locations along the access track at the base of the steep fill batter. The subsurface conditions encountered in the boreholes were logged by an Engineering Geologist from this office, who also carried out SPT tests at regular depth intervals and collected samples for laboratory testing.

Laboratory testing comprised:

- Triaxial Strength Tests: Consolidated, undrained with pore pressure measurements, carried out on undisturbed samples of the natural clay soils (2)
- Standard Compaction tests on samples of the coke ash fill (3)
- Direct Shear Tests on samples of the coke ash fill remoulded to 90% Standard Maximum Dry Density (SMDD) (3)
- Quality of Materials (Classification) tests carried out on samples of the coke ash fill, clay fill and natural clay soils (8)

The logs of the boreholes are presented in Appendix A to this report, while the laboratory test results are presented in Appendix B. The approximate locations of the boreholes are shown on the attached site plan.

3.0 SUBSURFACE CONDITIONS

The subsurface conditions at the site may be summarised as follows:-

Coke Ash Fill: Comprising mainly coke ash, but also containing various quantities of metal cuttings, filings, steel wire and soil and forming the upper section of the fill profile to depths ranging generally between 2.0m and 4.0m, but inferred to be up to 8.0m thick at the crest of the batter and thinning towards the access track, underlain by

General Fill: Comprising mainly clay soil mixed with various quantities of coke ash and other contaminants, but also including zones of clayey sands and silty sands; generally very stiff to hard in consistency, extending to depths of up to at least 10.0m, underlain by

Natural Soils: Comprising mainly very stiff to hard silty clays and sandy clays of medium to high and high plasticity, extending to depths ranging between 2.0m beneath the access track in the south and 16.0m on the broader flat area in the north, but being typically 1.0m to 2.0m thick, underlain by

Weathered Rock: Comprising mainly extremely weathered (XW siltstone and sandstone of very low but occasionally medium strength.

Groundwater was measured at a depth of 2.0m in BH14 on the access track, corresponding approximately to RL3.0m. The water level in the Bremer River varies but can be taken as approximately RL2.5m for analysis.

4.0 LABORATORY TEST RESULTS

The results of the laboratory tests are summarised in the following tables.

TABLE 1 – TRIAXIAL STRENGTH TESTS ON NATURAL CLAY SOILS

Borehole No.	Depth (m)	Material	Field Density (t/m ³)	Low Confining Stress		High Confining Stress	
				Effective Cohesion c'(kPa)	Effective Friction Angle (°)	Effective Cohesion c'(kPa)	Effective Friction Angle (°)
BH11	2.0-2.15	Clay (CH)	2.12	16	25	25	21
BH15	2.9-3.11	Clay (CH)	1.98	24	33	44	23

TABLE 2 – STANDARD COMPACTION TESTS

Borehole No.	Depth (m)	Material	Standard Maximum Dry Density (t/m ³)	OMC (%)
BH4	0.1-0.7	Coke Ash	1.251	26.1
BH8	1.5-2.0	Coke Ash	0.987	22.5
BH8	3.0-3.5	Coke Ash	1.552	17.1

TABLE 3 – DIRECT SHEAR TESTS ON REMULDED COKE ASH SAMPLES

Borehole No.	Depth (m)	Material	Remoulded Density		Peak Strength		Residual Strength		Moisture Content (%)
			% SMDD	Wet Value (t/m ³)	c' (kPa)	Ø' (°)	c' (kPa)	Ø' (°)	
BH4	0.1-0.7	Coke Ash	90	1.42	28	38	26	38	25.1
BH8	1.5-2.0	Coke Ash	90	1.088	0	52	0	51	22.7
BH8	3.0-3.5	Coke Ash	90	1.636	14	40	14	39	19.6

TABLE 4– QUALITY OF MATERIALS/CLASSIFICATION TESTS

Borehole No.	Depth (m)	Material Fraction (%)			Liquid Limit (%)	Plasticity Index (%)	Classification
		Gravel	Sand	Clay/Silt			
BH1	2.6-3.0	2	32	66	51	36	Fill, Silty Clay (CH)
BH1	5.2-5.8	0	12	88	71	50	Natural, Silty Clay (CH)
BH3	2.5-2.95	9	30	61	52	32	Fill, Sandy Clay, some Gravel (CH)
BH3	5.5-5.95	0	14	86	39	21	Natural, Sandy Clay (CH)
BH5	2.5-2.95	2	34	64	42	27	Fill, Sandy Clay (CI-CH)
BH8	1.0-1.5	48	36	16	69	4	Fill, Coke Ash
BH14	0.9-1.5	42	40	18	48	4	Fill, Silty Gravelly Sand (SM)
BH15	4.7-5.5	0	22	78	54	33	Natural, Silty Clay (CH)

5.0 GEOTECHNICAL MODEL

Geometrically, the site is described by the contours shown on the site plan and the interpreted cross-sections presented at the end of this report. These cross-sections are based on interpolation between discrete borehole locations and must be considered as only approximate. Variations in the geometry will occur and must be expected. The geotechnical cross-sections also show the interpolated surface conditions across the site, which are also based on interpolation between the borehole locations. Variations in subsurface conditions between boreholes must be expected.

Generally the site can be described as an upper layer of coke ash with other contaminants, which form the outermost layer in the fill batter, underlain by general fill, which typically comprises clay soils mixed with other soils and contaminants overlying the natural pre-existing river slope profile. The natural profile comprises a relatively thin layer of very stiff clay soils over the weathered siltstone and sandstone bedrock.

The material properties adopted for the site have been based on the results of the laboratory testing and visual observations made on site, and are presented in Table 5.

TABLE 5 – MATERIAL PROPERTIES FOR STABILITY ANALYSES

Material	Insitu Wet Density (kN/m ³)	Effective Cohesion c' (kPa)	Effective Angle of Friction Ø (degrees)
Coke Ash Fill	16	0	41 ^o for slope stability analysis 38 ^o for retaining wall design
General Fill	19	2	28
Natural Clay Soil	20	15	25
Sandstone	22	15	36

6.0 SLOPE STABILITY

The existing fill batter slopes range between approximately 30^o and 41^o and are assessed to be only marginally stable under dry weather conditions and unstable after wet weather. Stability analyses of the steepest batter section corresponding to Section AA' on the site plan have been carried out using the software G-SLOPE, the material properties presented in Section 5, the slope geometry interpreted from the site plan and the interpreted subsurface profiles. The results are presented in Appendix C and summarised in Table 6.

TABLE 6 – STABILITY OF EXISTING FILL BATTER

Figure No.	Failure Surface	Factor of Safety
1	Shallow	0.93
2	Intermediate	0.96
3	Deep Seated	1.09
4	Deep Seated	1.31
5	Deep Seated	1.49

The results indicate that under normal weather and groundwater conditions, the fill batters are only marginally stable and in a state of limiting equilibrium. Shallow surface slumping and sloughing can be expected after rainfall.

7.0 BATTER TREATMENT OPTIONS

7.1 Reprofilling of Existing Batter

If space permits, the existing fill batters can be flattened to improve stability to acceptable levels. Stability analyses have been carried out for a regraded batter slope of about 25^o, which removes mostly coke ash materials, and the results are attached in Appendix C.

Two groundwater conditions have been assessed; normal groundwater under average weather conditions and rapid drawdown assuming complete saturation of the fill slope under Q100 flood conditions, followed by rapid passing of the flood, with high groundwater within the slope. ✓

TABLE 7 – STABILITY ANALYSIS OF REPROFILED 25° BATTER SLOPE UNDER NORMAL GROUNDWATER CONDITIONS

Figure No.	Failure Surface	Factor of Safety
1A	Shallow	1.45
2A	Shallow	1.69
3A	Intermediate	1.86

TABLE 8 – STABILITY ANALYSIS OF REPROFILED 25° BATTER SLOPE UNDER RAPID DRAWDOWN CONDITIONS

Figure No.	Failure Surface	Factor of Safety
1B	Shallow	1.10
2B	Intermediate	1.57

These results are satisfactory. It is recommended that the batter be reprofiled to about 2(H) : 1(V) or 26° with a minimum 1.5m wide maintenance bench constructed every 5.0m vertically and the batter surface be lined with compacted clay to minimise erosion and the infiltration of surface water and flood water into the body of the fill, during rainfall events and floods.

RECOMMEND

7.2. Retaining Wall with Battered Slope Above

A gravity retaining wall with a reprofiled batter behind has been considered and analysed for stability, as an alternative to a totally reprofiled fill batter. This scheme is shown in Appendix D. The analysed retaining wall is a gravity structure termed the Rockblock Wall, developed by South East Excavations, but other gravity systems may be adopted. ✓

The system comprises hollow concrete blocks each 1.0m high, 1.0m deep and 2.0m long stacked on each other, filled with crushed rock gravel, and placed on a reinforced concrete footing. A 4.0m high wall has been analysed using the software Envirowall. The results are attached in Appendix D and show that the wall comprises two, two block lower cells with two, one block cells above. The lowest two internal blocks can be replaced with mass concrete or no fines concrete if required as a potential cost saving measure. The concrete footing incorporates a key and the dimensions are shown in Appendix D.

Drainage is required behind the wall and a layer of drainage gravel or crushed concrete will be adequate, connecting to a slotted PVC pipe at the rear of the footing. The analysis requires that the 57° wedge behind the block wall is filled with clean ash or a granular material with an angle of friction of at least 38° and a bulk density of no more than 18kN/m³. For this system the factor of safety with respect to sliding and overturning is at least 1.5.

Global stability analyses have been carried out for the entire slope geometry using the strength parameters presented in Table 5. The results are presented in Appendix D and summarised in Table 9. The results are assessed to be satisfactory.

TABLE 9 – GLOBAL STABILITY ANALYSIS OF RETAINING WALL AND REPROFILED BATTER

Figure No.	Failure Surface	Factor of Safety
1D	Shallow, Local	1.60
2D	Intermediate	1.53
3D	Deep Seated	1.59
4D	Intermediate	1.49

Prior to construction of the retaining wall, some foundation treatment is required as follows to provide a uniform bearing surface.

- Excavate a 0.4m deep trench beneath the footing alignment and compact the base to at least 95% SMDD.
- Construct a foundation blanket within the trench comprising a 400mm thick layer of crushed rock sub-base materials (CBR 45%) compacted to 100% SMDD.

The wall footing can then be constructed on this foundation.

The profiled batter slope behind the wall is constructed at 3(H) : 1(V) or about 18° with a 3.0m wide bench.

The reprofiled fill batter should be sealed with a suitable clay cap to minimise erosion and infiltration of rainwater and floodwater into the fill embankment.

It should be noted that there is minimal space gain with the retaining wall system and 18° batters compared to the fully reprofiled slope at 25°. Space increases over the 25° reprofiled batter may, however, be achieved by steepening the batters behind the retaining wall to 25°, which will necessitate increasing the wall lean from 3° (or 1:20) to 5° (1:11). Global stability checks would have to be carried out for this steeper configuration.

7.3. Northern Transition Batter at 30°

The northern transition batter is currently profiled at about 30°. Slope stability analyses have been carried out on the batter, assuming a similar geotechnical profile to the main southern batter. The results are presented in Appendix E and summarised in Table 10.

TABLE 10 – STABILITY OF EXISTING NORTHERN TRANSITION BATTER

Figure No.	Failure Surface	Factor of Safety
1C	Shallow	1.20
2C	Intermediate	1.26
3C	Deep Seated	1.46

The factors of safety would be lower for high groundwater conditions. On this basis, the batter should be reprofiled to 25° (2H : 1V) or left in its current geometry with acceptance of the factors of safety presented in Table 10.

8.0 LIMITS OF INVESTIGATION

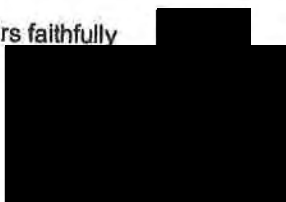
Recommendations given in this report are based on information supplied regarding the proposed construction in conjunction with the findings of the investigation. Any change in construction type or in building location may require additional testing and/or make recommendations invalid.

Every reasonable effort has been made to locate test sites so that bores are representative of the soil conditions within the area to be investigated. The Client should be made aware, however, that this assessment has been based on limited site data using small diameter boreholes.

In some cases, soil conditions can change dramatically over short distances, therefore even careful exploration programmes may not locate all the variations. If soil conditions differing from those shown on the log sheet are encountered during construction, this office should be advised immediately.

Unless otherwise stated in commissioning documents, any dimensions or magnitudes should not be used for any building or costing calculations. Any sketch supplied should be considered only as approximate pictorial evidence of site work. Your attention is drawn to the attachment "Important Information About Your Geotechnical Engineering Report".

Yours faithfully



(RPEQ 5641)

for and on behalf of

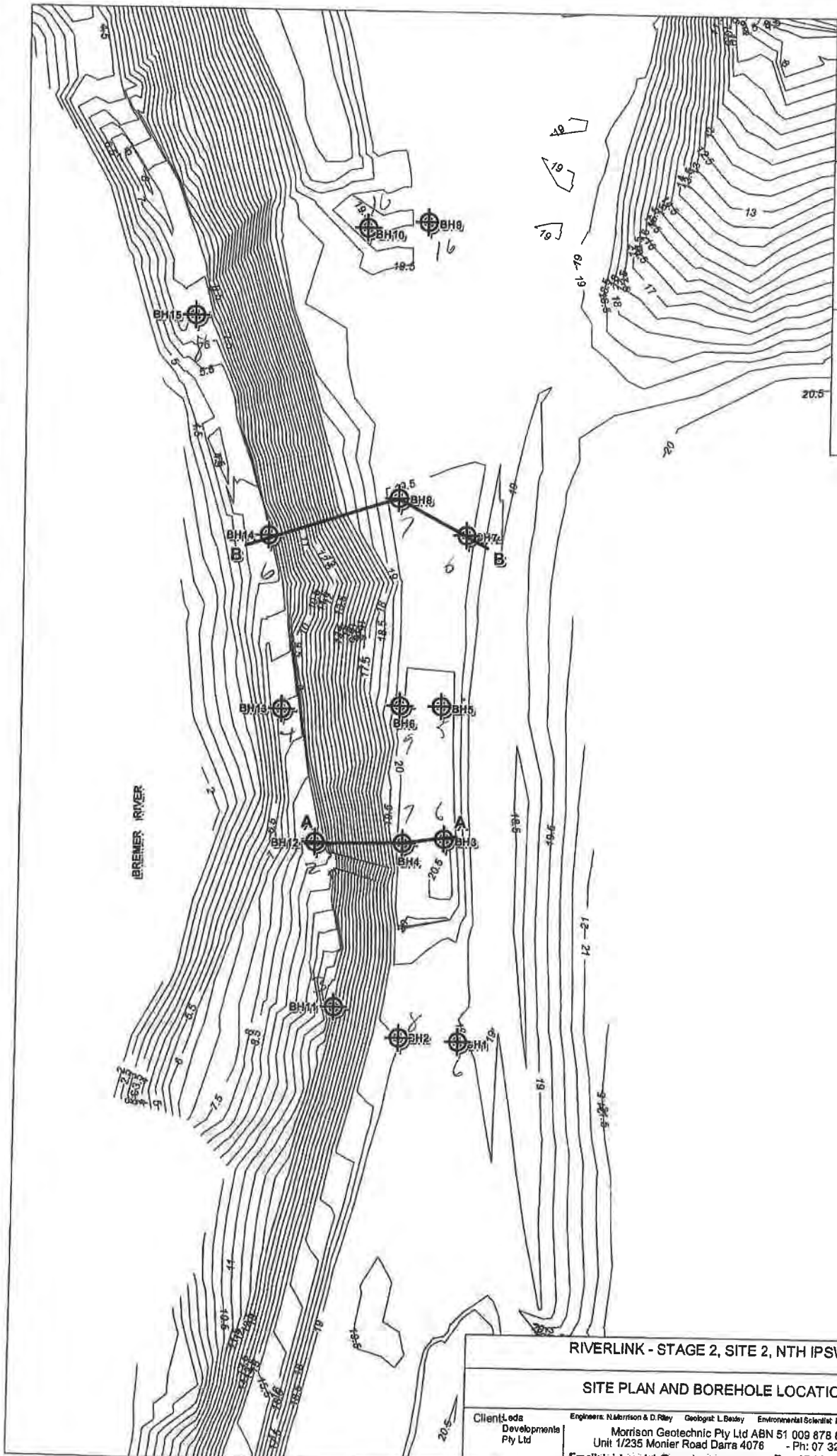
MORRISON GEOTECHNIC PTY LIMITED

- Encl
- Site Plan and Interpreted Cross-Sections
 - Appendix A – Borehole Record Sheets
 - Appendix B – Laboratory Test Results
 - Appendix C – Slope Stability Assessment Results
 - Appendix D – Gravity Retaining Wall Scheme
 - Appendix E – Stability Analyses of Northern Transition Batter

**SITE PLAN AND
INTERPRETED CROSS-SECTIONS**



SCALE
1 : 1000



RIVERLINK - STAGE 2, SITE 2, NTH IPSWICH

SITE PLAN AND BOREHOLE LOCATION

Client: Leda Developments Pty Ltd	Engineers: N Morrison & D Riley	Geologist: L Beasley	Environmental Scientist: R Howchin	Project No: 207E/186
	Morrison Geotechnic Pty Ltd ABN 51 009 878 899 Unit 1/235 Monier Road Darra 4076 - Ph: 07 3279 0900			Drawing No: 0768207E/186
Email: brisbane@geotechnic.com.au Fax: 07 3279 0955				

LEGEND



Fill

Measured Groundwater Level

Extrapolated Groundwater Level

GC Clayey Sandy Gravel

CH High Plasticity Clay

CI Medium Plasticity Clay

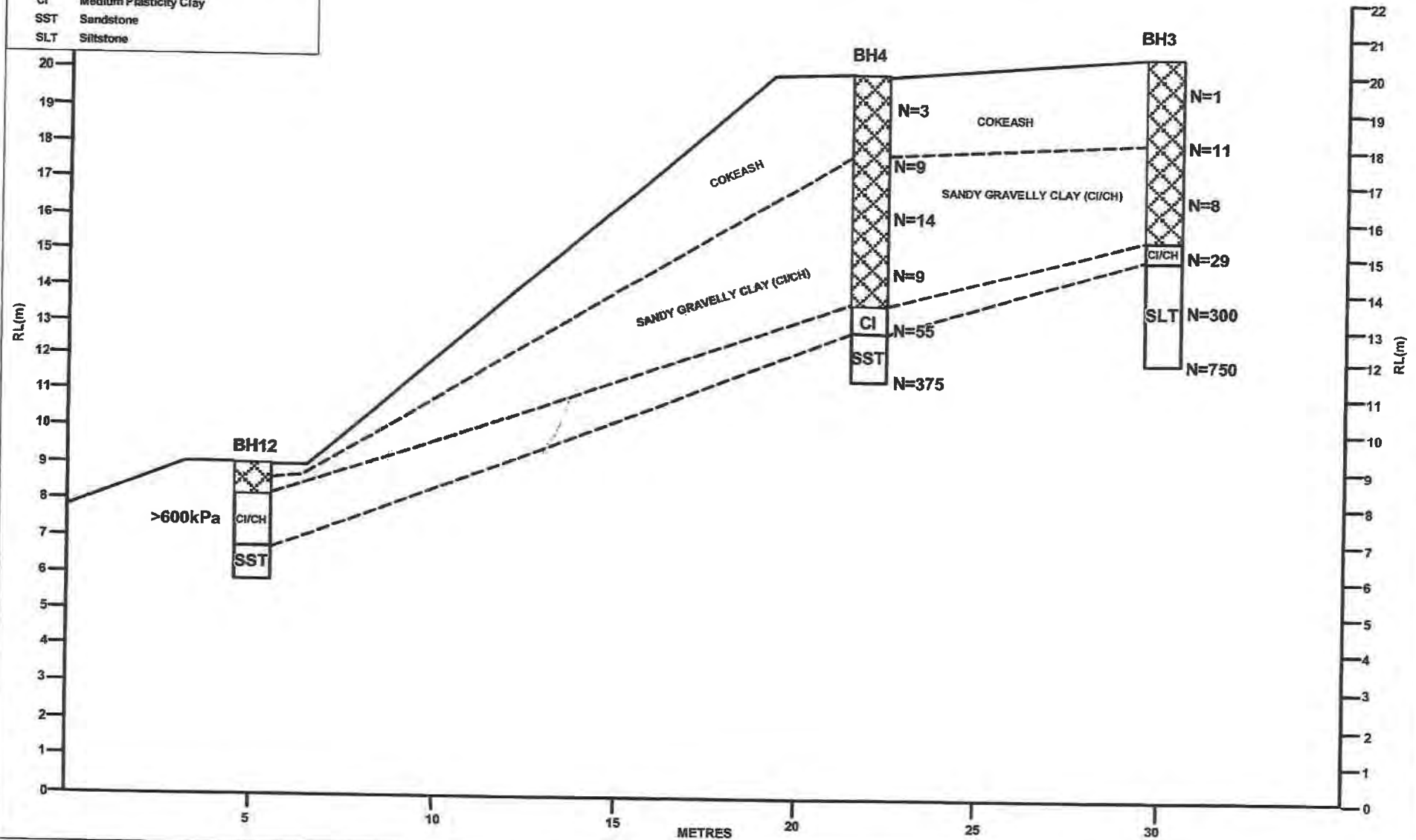
SST Sandstone

SLT Siltstone



MORRISON
GEOTECHNIC

RIVERLINK STAGE 2 - SITE 2, NTH IPSWICH
CROSS SECTION OF BOREHOLES BH3, BH4 AND BH12
SECTION A-A



LEGEND



Fill

Measured Groundwater Level

Extrapolated Groundwater Level

GC Clayey Sandy Gravel

CH High Plasticity Clay

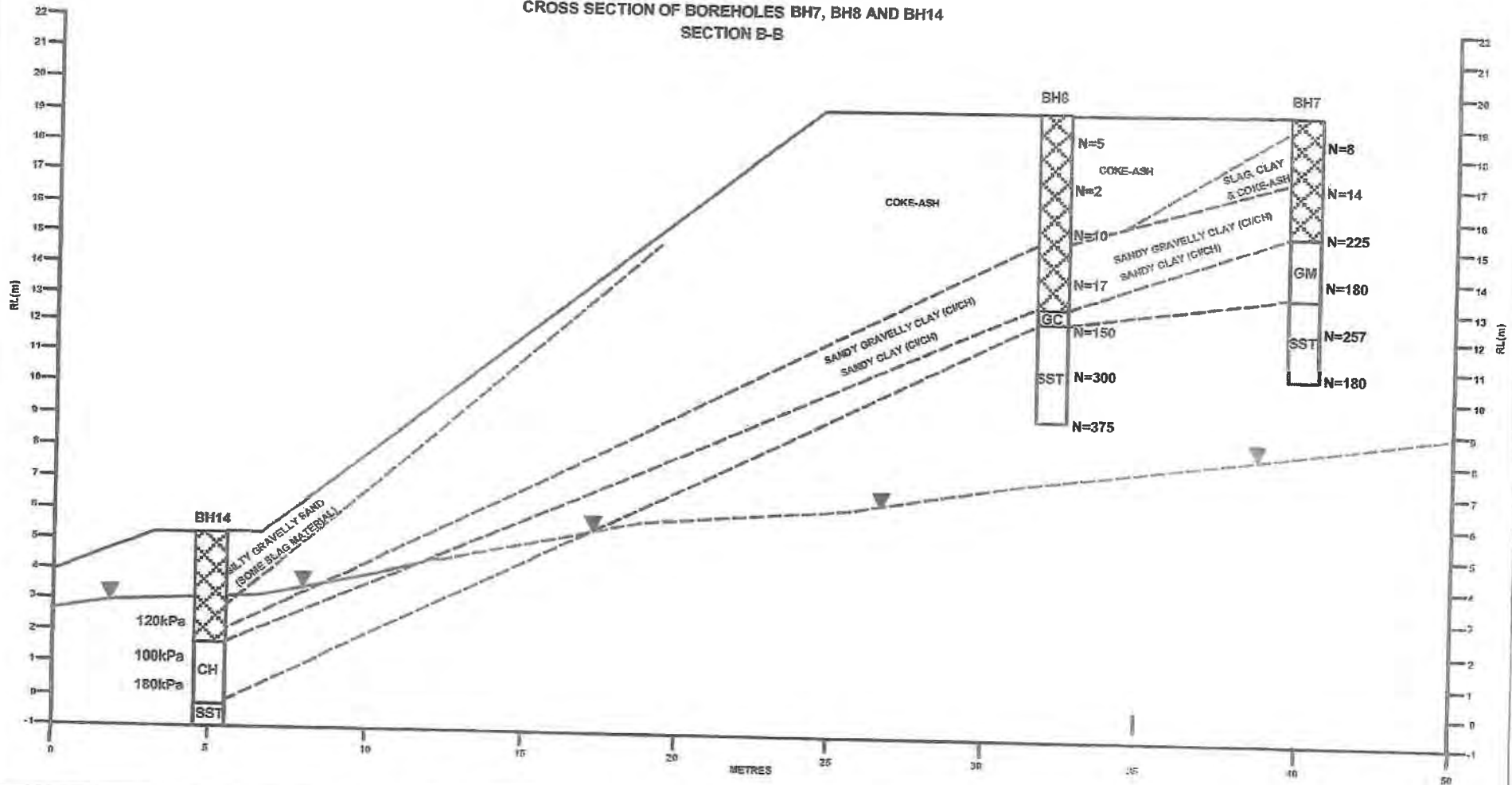
CI Medium Plasticity Clay

SST Sandstone

SLT Siltstone



**RIVERLINK STAGE 2 - SITE 2, NTH IPSWICH
CROSS SECTION OF BOREHOLES BH7, BH8 AND BH14
SECTION B-B**



APPENDIX 'A'

BOREHOLE RECORD SHEETS



Morrison Geotechnic Pty Ltd

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Engineering Log - Borehole

Borehole No.: BH1

Page: 1 of 2

Easting: 476129.00
 Northing: 6946541.00
 RL: Approx. 19.00
 Total Depth: 8.28

Drilling Rig: Hydrapower Scout 500
 Driller: Geodrill Pty Ltd
 Logged By: [Redacted]
 Date: 01/10/2007

Job Number: 207E/186

Client: Leda Developments Pty Ltd

Project: Geotechnical Investigation - Retaining Wall

Location: Riverlink-North Ipswich-Stage 2, Site 2

Drilling Information			Material Description					Test Samples					
Drill Method	Water	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
100mm TC Bit with Auger	Water	16.0	FIL	[Cross-hatched]	FIL	Gravelly Sandy CLAY (CL/CI): Very stiff, low to medium plasticity, grey brown mottled brown and orange brown, fine to coarse grained sand, fine to coarse sized gravel, moist		M	VSt				
		0.4			FIL	Silty Gravelly SAND (SM): Loose, fine to coarse grained sand, black, fine to coarse sized gravel, moist		M	L				
		0.6			FIL	Silty Gravelly SAND (SM): Loose, fine to coarse grained sand, black, fine to coarse sized gravel, moist		M	L				
		0.75			FIL	Silty Gravelly SAND (SM): As above but some clay fines		M	H				
		1.0			FIL	Sandy CLAY (CI/CH): Hard, medium to high plasticity, fine grained sand, orange brown, moist		M	MO				
		1.05			FIL	Silty Gravelly SAND (SM): Medium dense, fine to medium grained sand, grey brown, fine to coarse sized gravel, some clay fines, moist		M	H		1	SPT	4,3,5 N=8
		1.65			FIL	Sandy CLAY (CI): Hard, medium plasticity, orange brown, trace of fine to medium sized gravel, moist		M	H		2.1	PP	350kPa
		17.0			FIL	Sandy CLAY (CH): As above but high plasticity, and orange brown mottled grey		M	H		2.5	SPT D	5,5,6 N=11
		2.0			FIL	Ballast Material				2.6			
		2.6			FIL	Silty CLAY (CH): Very stiff, high plasticity, light orange brown mottled light grey and dark grey, moist		M	VSt		3.5	SPT	8,8,12 N=20 PP=400-600kPa
		16.0			FIL	Silty CLAY (CH): Very stiff, high plasticity, light orange brown mottled light grey and dark grey, moist		M	VSt				
		3.0			FIL	Silty CLAY (CH): Very stiff, high plasticity, light orange brown mottled light grey and dark grey, moist		M	VSt				
		3.3			FIL	Silty CLAY (CH): Very stiff, high plasticity, light orange brown mottled light grey and dark grey, moist		M	VSt				
		3.8			FIL	Silty CLAY (CH): Very stiff, high plasticity, light orange brown mottled light grey and dark grey, moist		M	VSt				
		15.0	Natural	[Vertical lines]	CH	Silty CLAY: As above but hard, light orange brown with mottled light grey streaking		M	H		5	SPT	5,7,10 N=17
		4.0			CH	Silty CLAY: As above but hard, light orange brown with mottled light grey streaking		M	H				
		14.0	Rock	[Vertical lines]	SLT	SILTSTONE: Extremely weathered, very low strength, orange brown, some grey mottling	XW		VLS				
		13.0			SLT	SILTSTONE: Extremely weathered, very low strength, orange brown, some grey mottling							

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
Water inflow	XW Extremely weathered	S Soft	L Loose	VLS Very low	D Disturbed sample.
Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	LS Low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa, Vane shear value kPa
	FR Fresh	VSt Very stiff	VD Very dense	HS High	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		H Hard		VHS Very high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes
		Molsture		EHS Extremely high	
		D Dry M Molst W Wet			



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Engineering Log - Borehole

Borehole No.: BH1

Page: 2 of 2

Job Number: 207E/186

Client: Leda Developments Pty Ltd

Project: Geotechnical Investigation - Retaining Wall

Location: Riverlink-North Ipswich-Stage 2, Site 2

Easting: 476129.00 **Drilling Rig:** Hydrapower Scout 500
Northing: 6946541.00 **Driller:** Geodrill Pty Ltd
RL: Approx. 19.00 **Logged By:** [Redacted]
Total Depth: 8.28 **Date:** 01/10/2007

Drilling Information				Material Description					Test Samples				
Drill Method	Water	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
Washbore	Water	12.0 11.0 8.28	Rock		SLT	SILTSTONE: Extremely weathered, very low strength, orange brown some grey mottling	XW		VLS		8.5 8	SPT	9,19,24 N=43 16,25/130mm N*=58
8.28m: BOREHOLE TERMINATED													
		10.0 9.0 8.0 7.0											

Comments:										Authorised by: Date:			
Water	Weathering	Consistency	Density	Rock Strength	Tests & Results								
▼ Water level on date shown ► Water inflow ◄ Water outflow	RS Residual soil XW Extremely weathered DW Distinctly weathered SW Slightly weathered FR Fresh	VS Very soft S Soft F Firm St Stiff VSst Very stiff H Hard Moisture D Dry M Moist W Wet	VL Very loose L Loose MD Medium dense D Dense VD Very dense	ELS Extremely low VLS Very low LS Low MS Medium HS High VHS Very high EHS Extremely high	U50 Undisturbed 50mm diam tube, D Disturbed sample. SPT Standard Penetration Test, N = number of blows to drive 60mm sampler 300mm with a 63.6kg hammer falling 762mm. PP Hand penetrometer estimate of unconfined compressive strength, kPa, S Vane shear value kPa DC Dynamic Cone test, 9.09kg hammer, fall 608mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section. From AS1289-1993 Methods of Testing Soils for Engineering Purposes								



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Engineering Log - Borehole

Borehole No.: BH2

Page: 1 of 2

Job Number: 207E/186

Client: Leda Developments Pty Ltd

Project: Geotechnical Investigation - Retaining Wall

Location: Riverlink-North Ipswich-Stage 2, Site 2

Easting: 476118.00
 Northing: 6946542.00
 RL: Approx. 19.00
 Total Depth: 8.60

Drilling Rig: Hydrapower Scout 500
 Driller: Geodrill Pty Ltd
 Logged By: [Redacted]
 Date: 01/10/2007

Drilling Information				Material Description				Test Samples						
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
100mm TC Bit with Auger		19.8	18.0	Fill	[Cross-hatched]	FIL	Sandy Gravelly CLAY (CI/CH): Stiff to very stiff, medium to high plasticity, brown, fine to coarse sized gravel, fine to medium grained sand, moist		M	St-VSt			1 } -SPT	4,6,7 N=12 PP=>250-300kPa
			17.0	Fill	[Cross-hatched]	FIL	Sandy Gravelly CLAY (CI/CH): As above but very stiff		M	VSt				
			16.0	Fill	[Cross-hatched]	FIL	Sandy Gravelly CLAY (CL): As above but low plasticity		M	VSt				
			15.0	Natural	[Diagonal lines]	CI	Sandy CLAY: Hard, medium plasticity, orange brown, fine grained sand, moist		M	H		2.5 } -SPT	5,7,6 N=13 PP=>600kPa	
			14.0	Natural	[Diagonal lines]	CI	Sandy CLAY: Hard, medium plasticity, orange brown, fine grained sand, moist		M	H		4 } -SPT	2,5,7 N=12 PP=>600kPa	
Washbore			13.0									5.5 } -SPT	9,10,9 N=19 PP=>600kPa	

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
Water inflow	XW Extremely weathered	S Soft	L Loose	LS Low	D Disturbed sample.
Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	VLS Very low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	VS Very stiff	VD Very dense	HS High	S Vane shear value kPa
		H Hard		VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		Moisture		EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes
		D Dry	M Moist	W Wet	



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Engineering Log - Borehole

Borehole No.: BH2

Page: 2 of 2

Job Number: 207E/186

Client: Leda Developments Pty Ltd

Project: Geotechnical Investigation - Retaining Wall

Location: Riverlink-North Ipswich-Stage 2, Site 2

Eastings: 476118.00 Drilling Rig: Hydrapower Scout 500
 Northings: 6946542.00 Driller: Geodrill Pty Ltd
 RL: Approx. 19.00 Logged By: [Redacted]
 Total Depth: 8.60 Date: 01/10/2007

Drilling Information				Material Description				Test Samples						
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
Washbore		13.0	6.8	Natural	[Hatched]	CI	Sandy CLAY: Hard, medium plasticity, orange brown, fine grained sand, molel		M	H				
		12.0	7.0		[Hatched]	CI	Sandy CLAY: As above but light grey with minor orange brown mottling		M	H		7	PP	10,13,17 N=30
		11.0	7.8	Rock	[Dotted]	SLT	SILTSTONE: Extremely weathered, very low strength, orange brown, some grey mottling	XW		VLS				
			8.6				8.60m: BOREHOLE TERMINATED					8.5	SPT	25/100 N=75
			10.0											
			9.0											
			8.0											
			7.0											

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
▼ Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U60 Undisturbed 50mm diam tube.
▶ Water Inflow	XW Extremely weathered	S Soft	L Loose	VLS Very low	D Disturbed sample.
▶ Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	LS Low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	VSt Very stiff	VD Very dense	HS High	S Vane shear value kPa
		H Hard		VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		Moisture		EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes
		D Dry M Moist W Wet			



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Engineering Log - Borehole

Borehole No.: BH3

Page: 1 of 2

Easting: 476126.00
 Northing: 6946581.00
 RL: Approx. 20.50
 Total Depth: 8.51

Drilling Rig: Hydrapower Scout 500
 Driller: Geodrill Pty Ltd
 Logged By: [Redacted]
 Date: 02/10/2007

Job Number: 207E/186

Client: Leda Developments Pty Ltd

Project: Geotechnical Investigation - Retaining Wall

Location: Riverlink-North Ipswich-Stage 2, Site 2

Drilling Information				Material Description					Test Samples						
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result	
100mm TC Bit with Auger	Water	20.50	0.1	FIL	[Cross-hatched]	FIL	Silty Sandy Gravel (GM): Loose to medium dense, fine to coarse sized gravel, orange brown, fine to coarse grained sand, moist		M	L-MD					
			1.0	FIL	[Cross-hatched]	FIL	Silty Gravelly SAND (SM) (Coke-ash): Loose, fine to coarse sized gravel, dark grey black, fine to coarse grained sand, moist		M	L					
			1.2	FIL	[Cross-hatched]	FIL	Silty Gravelly SAND (SM) (Coke-ash): As above but cobbles to 80mm		M	L					
			1.8	FIL	[Cross-hatched]	FIL	Silty Gravelly SAND (SM) (Coke-ash): As above but no cobbles		M	L					
			2.0												
			2.4	FIL	[Cross-hatched]	FIL	Sandy Gravelly CLAY (CICH): Very stiff, medium to high plasticity, orange brown mottled brown and dark grey, fine to medium sized gravel, fine to medium grained sand, moist		M	VSI					
			3.0												
			3.6												
			4.0												
			4.6												
Washbore	Water	15.0	5.0	Natural	[Cross-hatched]	SM	Silty Gravelly SAND: Medium dense, fine to coarse grained sand, dark orange brown, fine sized gravel, moist		M	MD					
			5.3	CI/CH	[Cross-hatched]	CI/CH	Sandy CLAY: Hard, medium to high plasticity, orange brown with some grey mottling, fine grained sand, moist		M	H					
			5.7	Rock	[Cross-hatched]	SLT	SILTSTONE: Extremely weathered, very low strength, orange brown, some gray mottling	XW		VLS					
			6.0												

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
Water inflow	XW Extremely weathered	S Soft	L Loose	LS Low	D Disturbed sample.
Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	VLS Very low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.8kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	H Hard	VD Very dense	HS High	S Vane shear value kPa
		Molsture		VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		D Dry M Moist W Wet		EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes



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Engineering Log - Borehole

Borehole No.: BH3

Page: 2 of 2

Job Number: 207E/186

Client: Leda Developments Pty Ltd

Project: Geotechnical Investigation - Retaining Wall

Location: Riverlink-North Ipswich-Stage 2, Site 2

Easting: 476126.00
 Northing: 6946581.00
 RL: Approx. 20.50
 Total Depth: 8.51

Drilling Rig: Hydrapower Scout 500
 Driller: Geodrill Pty Ltd
 Logged By: [Redacted]
 Date: 02/10/2007

Drilling Information				Material Description				Test Samples						
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
Washbore			14.0	Rock		SLT	SILTSTONE: Extremely weathered, very low strength, orange brown, some grey mottling	XW		VLS				
			7.0			SLT	SILTSTONE: As above but medium strength and extremely to distinctly weathered.	XW-DW		MS		7 -	SPT	30/30mm N ^o =300 No Recovery
			13.0											
			8.0											
			12.0	8.51			8.51m: BOREHOLE TERMINATED					8.5	SPT	25/10mm N ^o =750 No Recovery
			9.0											
			11.0											
			10.0											
			10.0											
			11.0											
			9.0											
			12.0											

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
▼ Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
▶ Water inflow	XW Extremely weathered	S Soft	L Loose	VLS Very low	D Disturbed sample.
◀ Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	LS Low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	VSt Very stiff	VD Very dense	HS High	S Vane shear value kPa
		H Hard		VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		Moisture		EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes
		D Dry	M Moist	W Wet	



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Engineering Log - Borehole

Borehole No.: BH4

Page: 1 of 2

Easting: 476118.00
 Northing: 6946580.00
 RL: Approx. 20.00
 Total Depth: 8.52

Drilling Rig: Hydrapower Scout 500
 Driller: Geodrill Pty Ltd
 Logged By: [Redacted]
 Date: 02/10/2007

Job Number: 207E/186

Client: Leda Developments Pty Ltd

Project: Geotechnical Investigation - Retaining Wall

Location: Riverlink-North Ipswich-Stage 2, Site 2

Drilling Information				Material Description					Test Samples								
Drill Method	Water	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result				
100mm TC Bit with Auger	Water	19.0	FIL	[Cross-hatched pattern]	FIL	Silty Gravelly SAND (SM) (Coke-ash): Loose, fine to medium grained sand some coarse grained sand, dark grey black, fine to medium sized gravel, with some coarse gravel, moist	M	L			0.1	BS					
		18.0				2.0					1			SPT - 2.2,1 N=3			
		17.0				2.3					FIL	Sandy CLAY (CI/CH): Very stiff, medium to high plasticity, orange brown mottled brown and dark grey, fine grained sand, some medium grained sand, some fine to medium sized gravel, moist	M	VSt	2.5	SPT	1.4,5 N=9 PP=500->600kPa
		16.0				2.7					FIL	Sandy CLAY (CI/CH): As above but hard	M	H			
15.0	3.8	FIL	Sandy Gravelly CLAY (CI/CH): Very stiff, medium to high plasticity, orange brown mottled dark grey, brown and light grey, fine to medium sized gravel, fine to medium grained sand, moist	M	VSt	4	SPT - 3,7,7 N=14										
14.0	5.0									5.5	SPT - 5,3,6 N=9						

Comments: _____
 Authorised by: _____
 Date: _____

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube
Water inflow	XW Extremely weathered	S Soft	L Loose	VLS Very low	D Disturbed sample
Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	LS Low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa
	FR Fresh	H Hard	VD Very dense	HS High	S Vane shear value kPa
		Moisture		VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		D Dry	M Moist	EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes
			W Wet		



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Engineering Log - Borehole

Borehole No.: BH4

Page: 2 of 2

Job Number: 207E/186

Client: Leda Developments Pty Ltd

Project: Geotechnical Investigation - Retaining Wall

Location: Riverlink-North Ipswich-Stage 2, Site 2

Easting: 476118.00 **Drilling Rig:** Hydrapower Scout 500
Northing: 6946580.00 **Driller:** Geodrill Pty Ltd
RL: Approx. 20.00 **Logged By:** [Redacted]
Total Depth: 8.52 **Date:** 02/10/2007

Drilling Information			Material Description					Test Samples							
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result	
Washbore		14.5	6.5	Natural	[Cross-hatched]	FIL	Sandy Gravelly CLAY (Cl/Ch): Very stiff, medium to high plasticity, orange brown mottled dark grey, brown and light grey, fine to medium sized gravel, fine to medium grained sand, moist		M	VSt					
			7.0			Cl	Sandy CLAY: Hard, medium plasticity, orange brown, fine to medium grained sand, moist		M	H					
			7.2	Rock	[Dotted]	SST	SANDSTONE: Extremely weathered, very low strength, orange brown, fine to medium grained sand	XW		VLS			SPT	9,20,25/85mm N ⁺ =88	
			8.0			SST	SANDSTONE: As above but medium strength and extremely to distinctly weathered.	-XW DW		MS					
			8.52				8.52m: BOREHOLE TERMINATED							SPT	25/20mm N ⁺ =375
			9.0												
			10.0												
			11.0												
			12.0												

Comments:										Authorised by: Date:				
Water	Weathering	Consistency	Density	Rock Strength	Tests & Results									
▽ Water level on date shown ► Water inflow ◄ Water outflow	RS Residual soil XW Extremely weathered DW Distinctly weathered SW Slightly weathered FR Fresh	VS Very soft S Soft F Firm St Stiff VSt Very stiff H Hard	VL Very loose L Loose MD Medium dense D Dense VD Very dense	ELS Extremely low VLS Very low LS Low MS Medium HS High VHS Very high EHS Extremely high	U50 Undisturbed 50mm diam tube. D Disturbed sample. SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm. PP Hand penetrometer estimate of unconfined compressive strength, kPa. S Vane shear value kPa DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section. From AS1289-1993 Methods of Testing Soils for Engineering Purposes									



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Engineering Log - Borehole

Borehole No.: BH5

Page: 1 of 2

Eastings: 476125.00
 Northings: 6946607.00
 RL: Approx. 20.00
 Total Depth: 7.23

Drilling Rig: Hydrapower Scout 500
 Driller: Geodrill Pty Ltd
 Logged By: [Redacted]
 Date: 02/10/2007

Job Number: 207E/186

Client: Leda Developments Pty Ltd

Project: Geotechnical Investigation - Retaining Wall

Location: Riverlink-North Ipswich-Stage 2, Site 2

Drilling Information			Material Description					Test Samples									
Drill Method	Water	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result				
Washbore	Water	19.0	Fill		FIL	Silty Gravelly SAND (SM) (Coke-ash): Loose, fine to coarse grained sand, dark grey black, fine to medium sized gravel, with some coarse gravel molet		M	L		1.0	SPT - 2,3,3 N=6					
		1.35				Sandy CLAY (Cl/Ch): Hard, medium to high plasticity, orange brown mottled dark grey, brown and light grey, fine to medium grained sand, some fine to medium sized gravel, molet		M	H	1.5	PP - 600->600kPa						
		18.0				2.0											
		17.0				3.0											
		3.2				Sandy CLAY (Cl/Ch): As above but with some inter-bedded Coke-ash		M	H								
		16.0				4.0											
4.6	Silty Gravelly SAND(SM) (Possible Natural): Loose to medium dense, fine to coarse grained sand, grey brown, fine to medium sized gravel, molet		M	L-MD													
15.0	5.0	Natural	CL/CI	Sandy CLAY: Hard, low to medium plasticity, orange brown, fine to medium grained sand, molet		M	H										
4.9	5.0	Rock	SST	SANDSTONE: Extremely weathered, very low strength, orange brown, fine to medium grained sand	XW		VLS										
14.0	6.0																

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
Water inflow	XW Extremely weathered	S Soft	L Loose	VLS Very low	D Disturbed sample.
Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	LS Low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	VSt Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	H Hard	VD Very dense	HS High	S Vane shear value kPa
		Moisture		VHS Very high	DC Dynamic Cone test, 8.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		D Dry M Moist W Wet		EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes



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Engineering Log - Borehole

Borehole No.: BH5

Page: 2 of 2

Easting: 476125.00
 Northing: 6946607.00
 RL: Approx. 20.00
 Total Depth: 7.23

Drilling Rig: Hydropower Scout 500
 Driller: Geodrill Pty Ltd
 Logged By: [Redacted]
 Date: 02/10/2007

Job Number: 207E/186

Client: Leda Developments Pty Ltd

Project: Geotechnical Investigation - Retaining Wall

Location: Riverlink-North Ipswich-Stage 2, Site 2

Drilling Information				Material Description					Test Samples				
Drill Method	Water	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
Washbore	Water	13.0 7.0 7.225	Rock	[Dotted Pattern]	SST	SANDSTONE: Extremely weathered, very low strength, orange brown, fine to medium grained sand	XW		VLS		7	SPT	9,25/75mm N*=100
7.23m: BOREHOLE TERMINATED													
		12.0 8.0											
		11.0 9.0											
		10.0 10.0											
		9.0 11.0											
		8.0 12.0											

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
▼ Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
▶ Water inflow	XW Extremely weathered	S Soft	L Loose	LS Low	D Disturbed sample.
◀ Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	VLS Very low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	H Hard	VD Very dense	HS High	S Vane shear value kPa
		Moisture		VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		D Dry	M Moist	EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes
			W Wet		



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Engineering Log - Borehole

Borehole No.: BH6

Page: 1 of 2

Easting: 476117.00
 Northing: 6946607.00
 RL: Approx. 20.00
 Total Depth: 10.10

Drilling Rig: Hydrapower Scout 500
 Driller: Geodfill Pty Ltd
 Logged By: [Redacted]
 Date: 02/10/2007

Job Number: 207E/186
 Client: Leda Developments Pty Ltd
 Project: Geotechnical Investigation - Retaining Wall
 Location: Riverlink-North Ipswich-Stage 2, Site 2

Drilling Information				Material Description				Test Samples					
Drill Method	Water	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
100mm TC Bit with Auger		19.0	FIL	[Cross-hatched]	FIL	Sandy Gravely CLAY (CL/CI): Stiff, low to medium plasticity, orange brown mottled grey, brown and dark grey, fine to coarse sized gravel, fine to medium grained sand, some inter-bedded Coke-ash, moist		M	St		1.0	SPT - 1,0,1 N=1	
		18.0	FIL	[Cross-hatched]	FIL	Clayey SAND (SC)/ Silty SAND (SM): Very loose, fine to medium grained sand, brown, low plasticity clay, moist. Some timber and glass		M	VL		1.9		
		17.0	FIL	[Cross-hatched]	FIL	Silty SAND (SM): Loose, fine to medium grained sand, orange brown some fine to medium sized gravel, moist		M	L		2.5	SPT - 6,2,2 N=4	
		16.0	FIL	[Cross-hatched]	FIL	Silty Gravely SAND (SM): Loose, grey brown, fine to medium grained sand, some coarse grained sand, fine to coarse sized gravel, moist. Some nails present. Some possible steel fragments at 3.5m		M	L		3.9		
Washbore		15.0	FIL	[Cross-hatched]	FIL	Clayey Gravely SAND (SC): Loose, fine to medium grained sand, some coarse grained sand, orange brown mottled grey and brown, fine to coarse sized gravel, medium plasticity clay moist. Some inter-bedded Coke-ash		M	L		4.4	SPT - 4,4,4 N=8	
		14.0									5.5	SPT - 6,4,2 N=6	

Comments: _____

Authorised by: _____

Date: _____

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
Water inflow	XW Extremely weathered	S Soft	L Loose	VLS Very low	D Disturbed sample.
Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	LS Low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	VSt Very stiff	VD Very dense	HS High	S Vane shear value kPa
		H Hard		VHS Very high	DC Dynamic Cone test, 8.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
				EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes



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Engineering Log - Borehole

Borehole No.: BH7

Page: 1 of 2

Eastings: 476125.00
 Northings: 6946637.00
 RL: Approx. 19.50
 Total Depth: 8.55

Drilling Rig: Hydrapower Scout 500
 Driller: Geodrill Pty Ltd
 Logged By: [Redacted]
 Date: 02/10/2007

Job Number: 207E/186

Client: Leda Developments Pty Ltd

Project: Geotechnical Investigation - Retaining Wall

Location: Riverlink-North Ipswich-Stage 2, Site 2

Drilling Information				Material Description					Test Samples						
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result	
100mm TC Bit with Auger			19.0	FIL	[Cross-hatch pattern]	FIL	Silty Gravelly SAND (SM) (Coke-ash): Loose, fine to medium grained sand, some coarse grained sand, dark grey, moist		M	L					
			18.0	FIL	[Cross-hatch pattern]	FIL	Sandy Gravelly CLAY (C/CH)/Clayey Sandy GRAVEL (GC): Hard, medium to high plasticity, orange brown mottled grey, black and brown, fine to medium sized gravel, fine to medium grained sand, moist		M	H		1.5 -	SPT - 3,5,3 N=8 PP - >600kPa		
			17.0	FIL	[Cross-hatch pattern]	FIL	Silty Sandy GRAVEL (GM) (Slag): Loose, fine to coarse sized gravel, dark grey black, fine to coarse grained sand, moist		M	L					
			16.0	FIL	[Cross-hatch pattern]	FIL	Sandy CLAY (C/CH): Hard, medium to high plasticity, orange brown, fine to medium grained sand, some fine to medium sized gravel, trace of Coke-ash, moist		M	H					
			15.0	FIL	[Cross-hatch pattern]	FIL	Sandy CLAY (C/CH): As above but some inter-bedded Coke-ash and pieces of Steel		M	H				2.5 -	SPT - 4,6,8 N=14 PP=>600kPa
Washbore			14.0	Natura	[Diagonal pattern]	GM	Sandy GRAVEL (GM) (Possible Fill): Dense, fine to medium sized gravel, some coarse gravel, orange brown and grey, fine to coarse grained sand, moist		M	D		4 -	SPT - 30/40mm N*=225 No Recovery		
			6.0										5.5 -	SPT - 30/50mm N*=180 No Recovery	

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
Water inflow	XW Extremely weathered	S Soft	L Loose	VLS Very low	D Disturbed sample.
Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	LS Low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	VST Very stiff	VD Very dense	HS High	S Vane shear value kPa
		H Hard		VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
				EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes



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Engineering Log - Borehole

Borehole No.: BH7

Page: 2 of 2

Easting: 476125.00
Northing: 6946637.00
RL: Approx 19.50
Total Depth: 8.55

Drilling Rig: Hydropower Scout 500
Driller: Geodrill Pty Ltd
Logged By: [Redacted]
Date: 02/10/2007

Job Number: 207E/186

Client: Leda Developments Pty Ltd

Project: Geotechnical Investigation - Retaining Wall

Location: Riverlink-North Ipswich-Stage 2, Site 2

Drilling Information				Material Description					Test Samples					
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
Washbore			13.0	Rock	[Dotted Pattern]	SST	SANDSTONE: Extremely weathered, very low strength, orange brown	XW		VLS		7 -	SPT	30/35mm N ^s =267
			7.0											
			12.0											
			8.0											
			11.0											
			8.55											
			9.0				8.55m: BOREHOLE TERMINATED							
			10.0											
			10.0											
			9.0											
			11.0											
			8.0											
			12.0											

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
▼ Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
▶ Water inflow	XW Extremely weathered	S Soft	L Loose	VLS Very low	D Disturbed sample.
▶ Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	LS Low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	VSt Very stiff	VD Very dense	HS High	S Vane shear value kPa
		H Hard		VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		Moisture		EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes
		D Dry	M Moist	W Wet	



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Engineering Log - Borehole

Borehole No.: BH8

Page: 1 of 2

Easting: 478118.00 Drilling Rig: Hydrapower Scout 500
 Northing: 6946651.00 Driller: Geodrill Pty Ltd
 RL: Approx. 19.50 Logged By: [Redacted]
 Total Depth: 10.02 Date: 03/10/2007

Job Number: 207E/186
 Client: Leda Developments Pty Ltd
 Project: Geotechnical Investigation - Retaining Wall
 Location: Riverlink-North Ipswich-Stage 2, Site 2

Drilling Information				Material Description					Test Samples													
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result								
100mm TC Bit with Auger	Water level on date shown	19.0	1.0	FIL	[Cross-hatched pattern]	FIL	Silty Gravelly SAND (SM) (Coke-ash): Very Loose to loose, dark grey speckled white, fine to medium sized gravel, fine to medium grained sand, moist to dry	M-D	VL-L			1	SPT	3,3,2 N=6								
							18.0								2.0	2.2	Silty Gravelly SAND (SM) (Coke-ash): As above but very loose, pink brown	M-D	VL	2.5	SPT	0,1,1 N=2
							17.0								3.0	4.3	Sandy CLAY (CH): Hard, orange brown, high plasticity, fine to medium grained sand, moist, with fine sized gravel and some Steel pieces and Slag	M	H	4	SPT	1,4,6 N=10 PP=>600kPa
							16.0								4.0	5.0	Sandy Gravelly CLAY (CI): Hard, orange brown, medium plasticity, fine sized gravel, fine to medium grained sand, moist, with some Steel materials and Slag	M	H	5.5	SPT	8,8,9 N=17 PP=>600kPa
							15.0								5.0	5						
Washbore	Water level on date shown	14.0	6.0	FIL	[Cross-hatched pattern]	FIL																

Comments: _____
 Authorised by:
 Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
Water inflow	XW Extremely weathered	S Soft	L Loose	VLS Very low	D Disturbed sample.
Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	LS Low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	VSt Very stiff	VD Very dense	HS High	S Vane shear value kPa
		H Hard		VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		Molsture		EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes
		D Dry M Moist W Wet			



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Engineering Log - Borehole

Borehole No.: **BH8**

Page: 2 of 2

Job Number: 207E/186

Client: Leda Developments Pty Ltd

Project: Geotechnical Investigation - Retaining Wall

Location: Riverlink-North Ipswich-Stage 2, Site 2

Easting: 476118.00 Drilling Rig: Hydrapower Scout 500
 Northing: 6946651.00 Driller: Geodrill Pty Ltd
 RL: Approx. 19.60 Logged By: [Redacted]
 Total Depth: 10.02 Date: 03/10/2007

Drilling Information				Material Description				Test Samples						
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
Washbore			6.3	Natural	[Cross-hatch pattern]	FIL	Sandy Gravelly CLAY (G): Hard, orange brown, medium plasticity, fine sized gravel, fine to medium grained sand, moist, with some steel materials and slag		M	H				
			6.8	Rock	[Diagonal lines]	GC	Clayey Sandy GRAVEL: Dense, fine sized gravel, fine to medium grained sand, high plasticity fines, moist, Slow drilling		M	D				
			7.0			SST	SANDSTONE: Extremely weathered, very low to low strength, orange brown	XW		VLS-LS		7 -	SPT	25/60mm N*=150
			8.0			SST	SANDSTONE: As above but medium strength and extremely to distinctly weathered	XW-DW		MS		8.5 -	SPT	20/20mm N*=300 No Recovery
		10.0	10.02			10.02m: BOREHOLE TERMINATED					10 -	SPT	25/20mm N*=375	

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube,
Water inflow	XW Extremely weathered	F Firm	MD Medium dense	VLS Very low	D Disturbed sample,
Water outflow	DW Distinctly weathered	St Stiff	D Dense	LS Low	SPT Standard Penetration Test, N = number of blows to drive 60mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	VSt Very stiff	VD Very dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	H Hard		HS High	S Vane shear value kPa
		Moisture		VHS Very high	DC Dynamic Cone test, 8.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		D Dry	M Moist	EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes



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Engineering Log - Borehole

Borehole No.: BH9

Page: 1 of 3

Easting: 476121.00
 Northing: 6946701.00
 RL: Approx. 19.50
 Total Depth: 16.06

Drilling Rig: Hydrpower Scout 500
 Driller: Geodrill Pty Ltd
 Logged By: [Redacted]
 Date: 04/10/2007

Job Number: 207E/186

Client: Leda Developments Pty Ltd

Project: Geotechnical Investigation - Retaining Wall

Location: Riverlink-North Ipswich-Stage 2, Site 2

Drilling Information				Material Description					Test Samples					
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
100mm TC Bit with Auger			19.0	Fill	[Cross-hatched]	FIL	Silty Gravelly SAND (SM) (Coke-ash): Loose, fine to coarse grained sand, dark grey black, fine to medium sized gravel, moist		M	L				
			0.65	Natural	[Diagonal lines]	FIL	Sandy CLAY (CI/CH) Stiff to very stiff, medium to high plasticity, orange brown mottled grey and brown, fine grained sand, moist		M	SI-VSI				
			0.8			FIL	Silty Sandy GRAVEL (GM): Loose, fine to medium sized gravel, orange brown, fine to coarse grained sand, moist, Some metal and nails		M	L				
			1.0			FIL	Silty Sandy GRAVEL (GM): As above but grey (Coke-ash) and some metal fragments		M	L				
			18.0		2.0	FIL	Silty Sandy GRAVEL (GM) As above but loose to medium dense, light grey brown with some inter-bedded Coke-ash and steel		M	L-MD				
			17.0		2.3									
3.0		2.9	CI/CH	Sandy CLAY: Very stiff to hard, medium to high plasticity, dark grey, fine grained sand, moist		M	VSI-H							
16.0		3.4	CI/CH	Sandy CLAY: As above but hard, orange brown		M	H							
4.0		4.0												
15.0		5.0												
14.0		5.5												
6.0		6.0												

Comments: _____

Authorised by: _____

Date: _____

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
Water inflow	XW Extremely weathered	S Soft	L Loose	D Disturbed sample.	D Disturbed sample.
Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	VLS Very low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	LS Low	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	VSt Very stiff	VD Very dense	MS Medium	S Vane shear value kPa
		H Hard		HS High	DC Dynamic Cone test, 8.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		Moisture		VHS Very high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes
		D Dry M Moist W Wet		EHS Extremely high	



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Engineering Log - Borehole

Borehole No.: BH9

Page: 2 of 3

Easting: 476121.00
 Northing: 6946701.00
 RL: Approx. 19.50
 Total Depth: 16.06

Drilling Rig: Hydrapower Scout 500
 Driller: Geodrill Pty Ltd
 Logged By: [Redacted]
 Date: 04/10/2007

Job Number: 207E/186

Client: Leda Developments Pty Ltd

Project: Geotechnical Investigation - Retaining Wall

Location: Riverlink-North Ipswich-Stage 2, Site 2

Drilling Information				Material Description					Test Samples					
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
			13.0			CI/CH	Sandy CLAY: As above but hard, orange brown		M	H				
			7.0											
			12.0									7	SPT	8,11,10 N=21 PP=>600kPa
			8.0											
			11.0											
			9.0									8.5	SPT	7,8,9 N=17 PP=>600kPa
			10.0											
			10.0											
			9.0									10	SPT	6,6,8 N=14 PP=>600kPa
			11.0			CI/CH	Sandy CLAY: As above but stiff to very stiff		M	St-VSI				
			8.0											
			11.8			CI/CH	Sandy CLAY: As above but very stiff		M	VSL				
			12.0									11.5	SPT	3,4,7 N=11 PP=200-400kPa

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube,
Water inflow	XW Extremely weathered	S Soft	L Loose	LS Low	D Disturbed sample.
Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	VLS Very low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	H Hard	VD Very dense	HS High	S Vane shear value kPa
		Moisture		VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		D Dry M Moist W Wet		EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes



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Engineering Log - Borehole

Borehole No.: BH9

Page: 3 of 3

Eastling: 476121.00
 Northing: 6946701.00
 RL: Approx. 19.50
 Total Depth: 16.06

Drilling Rig: Hydrapower Scout 500
 Driller: Geodrill Pty Ltd
 Logged By: [Redacted]
 Date: 04/10/2007

Job Number: 207E/186

Client: Leda Developments Pty Ltd

Project: Geotechnical Investigation - Retaining Wall

Location: Riverlink-North Ipswich-Stage 2, Site 2

Drilling Information				Material Description					Test Samples					
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
			7.0			CU/CH	Sandy CLAY: As above but very stiff		M	VSI				
			13.0									13	SPT	6,6,7 N=13 PP=250-310kPa
			6.0											
			14.0			CI	Sandy CLAY: As above but medium plasticity, orange brown mottled grey and some fine to medium sized gravel		M	VSI				
			5.0									14.5	SPT	8,9,14 N=23 PP= 300kPa
			15.0											
			4.0											
			15.6	Rock		SST	SANDSTONE: Extremely weathered, very low strength, orange brown mottled light grey	XW		VLS				
			16.0											
			16.06				16.06m: BOREHOLE TERMINATED					16	SPT	25/60mm N'=125 No Recovery
			3.0											
			17.0											
			2.0											
			18.0											

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soft	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
Water inflow	XW Extremely weathered	F Firm	L Loose	VLS Very low	D Disturbed sample.
Water outflow	DW Distinctly weathered	St Stiff	MD Medium dense	LS Low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	VSt Very stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	H Hard	VD Very dense	HS High	S Vane shear value kPa
				VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 608mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
				EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes



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Engineering Log - Borehole

Borehole No.: BH10

Page: 1 of 3

Easting: 476111.00 Drilling Rig: Hydrapower Scout 500
 Northing: 6948700.00 Driller: Geodrill Pty Ltd
 RL: Approx. 19.50 Logged By: [Redacted]
 Total Depth: 17.51 Date: 03/10/2007

Job Number: 207E/186

Client: Leda Developments Pty Ltd

Project: Geotechnical Investigation - Retaining Wall

Location: Riverlink-North Ipswich-Stage 2, Site 2

Drilling Information				Material Description				Test Samples							
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result	
100mm TC Bit with Auger	Water	19.50	0.25	Fill	[Cross-hatched]	FIL	Silty Gravelly SAND (SM): Very loose to loose, grey brown, fine to medium grained sand, fine to medium sized gravel, moist to dry	M-D	VL-L						
			0.5	Fill	[Cross-hatched]	FIL	Silty Sandy GRAVEL (GM): Very loose to loose, grey orange brown, fine to medium sized gravel, fine to medium grained sand, dry. Slag material observed	D	VL-L						
			0.75	Fill	[Cross-hatched]	FIL	Silty Sandy GRAVEL (GM): As above but grey (Cement material)	D	VL-L						
			1.0	Fill	[Cross-hatched]	FIL	Silty Sandy GRAVEL (GM): Very loose to loose, brown, fine to medium sized gravel, fine to medium grained sand, dry. Slag material observed	D	VL-L						
			2.0	Fill	[Cross-hatched]	FIL	Silty Gravelly SAND (SM): Very loose to loose, grey brown, fine to medium grained sand, some coarse sized gravel, dry	D	VL-L						
			2.2	Alluvial	[Vertical lines]	CH	Silty CLAY: Hard, high plasticity, grey with minor orange brown mottling, trace of fine to medium grained sand, moist	M	H					2.5	SPT
Washbore	Water	17.0	3.0	Alluvial	[Vertical lines]	CH	Silty CLAY: Hard, high plasticity, grey with minor orange brown mottling, trace of fine to medium grained sand, moist	M	H						
			4.0	Alluvial	[Vertical lines]	CH	Silty CLAY: Hard, high plasticity, grey with minor orange brown mottling, trace of fine to medium grained sand, moist	M	H						
			5.0	Alluvial	[Vertical lines]	CH	Silty CLAY: Hard, high plasticity, grey with minor orange brown mottling, trace of fine to medium grained sand, moist	M	H						
Washbore	Water	14.0	5.3	Alluvial	[Vertical lines]	CH	Sandy CLAY: Hard, high plasticity, orange brown, fine grained sand, moist	M	H						
			6.0	Alluvial	[Vertical lines]	CH	Sandy CLAY: Hard, high plasticity, orange brown, fine grained sand, moist	M	H						

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
Water inflow	XW Extremely weathered	S Soft	L Loose	VLS Very low	D Disturbed sample.
Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	LS Low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	H Hard	VD Very dense	HS High	S Vane shear value kPa
		Moisture		VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		D Dry M Moist W Wet		EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes



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Engineering Log - Borehole

Borehole No.: BH10

Page: 2 of 3

Easting: 476111.00
 Northing: 6946700.00
 RL: Approx 19.50
 Total Depth: 17.51

Drilling Rig: Hydrapower Scout 500
 Driller: Geodrill Pty Ltd
 Logged By: [Redacted]
 Date: 03/10/2007

Job Number: 207E/186
 Client: Leda Developments Pty Ltd
 Project: Geotechnical Investigation - Retaining Wall
 Location: Riverlink-North Ipswich-Stage 2, Site 2

Drilling Information			Material Description					Test Samples						
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
						CH	Sandy CLAY: Hard, high plasticity, orange brown, fine grained sand, moist		M	H				
			13.0											
			7.0											
			12.0											
			8.0											
			11.0											
			9.0											
			10.0											
			10.0											
			8.0											
			11.0											
			8.0											
			12.0											

Comments: _____

Authorised by: _____

Date: _____

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
▼ Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube,
▶ Water inflow	XW Extremely weathered	S Soft	L Loose	LS Low	D Disturbed sample.
◀ Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	VLS Very low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	H Hard	VD Very dense	HS High	S Vane shear value kPa
				VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
				EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes



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Engineering Log - Borehole

Borehole No.: BH10

Page: 3 of 3

Eastng: 476111.00
Northng: 6946700.00
RL: Approx. 19.50
Total Depth: 17.51

Drilling Rig: Hydrapower Scout 500
Driller: Geodrill Pty Ltd
Logged By: [Redacted]
Date: 03/10/2007

Job Number: 207E/186

Client: Leda Developments Pty Ltd

Project: Geotechnical Investigation - Retaining Wall

Location: Riverlink-North Ipswich-Stage 2, Site 2

Drilling Information				Material Description					Test Samples					
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
			7.0			CH	Sandy CLAY: Hard, high plasticity, orange brown, fine grained sand, moist		M	H				
			13.0									13	SPT	5,5,6 N=11
			6.0											
			14.0											
			14.3			SC	Clayey SAND: Loose to medium dense, orange brown, fine to medium grained sand, medium plasticity fines, moist		M	L-MD		14.5	SPT	5,4,5 N=9
			5.0											
			15.0											
			4.0											
			15.8	Rock		SST	SANDSTONE: Extremely weathered, very low to low strength, orange brown mottled grey, medium to coarse grained sand	XW		VLS-LS		16	SPT	25/90mm N*=83
			16.0											
			3.0											
			17.0											
			2.0				SANDSTONE: As above but medium strength and extremely to distinctly weathered.			MS				20/10mm N*=600
			17.4											
			17.51				17.51m: BOREHOLE TERMINATED					17.5	SPT	No Recovery
			18.0											

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
Water inflow	XW Extremely weathered	S Soft	L Loose	VLS Very low	D Disturbed sample.
Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	LS Low	SPT Standard Penetration Test, N = number of blows to drive 60mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	VSt Very stiff	VD Very dense	HS High	S Vane shear value kPa
		H Hard		VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		Moisture		EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes
		D Dry M Moist W Wet			



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Engineering Log Borehole

Borehole No.: BH11

Page: 1 of 1

Easting: 476108.00 Drilling Rig: Jacro 200
 Northing: 6946546.00 Driller: Battison & Sons P/L
 RL: Approx. 13.00 Logged By: [Redacted]
 Total Depth: 4.50 Date: 03/10/2007

Job Number: 207E/186
 Client: Leda Developments Pty Ltd
 Project: Geotechnical Investigation - Retaining Wall
 Location: Riverlink-North Ipswich-Stage 2, Site 2

Drilling Information			Material Description					Test Samples					
Drill Method	Water	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
100mm TC Bit with Auger	Water	12.0	Fill	[Cross-hatched]	FIL	Silty Gravelly SAND (SM): Medium dense, fine to medium grained sand, grey brown, fine to medium sized gravel, moist, some clay fines		M	MD	6			
		1.0								7			
		0.9								5			
										4			
										5			
										4			
										7			
										11			
										9			
										9			
		1.4			FIL	Sandy CLAY (CI): Hard, medium plasticity, brown, fine to medium grained sand, moist		M	H	9			
		1.6			FIL	Cobbles: No Recovery				10			
		2.0	Natural	[Vertical lines]	CH	Sandy CLAY: Hard, high plasticity, orange brown streaked grey, trace of fine ironstone, moist		M	H	11			
		2.4								Auger			
		3.0								Auger			
		3.1								Auger			
		4.0	Rock	[Horizontal dashes]	SLT	SILTSTONE: Extremely weathered, very low strength, light grey, some extremely low strength layering	XW		VLS	Auger			
		4.5								5			
										12			
										20			
		5.0				4.50m: BOREHOLE TERMINATED							
		6.0											

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U60 Undisturbed 50mm diam tube.
Water inflow	XW Extremely weathered	S Soft	L Loose	VLS Very low	D Disturbed sample.
Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	LS Low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	H Hard	VD Very dense	HS High	S Vane shear value kPa
				VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
				EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes



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Engineering Log - Borehole

Borehole No.: BH12

Page: 1 of 1

Easting: 476101.00
Northing: 6946580.00
RL: Approx. 9.00
Total Depth: 3.25

Drilling Rig: Jacro 200
Driller: Battison & Sons P/L
Logged By: [Redacted]
Date: 03/10/2007

Job Number: 207E/186

Client: Leda Developments Pty Ltd

Project: Geotechnical Investigation - Retaining Wall

Location: Riverlink-North Ipswich-Stage 2, Site 2

Drilling Information				Material Description					Test Samples								
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result			
100mm TC Bit with Auger		9.0	0.3	Fill	[Cross-hatch pattern]	FIL	Silty Gravelly SAND (SM): Medium dense, fine to medium grained sand, grey, fine to coarse sized gravel, molet (Coke-ash)		M	MD	4						
			0.5			FIL				M	L	2					
			0.85			FIL			Silty Gravelly SAND (SM): As above but loose		M	H	2				
			1.0	Natural	[Diagonal lines pattern]	CI/CH			Sandy CLAY (CI/CH): Hard, medium to high plasticity, orange brown mottled light grey, fine grained sand, molet				4				
			1.5						Sandy CLAY: Hard, medium to high plasticity, orange brown with some grey mottling, fine grained sand, molet		M	H	4				
			2.0										4				
			2.3										4				
			2.5										4				
			2.7										4				
			2.9										4				
			3.1										4				
			3.25										4				
							Rock	[Dotted pattern]	SST	SANDSTONE: Extremely weathered, very low strength, orange brown	XW		VLS	11/50m			
										SANDSTONE: As above but low strength	XW		LS				
										3.25m: BOREHOLE TERMINATED							

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
▼ Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
▶ Water inflow	XW Extremely weathered	S Soft	L Loose	low	D Disturbed sample.
▶ Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	VLS Very low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	LS Low	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	H Hard	VD Very dense	MS Medium	S Vane shear value kPa
		Moisture		HS High	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		D Dry	M Moist	VHS Very high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes
			W Wet	EHS Extremely high	



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Engineering Log - Borehole

Borehole No.: BH13

Page: 1 of 1

Easting: 476094.00
 Northing: 6946606.00
 RL: Approx. 7.50
 Total Depth: 6.00

Drilling Rig: Jacro 200
 Driller: Ballison & Sons P/L
 Logged By: [Redacted]
 Date: 03/10/2007

Job Number: 207E/186

Client: Leda Developments Pty Ltd

Project: Geotechnical Investigation - Retaining Wall

Location: Riverlink-North Ipswich-Stage 2, Site 2

Drilling Information				Material Description					Test Samples					
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
100mm TC Bit with Auger			0.2	Fill	[Cross-hatch pattern]	FIL	Silty Gravelly SAND (SM): Loose to medium dense, fine to medium grained sand, grey, fine to medium sized gravel, moist (burnt Coke-ash)		M	L-MD	5			
			0.4			FIL			M	L	3			
						FIL	Silty Gravelly SAND (SM): As above but loose		M	L	2			
							Silty Sandy GRAVEL (GM): Loose, fine to coarse sized gravel, orange brown, fine to coarse grained sand, moist. Some wire steel and glass				1			
											2			
											1			
											2			
											1			
											2			
											2			
											2			
											10			
											4			
											2			
											3			
										2				
										4				
										7				
										8				
										7				
										11				
										19				
			2.8			FIL	Silty Gravelly SAND (SM): Medium dense to dense, fine to coarse grained sand, orange brown, fine to coarse size gravel, moist		M	MD-D				
			3.1			FIL	Silty Gravelly SAND (SM): As above but loose		M	L				
			4.0	Natural	[Vertical lines pattern]	CH	Sandy CLAY: Stiff, high plasticity, orange brown, fine grained sand, moist		M	SI			4 - PP - 180kPa	
			4.4			SST	SANDSTONE: Extremely weathered, very low strength, dark grey bleached orange brown	XW		VLS				
			5.0											
			5.3			SST	SANDSTONE: As above but extremely low strength	XW		ELS				
			5.7			SST	SANDSTONE: As above but very low strength with some Chert veining	XW		VLS				
			6.0											

Comments: 6.00m: BOREHOLE TERMINATED

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
Water inflow	XW Extremely weathered	F Firm	L Loose	VLS Very low	D Disturbed sample.
Water outflow	DW Distinctly weathered	St Stiff	MD Medium dense	LS Low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	VSt Very stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	H Hard	VD Very dense	HS High	S Vane shear value kPa
		Moisture		VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		D Dry M Molst W Wet		EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes



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Engineering Log - Borehole

Borehole No.: **BH14**

Page: 1 of 2

Easting: 476091.00 **Drilling Rig:** Jacro 200
Northing: 6946640.00 **Driller:** Battison & Sons P/L
RL: Approx. 5.00 **Logged By:** [Redacted]
Total Depth: 6.25 **Date:** 03/10/2007

Job Number: 207E/186

Client: Leda Developments Pty Ltd

Project: Geotechnical Investigation - Retaining Wall

Location: Riverlink-North Ipswich-Stage 2, Site 2

Drilling Information				Material Description				Test Samples						
Drift Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
		5.6	0.15	Fill	[Cross-hatched]	FIL	Sandy CLAY (CI): Very stiff, medium plasticity, brown, fine to medium grained sand, moist	M	VSt		3			
			1.0			FIL	Silty Gravelly SAND (SM): Loose, fine to coarse grained sand, grey brown, fine to coarse sized gravel, moist, some Slag material	M	L		3			
			2.0			FIL	Silty Gravelly SAND (SM): As above but orange brown. Some brick and steel materials	M	L		2	0.9	BS	
			3.0			FIL	Silty Gravelly SAND (SM): As above but dark grey black (Coke-ash)	M	L		1			
			4.0			FIL	Sandy CLAY (CH): Stiff, high plasticity, grey mottled orange brown and dark grey, fine grained sand, moist, some inter-bedded Coke-ash	M	St		2			
			5.0	Natural	[Vertical lines]	CH	Silty CLAY: Firm to stiff, high plasticity, dark grey, some fine grained sand, moist	M	St		3			
			5.2			CH	Silty CLAY: As above but stiff and grey mottled orange brown	M	St		4			
			5.6			SST	SANDSTONE: Extremely weathered, very low strength, grey bleached orange brown	XW	VLS		5			
			6.0								6			
											7			
											8			
											9			
											10			
											11			
											12			
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											85			
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											98			
											99			
											100			

Comments:										Authorised by:	
										Date:	
Water	Weathering	Consistency	Density	Rock Strength	Tests & Results						
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.						
Water inflow	XW Extremely weathered	S Soft	L Loose	VLS Very low	D Disturbed sample.						
Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	LS Low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.0kg hammer falling 762mm.						
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.						
	FR Fresh	H Hard	VD Very dense	HS High	S Vane shear value kPa						
		Moisture		VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.						
		D Dry M Moist W Wet		EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes						



Morrison Geotechnic Pty Ltd

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Engineering Log - Borehole

Borehole No.: BH14

Page: 2 of 2

Easting: 476091.00
 Northing: 6946640.00
 RL: Approx. 5.00
 Total Depth: 6.25

Drilling Rig: Jacro 200
 Driller: Bettison & Sons P/L
 Logged By: [Redacted]
 Date: 03/10/2007

Job Number: 207E/186

Client: Leda Developments Pty Ltd

Project: Geotechnical Investigation - Retaining Wall

Location: Riverlink-North Ipswich-Stage 2, Site 2

Drilling Information				Material Description				Test Samples						
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
			5.15			SST	SANDSTONE: Extremely weathered, very low strength, grey bleached orange brown	XW		VLS				
			6.25			SST	SANDSTONE: As above but low strength	XW		LS				
							6.25m: BOREHOLE TERMINATED							
			7.0											
			8.0											
			9.0											
			10.0											
			11.0											
			12.0											

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
Water inflow	XW Extremely weathered	S Soft	L Loose	VLS Very low	D Disturbed sample,
Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	LS Low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	H Hard	VD Very dense	HS High	S Vane shear value kPa
		Moisture		VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		D Dry	M Moist	EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes
		W Wet			



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Engineering Log - Borehole

Borehole No.: BH15

Page: 1 of 2

Easting: 476074.00
 Northing: 6946681.00
 RL: Approx. 8.50
 Total Depth: 8.50

Drilling Rig: Jacro 200
 Driller: Baltison & Sons P/L
 Logged By: [Redacted]
 Date: 03/10/2007

Job Number: 207E/186

Client: Leda Developments Pty Ltd

Project: Geotechnical Investigation - Retaining Wall

Location: Riverlink-North Ipswich-Stage 2, Site 2

Drilling Information			Material Description					Test Samples																																																																																																			
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result																																																																																													
100mm TC BR with Auger			6.0	Fill	[Cross-hatched]	FL	Sandy CLAY (CL/CI): Hard, low to medium plasticity, brown, fine to medium grained sand, moist		M	H	8 6 3 5 4 3 3 4 4 3 4 4	0.7 -	PP	>600kPa																																																																																													
			1.0	Natural	[Diagonal lines]	CI	Sandy CLAY: Hard, medium plasticity, dark grey brown with minor orange brown streaking, fine grained sand, moist		M	H		5 5 4 7 6 6	1.2 -	PP	>600kPa																																																																																												
			5.0									1.1	CH	Sandy CLAY: As above but high plasticity		M	H			5 4 4	2 }	U50	280-300kPa																																																																																				
			1.7									2.0								CH				Sandy CLAY: As above but very stiff and orange brown		M	VSt			5 5 3 4 4 5 4	2.9 }	U50	PP=180-210kPa																																																																										
			2.0									2.7																		CH				Sandy CLAY: as above but stiff to very stiff		M	St-VSt			7 9 8 8	3.2 -	PP	240-280kPa																																																																
			4.0									3.0																												CH				Sandy CLAY: As above but very stiff, orange brown mottled grey		M	VSt			8 12 13 15	4.7 }	PP	240-270kPa																																																						
			3.0									3.5																																						CH				Silty CLAY: Stiff, high plasticity, orange brown, trace of fine grained sand, moist		M	St				4.8 }	D																																													
			3.0									3.8																																																				CH	Sandy CLAY: Stiff, high plasticity, orange brown, fine grained sand, moist		M	St																																							
			2.0									4.0																																																															CH	Sandy CLAY: Stiff, high plasticity, orange brown, fine grained sand, moist		M	St																												
			1.0									4.7																																																																										CH	Sandy CLAY: As above but very stiff		M	VSt																	
			6.0									5.0																																																																																					CH	Sandy CLAY: As above but very stiff		M	VSt						

Comments: _____

Authorised by: _____

Date: _____

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube,
Water inflow	XW Extremely weathered	S Soft	L Loose	VLS Very low	D Disturbed sample,
Water outflow	DW Distinctly weathered	St Stiff	MD Medium dense	LS Low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	VSt Very stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	H Hard	VD Very dense	HS High	S Vane shear value kPa
		Moisture		VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section,
		D Dry M Moist W Wet		EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes



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Engineering Log - Borehole

Borehole No.: BH15

Page: 2 of 2

Eastings: 476074.00
 Northings: 6946681.00
 RL: Approx. 6.50
 Total Depth: 8.50

Drilling Rig: Jacro 200
 Driller: Battison & Sons P/L
 Logged By: [Redacted]
 Date: 03/10/2007

Job Number: 207E/186

Client: Leda Developments Pty Ltd

Project: Geotechnical Investigation - Retaining Wall

Location: Riverlink-North Ipswich-Stage 2, Site 2

Drilling Information			Material Description					Test Samples						
Drill Method	Water	RL	Hole Depth (m)	Soil Origin	Graphic Log	Classification Code	Description	Weathering	Moisture	Consistency - Density - Strength	DC Test Results	Test Depth	Tests	Sample/Result
			0.0			CH	Sandy CLAY: As above but very stiff		M	VSt				
			7.0			CH	Sandy CLAY: As above but very stiff to hard, fine to coarse sized gravel layering		M	VSt-H		6.9 -	PP	-380kPa
			7.6			CH	Sandy CLAY: As above but hard		M	H				
			8.0											
			8.1	Rock		SST	SANDSTONE: Extremely weathered, very low strength, light grey, some low strength layering	XW		VLS				
			8.5				8.50m: BOREHOLE TERMINATED							
			9.0											
			-3.0											
			10.0											
			-4.0											
			11.0											
			-5.0											
			12.0											

Comments:

Authorised by:

Date:

Water	Weathering	Consistency	Density	Rock Strength	Tests & Results
Water level on date shown	RS Residual soil	VS Very soft	VL Very loose	ELS Extremely low	U50 Undisturbed 50mm diam tube.
Water inflow	XW Extremely weathered	S Soft	L Loose	VLS Very low	D Disturbed sample.
Water outflow	DW Distinctly weathered	F Firm	MD Medium dense	LS Low	SPT Standard Penetration Test, N = number of blows to drive 50mm sampler 300mm with a 63.6kg hammer falling 762mm.
	SW Slightly weathered	St Stiff	D Dense	MS Medium	PP Hand penetrometer estimate of unconfined compressive strength, kPa.
	FR Fresh	H Hard	VD Very dense	HS High	S Vane shear value kPa
		Moisture		VHS Very high	DC Dynamic Cone test, 9.09kg hammer, fall 508mm, driving 20mm, 30 deg taper cone fitted to rods of smaller section.
		D Dry M Moist W Wet		EHS Extremely high	From AS1289-1993 Methods of Testing Soils for Engineering Purposes

APPENDIX 'B'

LABORATORY TEST RESULTS

COMPACTION TESTS

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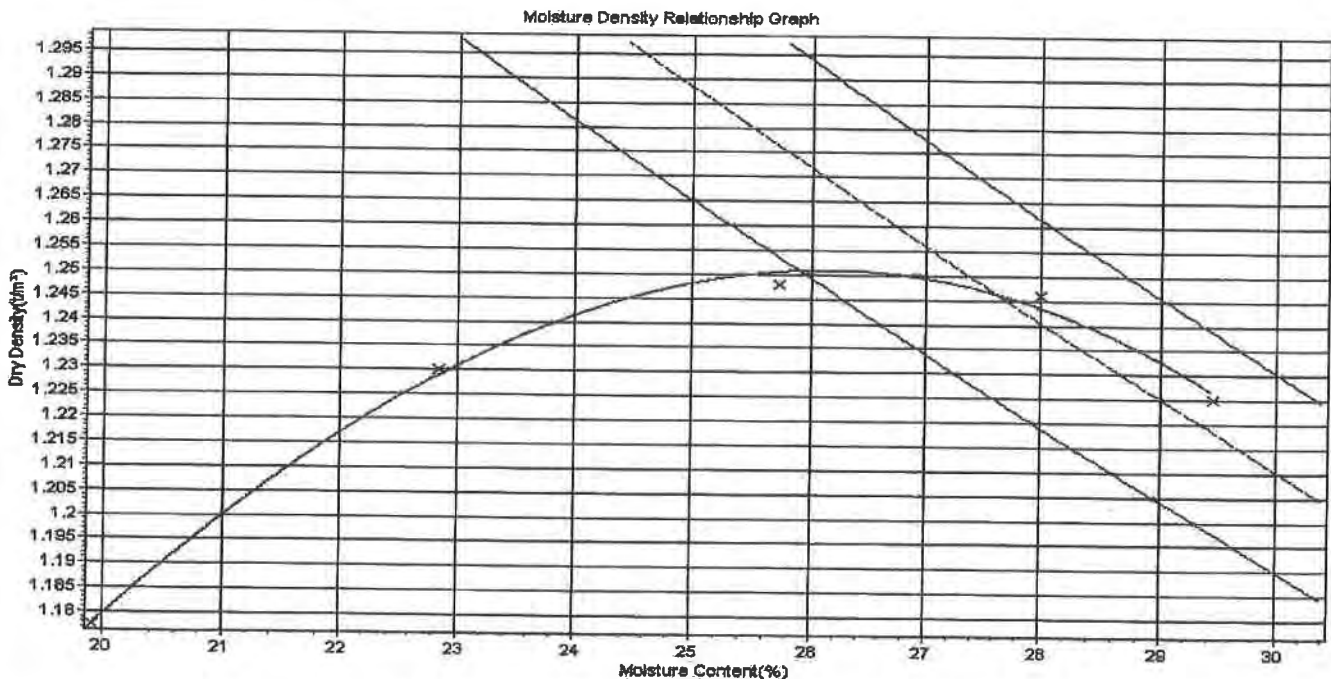


Moisture Density Relationship Report

Client:	LEDA DEVELOPMENTS PTY LTD	Report Number:	207E/186 - 2
Job Number:	207E/186	Report Date:	15/10/2007
Project:	GEOTECHNICAL INVESTIGATION - RETAINING WALL	Order Number:	
Location:	RIVER LINK STAGE 2 , NORTH IPSWICH	Test Method :	AS1289.5.1.1
Lab No:	99040	Sampled ID :	2
Date Sampled:	05/10/2007	Sample Location	
Date Tested:	10/10/2007	Borehole #4	
Sampled By:	LB	Depth 0.10m - 0.70m	
Sample Method:	AS 1141.3.1	Lot Number:	-
Material Source:	-	Item Number :	-
For Use As:	-		
Remarks:	Ash.		

Page 1 of 1

Maximum Size (mm) :	19.0	Moisture Content Test Method :	AS1289.2.1.1
Oversize (%) :	-	Oversize Test Method :	-
MDD (t/m ³) :	1.251	Oversize Density (t/m ³) :	
OMC(%) :	26.1		



x MDR Points — MDR Line - SG= 1.850 - - SG= 1.900 - - SG= 1.950



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REP AMDR-1-3
NATA Accred No: [REDACTED]

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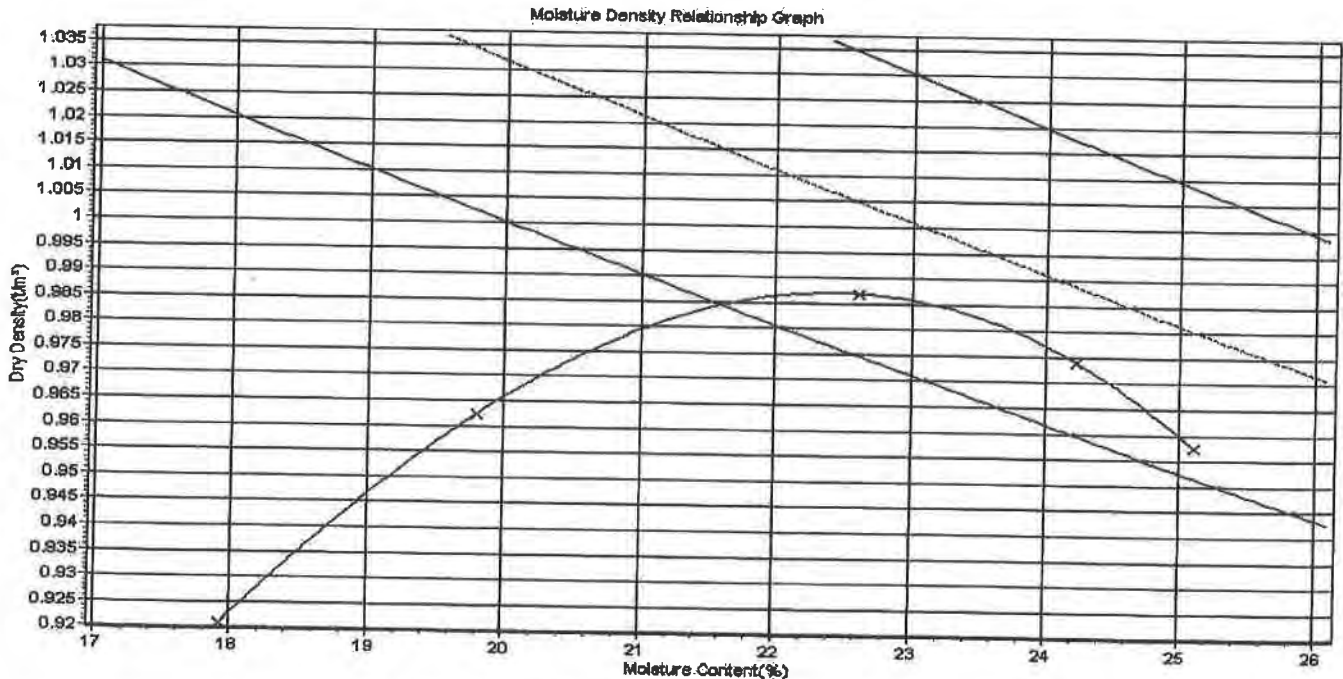


Moisture Density Relationship Report

Client:	LEDA DEVELOPMENTS PTY LTD	Report Number:	207E/186 - 1
Job Number:	207E/186	Report Date:	15/10/2007
Project:	GEOTECHNICAL INVESTIGATION - RETAINING WALL	Order Number:	
Location:	RIVER LINK STAGE 2 , NORTH IPSWICH	Test Method :	AS1289.5.1.1
Lab No:	99039	Sampled ID :	1
Date Sampled:	05/10/2007	Sample Location	
Date Tested:	10/10/2007	Borehole #8	
Sampled By:	LB	Depth 1.50m - 2.00m	
Sample Method:	AS 1141.3.1	Lot Number:	-
Material Source:	-	Item Number :	-
For Use As:	-		
Remarks:	Ash.		

Page 1 of 1

Maximum Size (mm) :	19.0	Moisture Content Test Method :	AS1289.2.1.1
Oversize (%) :	-	Oversize Test Method :	-
MDD (t/m ³) :	0.987	Oversize Density (t/m ³) :	
OMC(%) :	22.5		



x MDR Points — MDR Line — SG= 1.250 - - SG= 1.300 - . . SG= 1.350



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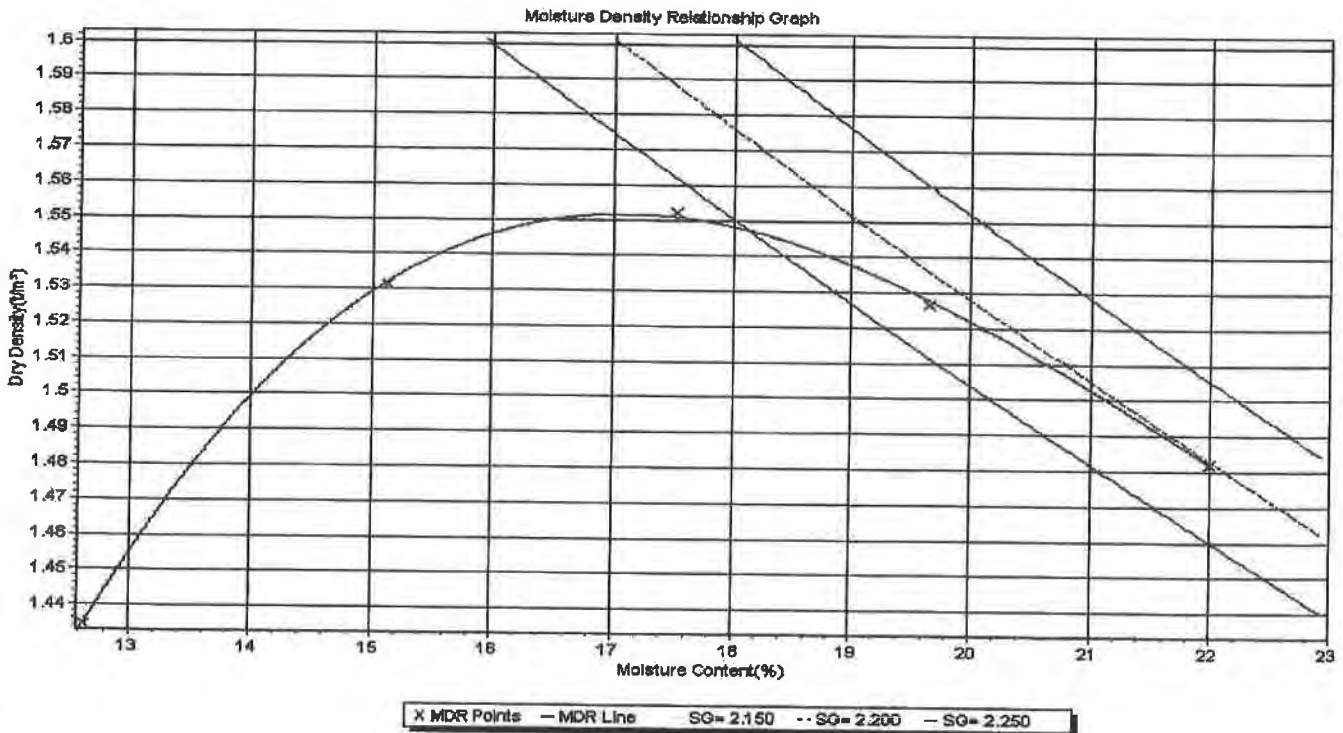


Moisture Density Relationship Report

Client:	LEDA DEVELOPMENTS PTY LTD	Report Number:	207E/186 - 3
Job Number:	207E/186	Report Date:	15/10/2007
Project:	GEOTECHNICAL INVESTIGATION - RETAINING WALL	Order Number:	
Location:	RIVER LINK STAGE 2 , NORTH IPSWICH	Test Method :	AS1289.5.1.1
Lab No:	99041	Sampled ID :	3
Date Sampled:	05/10/2007	Sample Location	
Date Tested:	10/10/2007	Borehole #8	
Sampled By:	LB	Depth 3.00m - 3.50m	
Sample Method:	AS 1141.3.1	Lot Number:	-
Material Source:	-	Item Number :	-
For Use As:	-		
Remarks:	-		

Page 1 of 1

Maximum Size (mm) :	19.0	Moisture Content Test Method :	AS1289.2.1.1
Oversize (%) :	-	Oversize Test Method :	-
MDD (t/m ³) :	1.552	Oversize Density (t/m ³) :	
OMC(%) :	17.1		



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NATA Accred No: [Redacted]

QUALITY OF MATERIALS TESTS

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PTY LTD
ABN 51 608 979 989
RFRUG 2241

Quality of Materials Report

Client:	LEDA DEVELOPMENTS PTY LTD	Report Number:	207E/186 - 8
Job Number:	207E/186	Report Date:	18/10/2007
Project:	GEOTECHNICAL INVESTIGATION - RETAINING WALL	Order Number:	-
Location:	RIVER LINK, SITE 1, STAGE 2, NORTH IPSWICH	Page 1 of 1	
Lab No:	99035	Sample ID :	-
Date Sampled:	05/10/2007	Sample Location	
Date Tested:	11/10/2007	Borehole #1	
Sampled By:	LB	Depth 2.60m - 3.00m	
Sample Method:	AS 1141.3.1	Spec Description: -	
Material Source:	-	Lot Number: -	
For Use As:	-	Spec Number: -	
Remarks:	-		

A.S. Sieve Sizes		Specification Minimum	Percent Passing	Specification Maximum
Test Method: AS1289.3.6.1				
75.00 mm				
53.00 mm				
37.50 mm				
26.50 mm				
19.00 mm				
13.2 mm			100	
9.50 mm			100	
6.7 mm			99	
4.75 mm			99	
2.36 mm			98	
1.18 mm			96	
0.600 mm			95	
0.425 mm			92	
0.300 mm			89	
0.150 mm			77	
0.075 mm			66	

Atterberg Tests	Test Method	Specification Minimum	Result	Specification Maximum
Liquid Limit (%)	AS1289.3.1.1		51.2	
Plastic Limit (%)	AS1289.3.2.1		15	
Plasticity Index	AS1289.3.3.1		36	
Linear Shrinkage (%)	AS1289.3.4.1		17.0	
P.I. x % Passing 0.425 mm			3312	
L.S. x % Passing 0.425 mm			1564	
Ratio of % Passing (0.075 / 0.425)			0.72	



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PTY LTD
ABN 51 008 579 290
FPSU2 2241

Quality of Materials Report

Client:	LEDA DEVELOPMENTS PTY LTD	Report Number:	207E/186 - 4
Job Number:	207E/186	Report Date:	18/10/2007
Project:	GEOTECHNICAL INVESTIGATION - RETAINING WALL	Order Number:	-
Location:	RIVER LINK, SITE 1, STAGE 2, NORTH IPSWICH	Page 1 of 1	
Lab No:	99034	Sample ID :	-
Date Sampled:	05/10/2007	Sample Location	
Date Tested:	11/10/2007	Borehole #1	
Sampled By:	LB	Depth 5.20m - 5.80m	
Sample Method:	AS 1141.3.1	Spec Description: -	
Material Source:	-	Lot Number: -	
For Use As:	-	Spec Number: -	
Remarks:	-		

Test Method: AS1289.3.6.1		A.S. Sieve Sizes	Specification Minimum	Percent Passing	Specification Maximum
		75.00 mm			
		53.00 mm			
		37.50 mm			
		26.50 mm			
		19.00 mm			
		13.2 mm			
		9.50 mm			
		6.7 mm			100
		4.75 mm			100
		2.36 mm			100
		1.18 mm			99
		0.600 mm			98
		0.425 mm			98
		0.300 mm			94
		0.150 mm			91
	0.075 mm			88	

Atterberg Tests	Test Method	Specification Minimum	Result	Specification Maximum
Liquid Limit (%)	AS1289.3.1.1		70.6	
Plastic Limit (%)	AS1289.3.2.1		21	
Plasticity Index	AS1289.3.3.1		50	
Linear Shrinkage (%)	AS1289.3.4.1		20.0	
P.I. x % Passing 0.425 mm			4800	
L.S. x % Passing 0.425 mm			1920	
Ratio of % Passing (0.075 / 0.425)			0.92	



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PTV LTD
ABN 61 006 676 899
RPEUQ 3241

Quality of Materials Report

Client:	LEDA DEVELOPMENTS PTY LTD	Report Number:	207E/186 - 6
Job Number:	207E/186	Report Date:	18/10/2007
Project:	GEOTECHNICAL INVESTIGATION - RETAINING WALL	Order Number:	-
Location:	RIVER LINK, SITE 1, STAGE 2 , NORTH IPSWICH	Page 1 of 1	
Lab No:	99036	Sample ID :	-
Date Sampled:	05/10/2007	Sample Location	
Date Tested:	11/10/2007	Borehole #3	
Sampled By:	LB	Depth 2.50m - 2.95m	
Sample Method:	AS 1141.3.1	Spec Description: -	
Material Source:	-	Lot Number: -	
For Use As:	-	Spec Number: -	
Remarks:	-		

Test Method: AS1289.3.6.1		A.S. Sieve Sizes	Specification Minimum	Percent Passing	Specification Maximum
		75.00 mm			
		53.00 mm			
		37.50 mm			
		26.50 mm			
		19.00 mm			
		13.2 mm		99	
		9.50 mm		98	
		6.7 mm		97	
		4.75 mm		97	
		2.36 mm		91	
		1.18 mm		86	
		0.600 mm		81	
		0.425 mm		79	
		0.300 mm		76	
		0.150 mm		69	
	0.075 mm		61		

Atterberg Tests	Test Method	Specification Minimum	Result	Specification Maximum
Liquid Limit (%)	AS1289.3.1.1		52.2	
Plastic Limit (%)	AS1289.3.2.1		20	
Plasticity Index	AS1289.3.3.1		32	
Linear Shrinkage (%)	AS1289.3.4.1		15.0	
P.I. x % Passing 0.425 mm			2528	
L.S. x % Passing 0.425 mm			1185	
Ratio of % Passing (0.075 / 0.425)			0.77	



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PTY LTD
ABN 51 009 676 609
RPEUQ 2241

Quality of Materials Report

Client:	LEDA DEVELOPMENTS PTY LTD	Report Number:	207E/186 - 11
Job Number:	207E/186	Report Date:	18/10/2007
Project:	GEOTECHNICAL INVESTIGATION - RETAINING WALL	Order Number:	-
Location:	RIVER LINK, SITE 1, STAGE 2, NORTH IPSWICH	Page 1 of 1	
Lab No:	99044	Sample ID :	-
Date Sampled:	05/10/2007	Sample Location	
Date Tested:	16/10/2007	Borehole #3	
Sampled By:	LB	Depth 5.50m - 5.95m	
Sample Method:	AS 1141.3.1	Spec Description: -	
Material Source:	-	Lot Number: -	
For Use As:	-	Spec Number: -	
Remarks:	-		

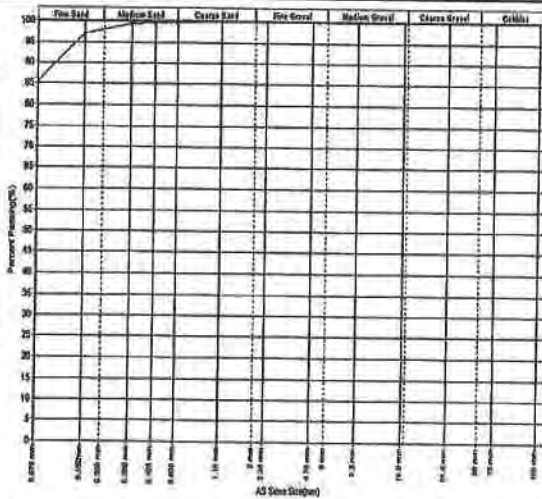
A.S. Sieve Sizes

Specification Minimum

Percent Passing

Specification Maximum

Test Method: **AS1289.3.6.1**



A.S. Sieve Sizes	Specification Minimum	Percent Passing	Specification Maximum
75.00 mm			
53.00 mm			
37.50 mm			
26.50 mm			
19.00 mm			
13.2 mm			
9.50 mm			
6.7 mm			
4.75 mm			
2.36 mm		100	
1.18 mm		100	
0.600 mm		100	
0.425 mm		100	
0.300 mm		99	
0.150 mm		97	
0.075 mm		85	

Atterberg Tests	Test Method	Specification Minimum	Result	Specification Maximum
Liquid Limit (%)	AS1289.3.1.1		38.6	
Plastic Limit (%)	AS1289.3.2.1		18	
Plasticity Index	AS1289.3.3.1		21	
Linear Shrinkage (%)	AS1289.3.4.1		12.5	
P.I. x % Passing 0.425 mm			2100	
L.S. x % Passing 0.425 mm			1250	
Ratio of % Passing (0.075 / 0.425)			0.86	



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PTY LTD
ABN 51 009 876 869
RFEUG 2241

Quality of Materials Report

Client:	LEDA DEVELOPMENTS PTY LTD	Report Number:	207E/186 - 7
Job Number:	207E/186	Report Date:	18/10/2007
Project:	GEOTECHNICAL INVESTIGATION - RETAINING WALL	Order Number:	-
Location:	RIVER LINK, SITE 1, STAGE 2 , NORTH IPSWICH	Page 1 of 1	
Lab No:	99037	Sample ID :	-
Date Sampled:	05/10/2007	Sample Location	
Date Tested:	11/10/2007	Borehole #5	
Sampled By:	LB	Depth 2.50m - 2.95m	
Sample Method:	AS 1141.3.1	Spec Description: -	
Material Source:	-	Lot Number: -	
For Use As:	-	Spec Number: -	
Remarks:	-		

Test Method:	A.S. Sieve Sizes	Specification Minimum	Percent Passing	Specification Maximum
AS1289.3.6.1	75.00 mm			
	53.00 mm			
	37.50 mm			
	26.50 mm			
	19.00 mm			
	13.2 mm			
	9.50 mm			
	6.7 mm		100	
	4.75 mm		100	
	2.36 mm		98	
	1.18 mm		91	
	0.600 mm		81	
	0.425 mm		76	
	0.300 mm		73	
0.150 mm		69		
0.075 mm		64		

Atterberg Tests	Test Method	Specification Minimum	Result	Specification Maximum
Liquid Limit (%)	AS1289.3.1.1		42.0	
Plastic Limit (%)	AS1289.3.2.1		15	
Plasticity Index	AS1289.3.3.1		27	
Linear Shrinkage (%)	AS1289.3.4.1		14.5	
P.I. x % Passing 0.425 mm			2052	
L.S. x % Passing 0.425 mm			1102	
Ratio of % Passing (0.075 / 0.425)			0.84	

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PTY LTD
ABN 51 000 876 899
RPELQ 2241

Quality of Materials Report

Client:	LEDA DEVELOPMENTS PTY LTD	Report Number:	207E/186 - 8
Job Number:	207E/186	Report Date:	18/10/2007
Project:	GEOTECHNICAL INVESTIGATION - RETAINING WALL	Order Number:	-
Location:	RIVER LINK, SITE 1, STAGE 2, NORTH IPSWICH	Page 1 of 1	
Lab No:	99038	Sample ID :	-
Date Sampled:	05/10/2007	Sample Location	
Date Tested:	11/10/2007	Borehole #8	
Sampled By:	LB	Depth 1.00m - 1.50m	
Sample Method:	AS 1141.3.1	Spec Description: -	
Material Source:	-	Lot Number: -	
For Use As:	-	Spec Number: -	
Remarks:	-		

Test Method:	A.S. Sieve Sizes	Specification Minimum	Percent Passing	Specification Maximum
<p>AS1289.3.6.1</p>	75.00 mm			
	53.00 mm			
	37.50 mm			
	26.50 mm		100	
	19.00 mm		100	
	13.2 mm		95	
	9.50 mm		89	
	6.7 mm		81	
	4.75 mm		79	
	2.36 mm		52	
	1.18 mm		41	
	0.600 mm		33	
	0.425 mm		29	
	0.300 mm		26	
	0.150 mm		21	
0.075 mm		16		

Atterberg Tests	Test Method	Specification Minimum	Result	Specification Maximum
Liquid Limit (%)	AS1289.3.9		69.2	
Plastic Limit (%)	AS1289.3.2.1		65	
Plasticity Index	AS1289.3.3.1		4	
Linear Shrinkage (%)	AS1289.3.4.1		2.5	
P.I. x % Passing 0.425 mm			116	
L.S. x % Passing 0.425 mm			72.5	
Ratio of % Passing (0.075 / 0.425)			0.55	



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PTY LTD
ABN 51 009 670 600
RPEUQ 2241

Quality of Materials Report

Client:	LEDA DEVELOPMENTS PTY LTD	Report Number:	207E/186 - 9
Job Number:	207E/186	Report Date:	18/10/2007
Project:	GEOTECHNICAL INVESTIGATION - RETAINING WALL	Order Number:	-
Location:	RIVER LINK, SITE 1, STAGE 2 , NORTH IPSWICH	Page 1 of 1	
Lab No:	99042	Sample ID :	-
Date Sampled:	05/10/2007	Sample Location	
Date Tested:	12/10/2007	Borehole #14	
Sampled By:	LB	Depth 0.90m - 1.50m	
Sample Method:	AS 1141.3.1	Spec Description: -	
Material Source:	-	Lot Number: -	
For Use As:	-	Spec Number: -	
Remarks:	-		

Test Method:	A.S. Sieve Sizes	Specification Minimum	Percent Passing	Specification Maximum
AS1289.3.6.1	75.00 mm			
	53.00 mm			
	37.50 mm		100	
	26.50 mm		97	
	19.00 mm		93	
	13.2 mm		87	
	9.50 mm		81	
	6.7 mm		74	
	4.75 mm		69	
	2.36 mm		58	
	1.18 mm		48	
	0.600 mm		40	
	0.425 mm		35	
	0.300 mm		31	
	0.150 mm		24	
0.075 mm		18		

Atterberg Tests	Test Method	Specification Minimum	Result	Specification Maximum
Liquid Limit (%)	AS1289.3.9		48.4	
Plastic Limit (%)	AS1289.3.2.1		44	
Plasticity Index	AS1289.3.3.1		4	
Linear Shrinkage (%)	AS1289.3.4.1		0.5	
P.I. x % Passing 0.425 mm			140	
L.S. x % Passing 0.425 mm			17.5	
Ratio of % Passing (0.075 / 0.425)			0.51	

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PTY LTD
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Quality of Materials Report

Client:	LEDA DEVELOPMENTS PTY LTD	Report Number:	207E/186 - 10
Job Number:	207E/186	Report Date:	18/10/2007
Project:	GEOTECHNICAL INVESTIGATION - RETAINING WALL	Order Number:	-
Location:	RIVER LINK, SITE 1, STAGE 2, NORTH IPSWICH	Page 1 of 1	
Lab No:	99043	Sample ID :	-
Date Sampled:	05/10/2007	Sample Location	
Date Tested:	11/10/2007	Borehole #15	
Sampled By:	LB	Depth 4.70m - 5.50m	
Sample Method:	AS 1141.3.1	Spec Description: -	
Material Source:	-	Lot Number: -	
For Use As:	-	Spec Number: -	
Remarks:	-		

A.S. Sieve Sizes		Specification Minimum	Percent Passing	Specification Maximum
Test Method: AS1289.3.6.1				
	75.00 mm			
	53.00 mm			
	37.50 mm			
	26.50 mm			
	19.00 mm			
	13.2 mm			
	9.50 mm			
	6.7 mm			
	4.75 mm			
	2.36 mm		100	
	1.18 mm		100	
	0.600 mm		100	
	0.425 mm		99	
	0.300 mm		97	
	0.150 mm		89	
	0.075 mm		78	

Atterberg Tests	Test Method	Specification Minimum	Result	Specification Maximum
Liquid Limit (%)	AS1289.3.1.1		54.0	
Plastic Limit (%)	AS1289.3.2.1		21	
Plasticity Index	AS1289.3.3.1		33	
Linear Shrinkage (%)	AS1289.3.4.1		16.5	
P.I. x % Passing 0.425 mm			3267	
L.S. x % Passing 0.425 mm			1633.5	
Ratio of % Passing (0.075 / 0.425)			0.79	



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TRIAxIAL STRENGTH TESTS

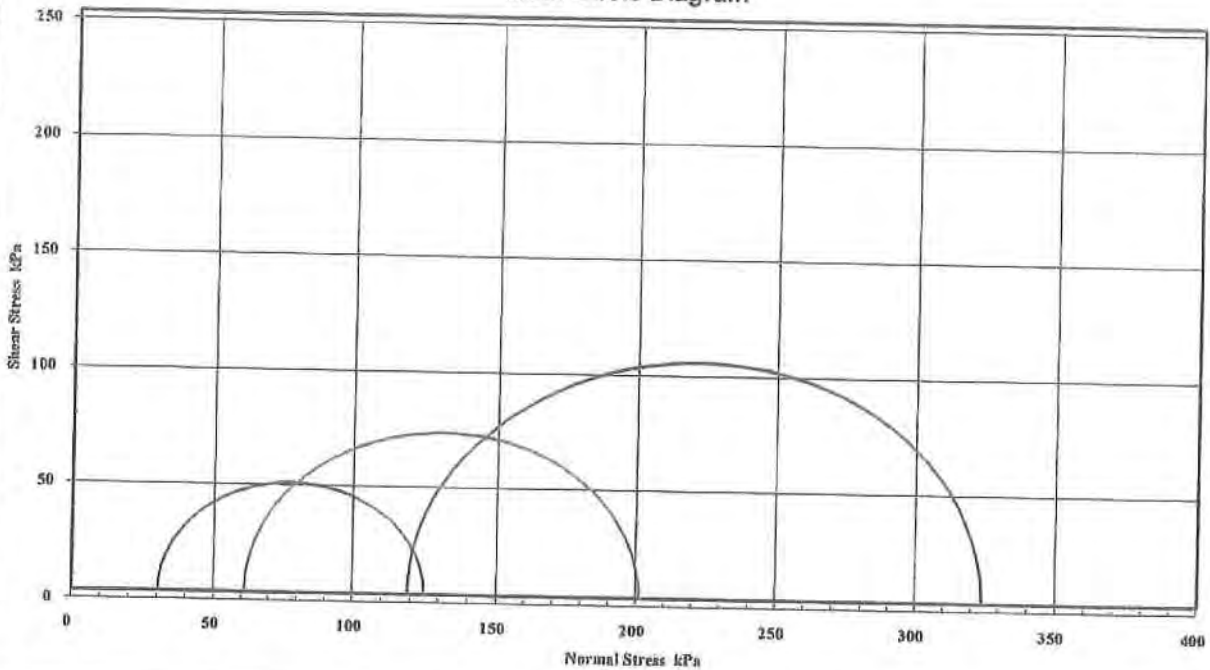
TRIAXIAL TEST REPORT

Test Method: AS1289.6.4.2

Client: Morrison Geotechnics Pty Ltd	Report No.: 710500-CU
Project: Riverlink Stage 2	Test Date: 15/10/2007
Client Id.: 11	Report Date: 29/10/2007
	Depth (m): 2.0-2.15

Description: (CH) CLAY- brown

Mohr Circle Diagram

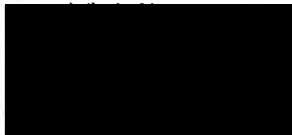


Interpretation between stages :	1 to 2	2 to 3	1 to 3
Cohesion (kPa) :	16.3	24.7	20.4
Angle of Shear Resistance (Degrees) :	25.0	21.0	22.3

Cell Pressures (kPa):	50-100-200	Failure Criteria:	Peak Principal Stress Ratio				
SAMPLE & TEST DETAILS		FAILURE DETAILS					
Sample Details		Moisture Contents		Principal Effective Stresses		Deviator Stress	Strain
Initial Height : 92.7 mm		Initial Moisture		σ'_1	σ'_3		
Initial Diameter : 47.4 mm		15.6 %		125 kPa	30 kPa	95 kPa	1.46 %
Wet Density : 2.12 t/m ³		Final Moisture		201 kPa	61 kPa	140 kPa	3.00 %
Dry Density : 1.83 t/m ³		22.9 %		324 kPa	119 kPa	205 kPa	5.18 %
Rate of Strain: 0.009 %/min							
B Response: 98 %							
Sample Type:	Single Individual undisturbed specimen		Remarks:	Tested as received			



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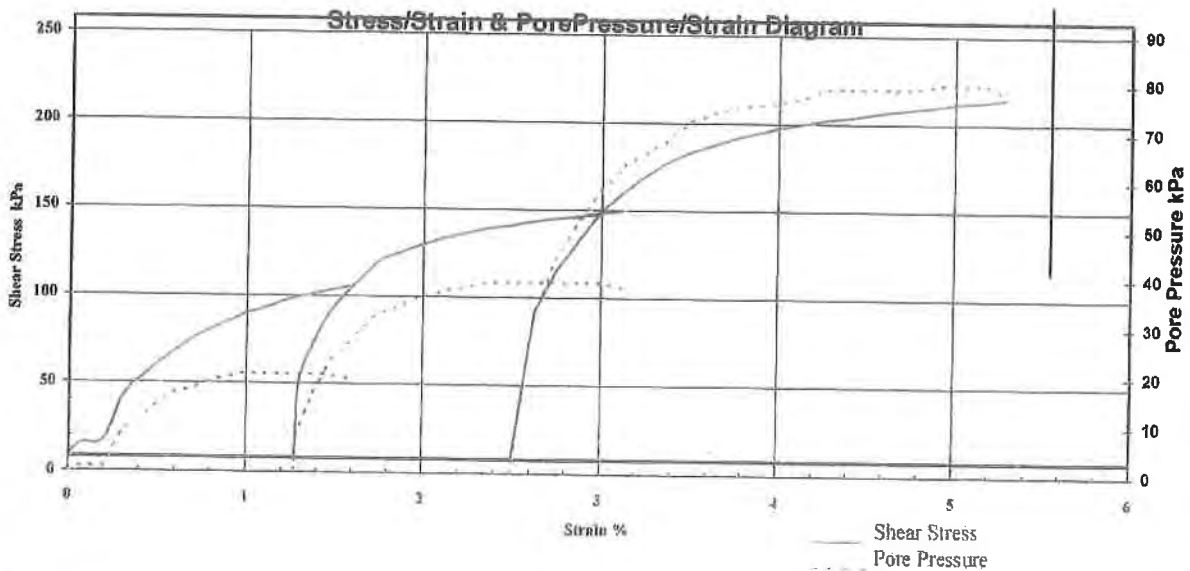
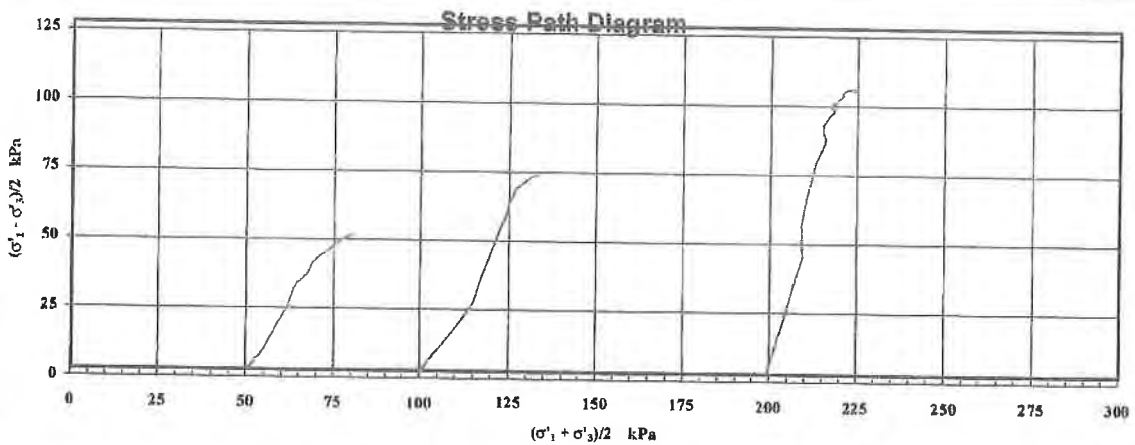


TRIAXIAL TEST REPORT

Test Method: AS1289.6.4.2

Client: Morrison Geotechnics Pty Ltd	Report No.: 710500-CU
Project: Riverlink Stage 2	Test Date: 15/10/2007
	Report Date: 29/10/2007
Client Id.: 11	Depth (m): 2.0-2.15

Description: (CH) CLAY- brown



Sample Type: Single individual undisturbed specimen	Remarks: Tested as received
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Authorized Signatory:



TRIAXIAL TEST REPORT

Test Method: AS1289.6.4.2

Client: Morrison Geotechnics Pty Ltd	Report No.: 710500-CU
Project: Riverlink Stage 2	Test Date: 15/10/2007 Report Date: 29/10/2007
Client Id.: 11	Depth (m): 2.0-2.15

Description: (CH) CLAY- brown

CLIENT: MORRISON GEOTECHNIC
 PROJECT: RIVERLINK STAGE 2
 LAB SAMPLE No. 710500
 BH: 11

AFTER TEST
 DATE: 17/10/07
 DEPTH: 2.0-2.15



Sample Type: Single individual undisturbed specimen Remarks: Tested as received



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Authorised Signature



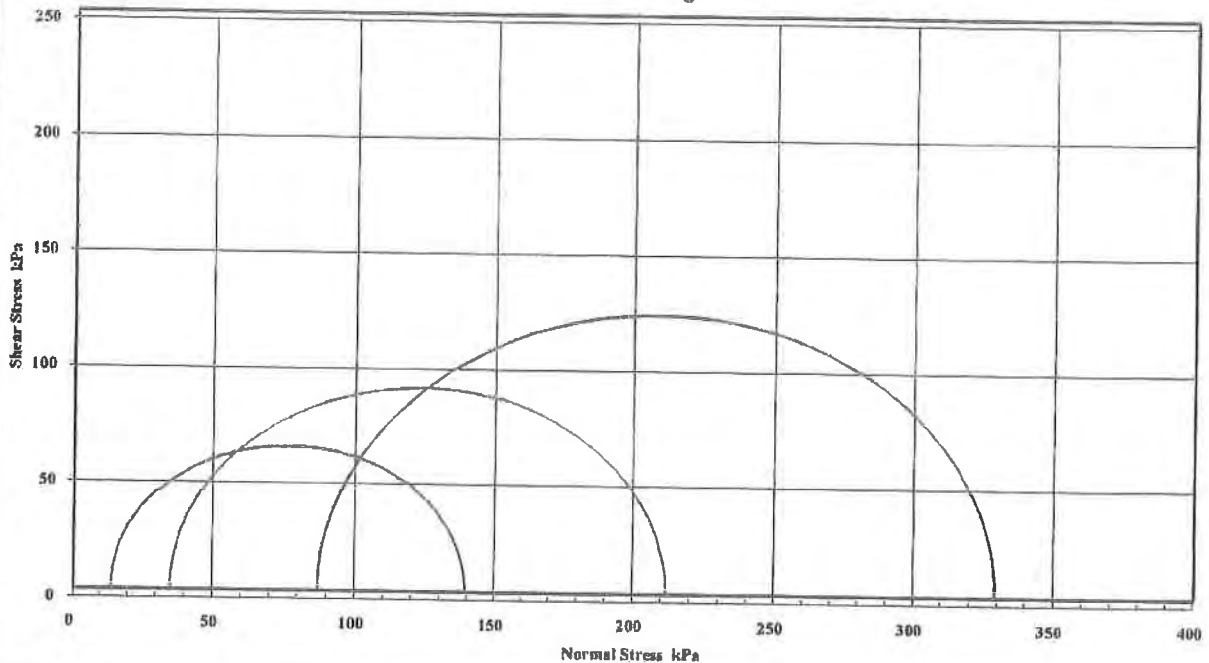
TRIAxIAL TEST REPORT

Test Method: AS1289.6.4.2

Client: Morrison Geotechnics Pty Ltd	Report No.: 710501-CU
Project: Riverlink Stage 2	Test Date: 12/10/2007
	Report Date: 29/10/2007
Client Id.: 15	Depth (m): 2.9-3.11

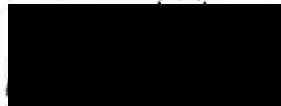
Description: (CH) CLAY- brown

Mohr Circle Diagram



Interpretation between stages :	1 to 2	2 to 3	1 to 3
Cohesion C' (kPa) :	24.5	44.2	34.7
Angle of Shear Resistance ?' (Degrees) :	33.4	22.7	25.9

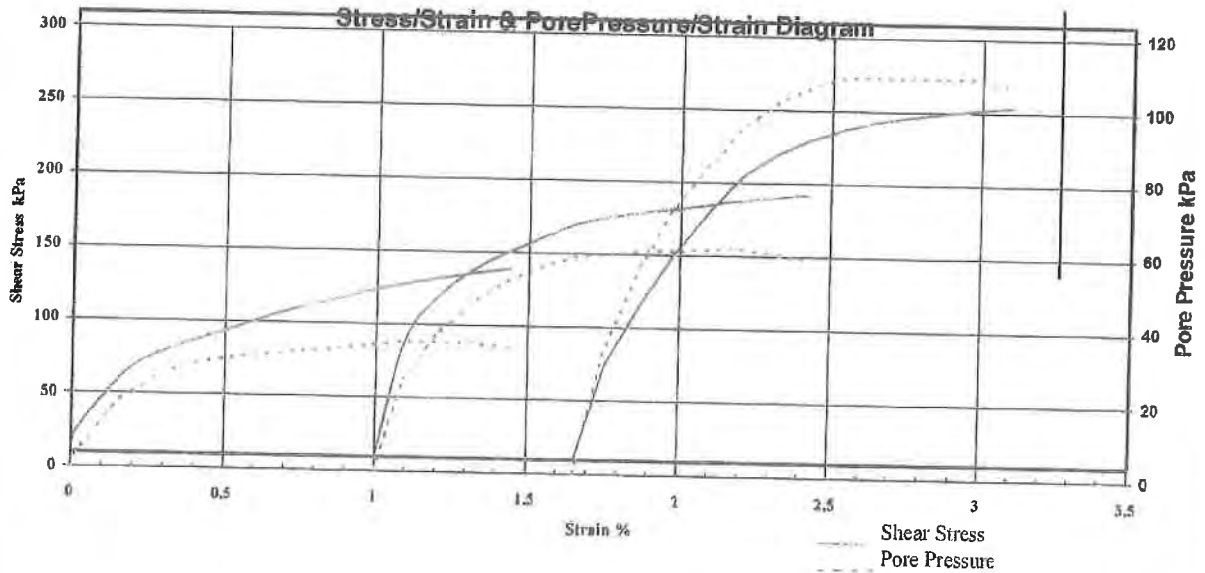
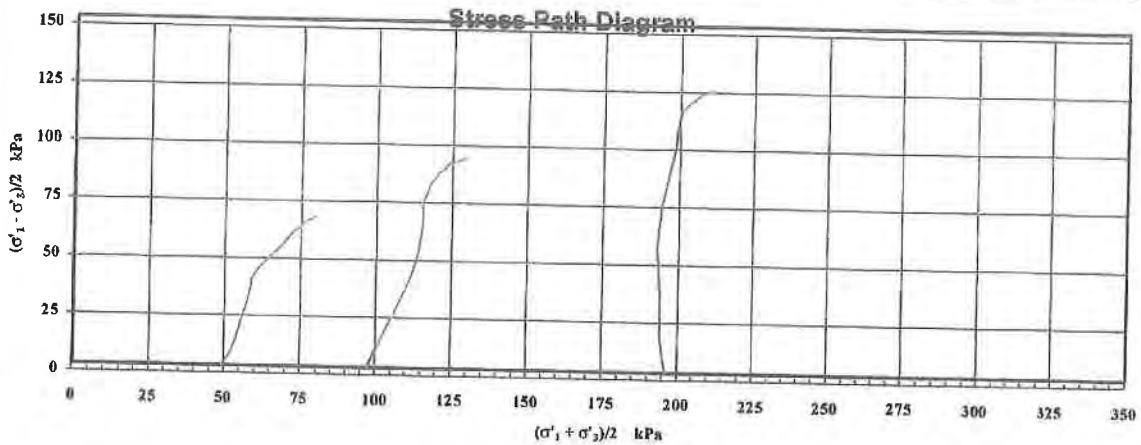
Cell Pressure (kPa):	50-100-200	Failure Criteria:	Peak Principal Stress Ratio				
SAMPLE & TEST DETAILS		FAILURE DETAILS					
<i>Sample Details</i>		<i>Moisture Contents</i>		<i>Principal Effective Stresses</i>		<i>Deviator Stress</i>	<i>Strain</i>
Initial Height :	91.8 mm	Initial Moisture	σ'_1	σ'_3			
Initial Diameter :	47.4 mm	26.5 %	139 kPa	14 kPa	125 kPa	1.31 %	
Wet Density :	1.98 t/m ³	Final Moisture	212 kPa	35 kPa	177 kPa	2.18 %	
Dry Density :	1.56 t/m ³		329 kPa	87 kPa	242 kPa	2.99 %	
Rate of Strain:	0.010 %/min	27.2 %					
B Response:	100 %						
Sample Type:	Single Individual Undisturbed Specimen	Remarks:	Tested as received				



TRIAXIAL TEST REPORT

Test Method: AS1289.6.4.2

Client: Morrison Geotechnics Pty Ltd	Report No.: 710501-CU
Project: Riverlink Stage 2	Test Date: 12/10/2007
Client Id.: 15	Report Date: 29/10/2007
Description: (CH) CLAY- brown	
Depth (m): 2.9-3.11	



Sample Type: Single Individual Undisturbed Specimen	Remarks: Tested as received
--	------------------------------------



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DIRECT SHEAR TESTS

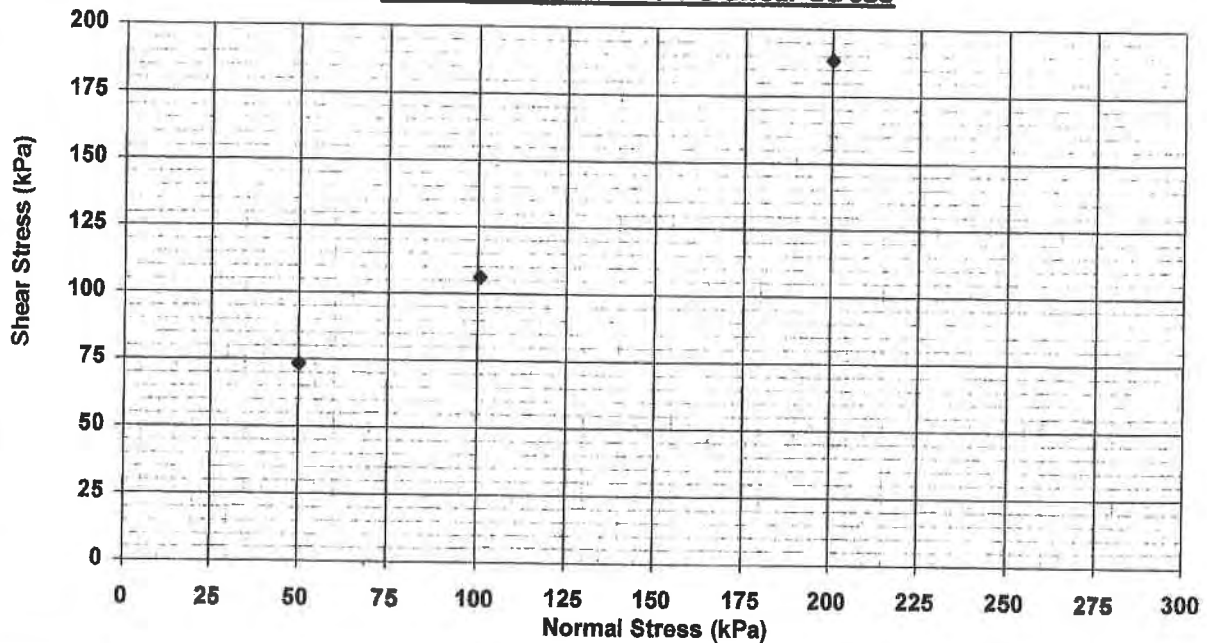
DIRECT SHEAR TEST REPORT

Test Method: AS 1289.6.2.2 / KH2 based on K.H. Head Vol. 2

Client: Morrison Geotechnical Pty Ltd	Report No.: 710490-DS
Project: 207E/186	Test Date: 25/10/2007
	Report Date: 29/10/2007
Client Id.: BH 4 (99040)	Depth (m): 0.1-0.7
Description: Coal (GP) SANDY GRAVEL-black	Sample Type: Three Individual Specimens remoulded to a target of 90% of Standard Maximum Dry Density

Failure Criteria: **PEAK**

Peak - Normal Stress v's Shear Stress



Shear Angle (deg.): 37.9		Cohesion (kPa): 28		r: 0.999
Specimen Dimensions(mm):	60 x 60	Normal Stress (kPa)		Shear Stress (kPa)
Rate of Strain(mm/min):	0.06	Stage 1	50.0	69.8
Initial Moisture Content(%):	25.1	Stage 2	100.4	102.6
Initial Wet Density(t/m3):	1.42	Stage 3	200.0	184.8

Remarks: Review the residual results as the Cohesion is above 2 kPa when plotted with a line of best fit. -6.7mm material test

Sample/s supplied by the client Note: Graph not to scale Page 1 of 1



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Authorized Signatory



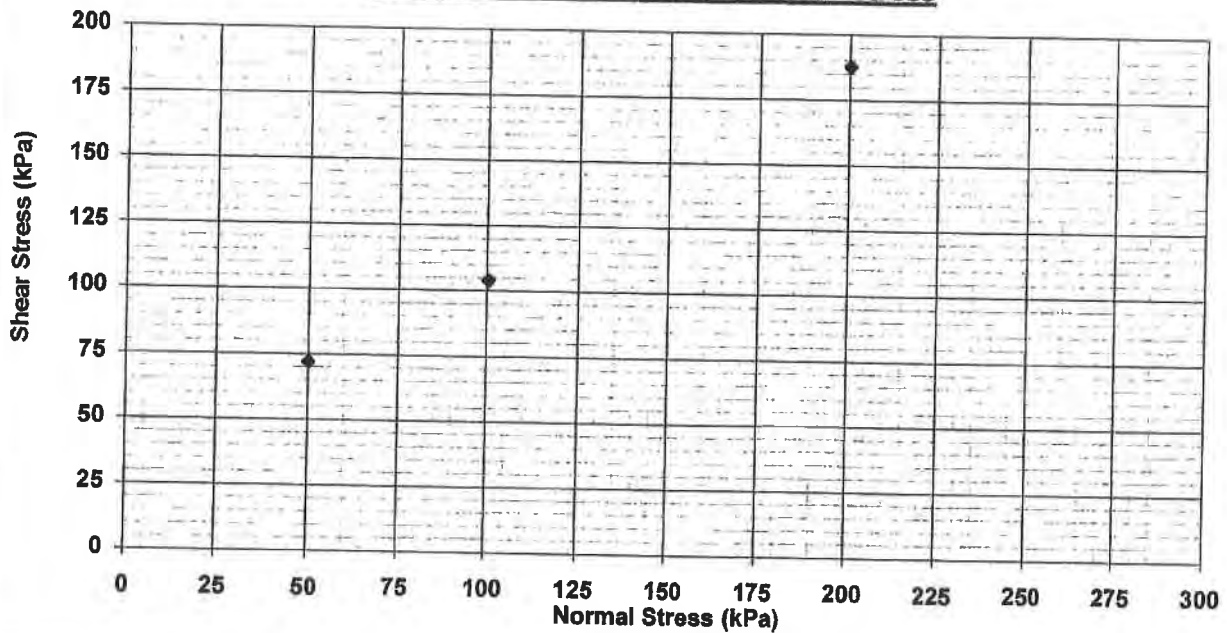
DIRECT SHEAR TEST REPORT

Test Method: AS 1289.6.2.2 / KH2 based on K.H. Head Vol. 2

Client: Morrison Geotechnical Pty Ltd	Report No.: 710490-DS
Project: 207E/186	Test Date: 25/10/2007 Report Date: 29/10/2007
Client Id.: BH 4 (99040)	Depth (m): 0.1-0.7
Description: Coal (GP) SANDY GRAVEL-black	Sample Type: Three Individual Specimens remoulded to a target of 90% of Standard Maximum Dry Density

Failure Criteria: RESIDUAL @ 6 mm DISPLACEMENT

Residual - Normal Stress v's Shear Stress



Shear Angle (deg): 38.2		Cohesion (kPa): 26		r: 0.999
Specimen Dimensions(mm):	60 x 60	Normal Stress (kPa)		Shear Stress (kPa)
Rate of Strain(mm/min):	0.06	Stage 1	50.0	68.2
Initial Moisture Content(%):	25.1	Stage 2	100.4	100.3
Initial Wet Density(t/m3):	1.42	Stage 3	200.0	184.1
Remarks: Review the residual results as the Cohesion is above 2 kPa when plotted with a line of best fit. -6.7mm material				
Sample/s supplied by the client		Note: Graph not to scale		Page 1 of 1



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Laboratory Number 9926

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Authorised Signatory

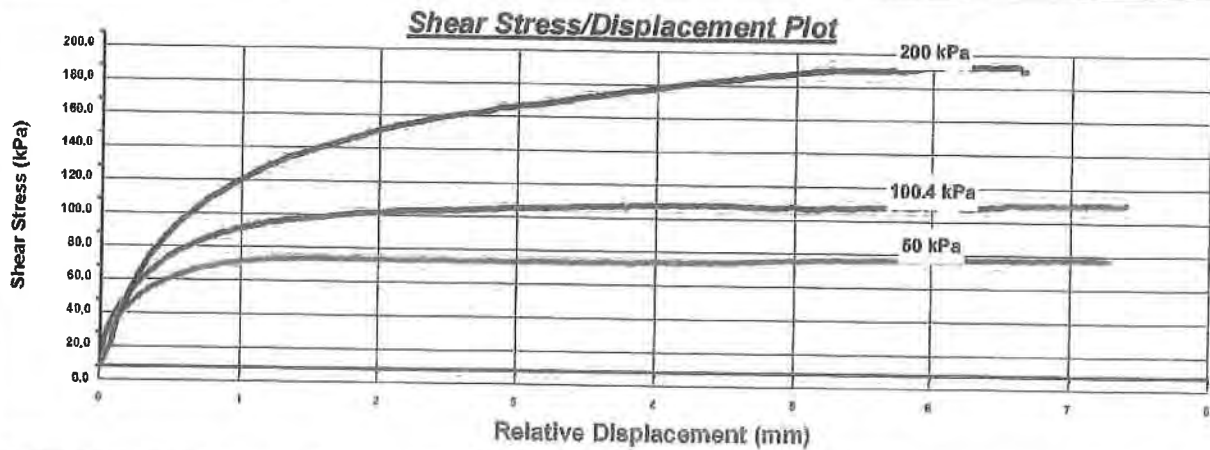
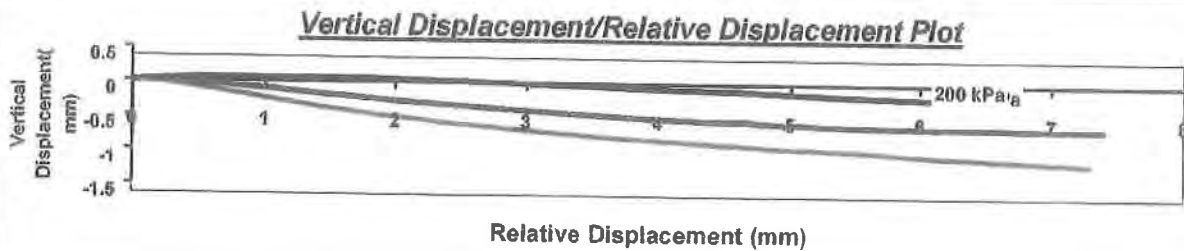


DIRECT SHEAR TEST REPORT

Test Method: AS 1289.6.2.2 / KH2 based on K.H. Head Vol. 2

Client: Morrison Geotechnical Pty Ltd	Report No.: 710490-DS
Project: 207E/186	Test Date: 25/10/2007 Report Date: 29/10/2007
Client Id.: BH 4 (99040)	Depth (m): 0.1-0.7
Description: Coal (GP) SANDY GRAVEL-black	Sample Type: Three Individual Specimens remoulded to a target of 90% of Standard Maximum Dry Density

Failure Criteria: RESIDUAL @ 6 mm DISPLACEMENT



Specimen Dimensions(mm):	60 x 60	Normal Stress (kPa)		Shear Stress (kPa)
Rate of Strain(mm/min):	0.06	Stage 1	50.0	68.2
Initial Moisture Content(%):	25.1	Stage 2	100.4	100.3
Initial Wet Density(t/m3):	1.42	Stage 3	200.0	184.1

Remarks: Review the residual results as the Cohesion is above 2 kPa when plotted with a line of best fit. -6.7mm material Sample & compaction data supplied by the client Note: Graph not to scale Page 1 of 1



TECHNICAL COMPETENCE

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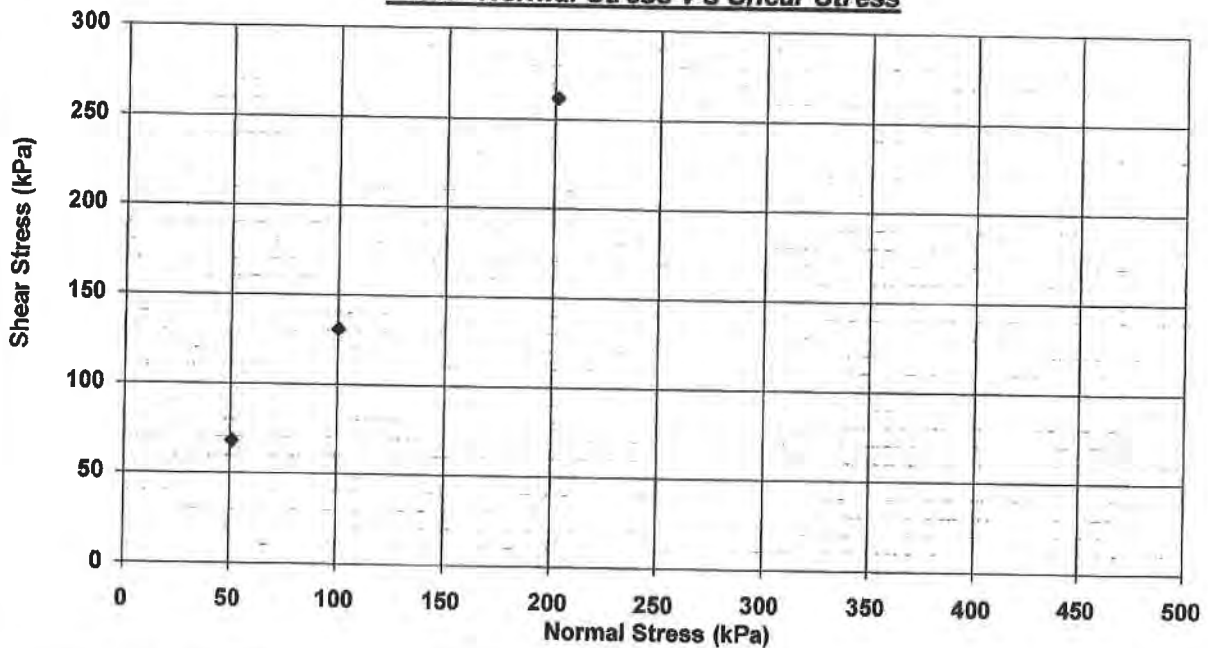
DIRECT SHEAR TEST REPORT

Test Method: AS 1289.6.2.2 / KH2 based on K.H. Head Vol. 2

Client: Morrison Geotechnical Pty Ltd		Report No.: 710489-DS	
Project: 207E/186		Test Date: 24/10/2007	
		Report Date: 29/10/2007	
Client Id.:	BH 8 (99039)	Depth (m): 1.5-2.0	
Description:	Coal (GP) SANDY GRAVEL-black	Sample Type: Three individual Specimens remoulded to a target of 90% of Standard Maximum Dry Density	

Failure Criteria: **PEAK**

Peak - Normal Stress v's Shear Stress



Shear Angle (deg.): 51.9		Cohesion (kPa): 0		r: 1.000	
Specimen Dimensions(mm):	60 x 60	Normal Stress (kPa)		Shear Stress (kPa)	
Rate of Strain(mm/min):	0.06	Stage 1	50.7	62.8	
Initial Moisture Content(%):	22.7	Stage 2	100.0	125.7	
Initial Wet Density(t/m3):	1.088	Stage 3	201.1	256.4	
Remarks: Compaction data supplied by the client -6.7mm material tested.					
Sample/s supplied by the client			Note: Graph not to scale		Page 1 of 1



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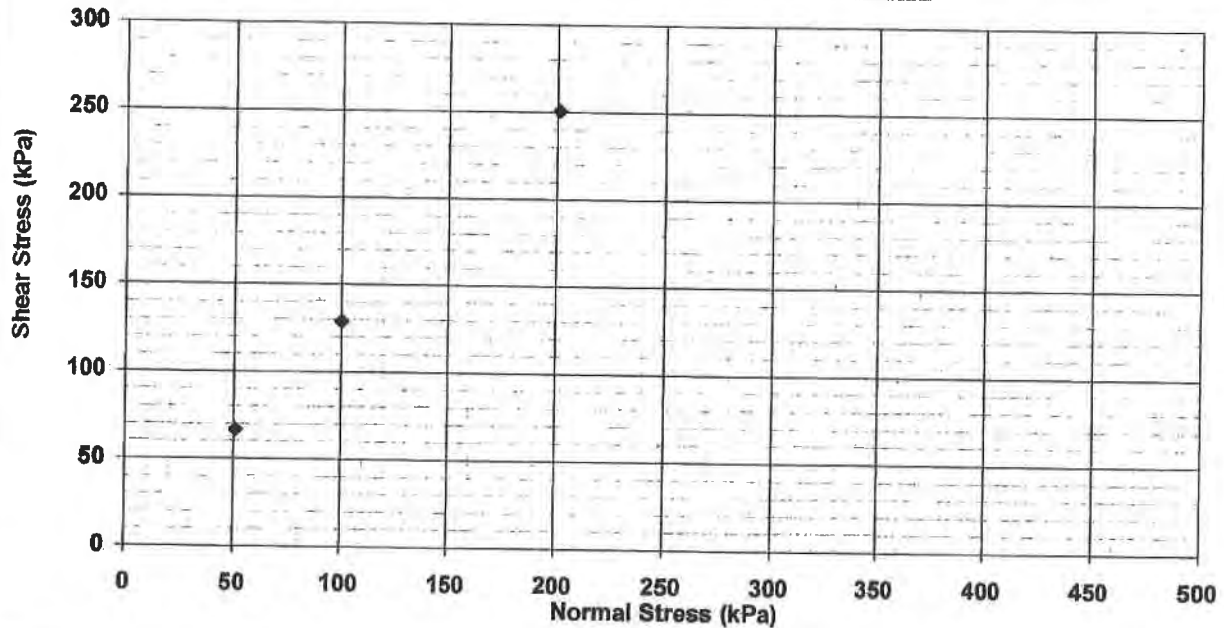
DIRECT SHEAR TEST REPORT

Test Method: AS 1289.6.2.2 / KH2 based on K.H. Head Vol. 2

Client: Morrison Geotechnical Pty Ltd	Report No.: 710489-DS
Project: 207E/186	Test Date: 24/10/2007 Report Date: 29/10/2007
Client Id.: BH 8 (99039)	Depth (m): 1.5-2.0
Description: Coal (GP) SANDY GRAVEL-black	Sample Type: Three individual specimens remoulded to a target of 90% of Standard Maximum Dry Density

Failure Criteria: RESIDUAL @ 5.5 mm DISPLACEMENT

Residual - Normal Stress v's Shear Stress



Shear Angle (deg.): 50.7	Cohesion (kPa): 0	r: 1.000
Specimen Dimensions(mm): 60 x 60	Normal Stress (kPa)	
Rate of Strain(mm/min): 0.06	Stage 1 50.7	Shear Stress (kPa) 61.1
Initial Moisture Content(%): 22.7	Stage 2 100.0	123.5
Initial Wet Density(t/m3): 1.088	Stage 3 201.1	245.4
Remarks: Compaction data supplied by the client -6.7mm material tested.		
Sample/s supplied by the client	Note: Graph not to scale	Page 1 of 1



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Authorized Signatory

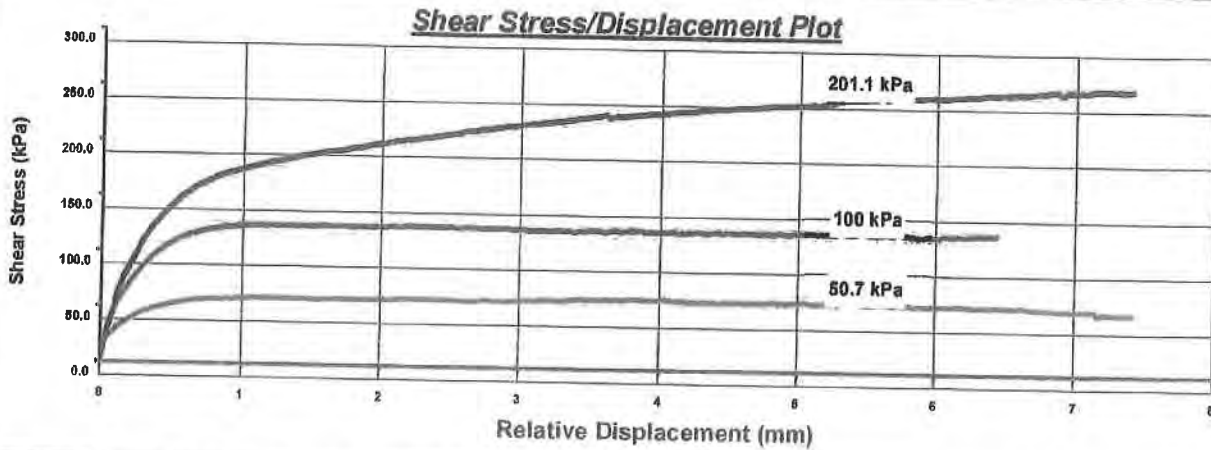
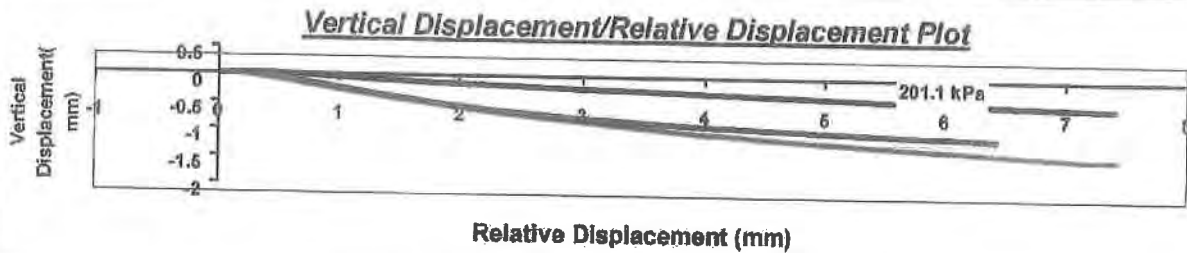


DIRECT SHEAR TEST REPORT

Test Method: AS 1289.6.2.2 / KH2 based on K.H. Head Vol. 2

Client: Morrison Geotechnical Pty Ltd	Report No.: 710489-DS
Project: 207E/186	Test Date: 24/10/2007 Report Date: 29/10/2007
Client Id.: BH 8 (99039)	Depth (m): 1.5-2.0
Description: Coal (GP) SANDY GRAVEL-black	Sample Type: Three Individual Specimens remoulded to a target of 90% of Standard Maximum Dry Density

Failure Criteria: RESIDUAL @ 5.5 mm DISPLACEMENT



Specimen Dimensions(mm):	60 x 60	Normal Stress (kPa)		Shear Stress (kPa)
Rate of Strain(mm/min):	0.06	Stage 1	50.7	61.1
Initial Moisture Content(%):	22.7	Stage 2	100.0	123.5
Initial Wet Density(t/m3):	1.088	Stage 3	201.1	245.4

Remarks: Compaction data supplied by the client -6.7mm material tested.

Sample/s supplied by the client	Note: Graph not to scale	Page 1 of 1
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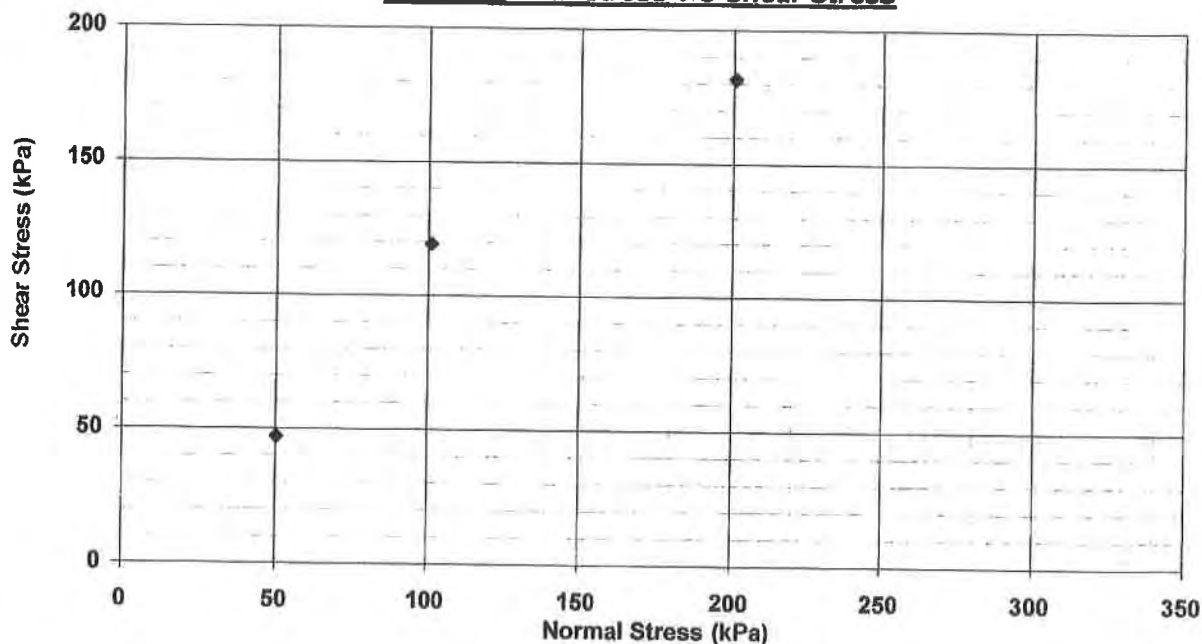
DIRECT SHEAR TEST REPORT

Test Method: AS 1289.6.2.2 / KH2 based on K.H. Head Vol. 2

Client: Morrison Geotechnical Pty Ltd	Report No.: 710491-DS
Project: 207E/186	Test Date: 26/10/2007 Report Date: 29/10/2007
Client Id.: BH 8 (99041)	Depth (m): 3.0-3.5
Description: (SM) SILTY SAND-brown with gravel	Sample Type: Three Individual Specimens remoulded to a target of 95% of Standard Maximum Dry density

Failure Criteria: **PEAK**

Peak - Normal Stress v's Shear Stress



Shear Angle (deg.): 39.9		Cohesion (kPa): 14		r: 0.981	
Specimen Dimensions(mm):	60 x 60	Normal Stress (kPa)		Shear Stress (kPa)	
Rate of Strain(mm/min):	0.06	Stage 1	50.0	43.5	
Initial Moisture Content(%):	19.6	Stage 2	100.8	115.7	
Initial Wet Density(t/m ³):	1.636	Stage 3	200.5	178.1	

Remarks: Please review the results if the Cohesion is above 2 kPa when plotted with a line of best fit

Sample/s supplied by the client	Note: Graph not to scale	Page 1 of 1
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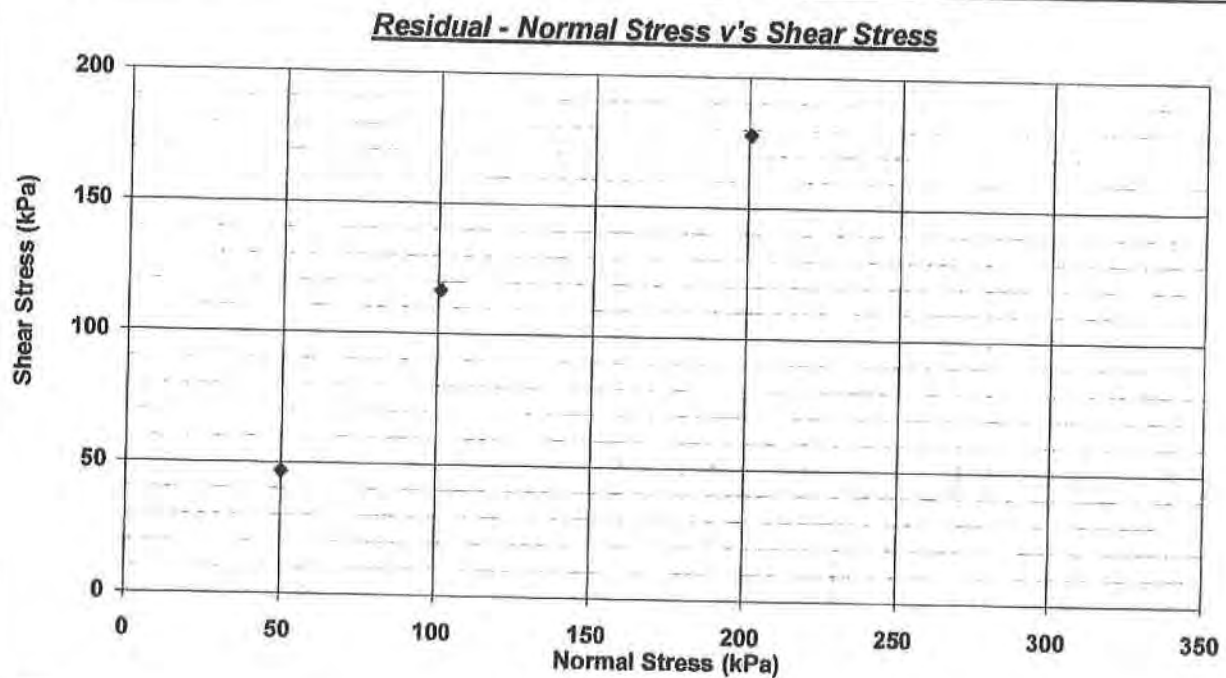


DIRECT SHEAR TEST REPORT

Test Method: AS 1289.6.2.2 / KH2 based on K.H. Head Vol. 2

Client: Morrison Geotechnical Pty Ltd	Report No.: 710491-DS
Project: 207E/186	Test Date: 26/10/2007 Report Date: 29/10/2007
Client Id.: BH 8 (99041)	Depth (m): 3.0-3.5
Description: (SM) SILTY SAND-brown with gravel	Sample Type: Three Individual Specimens remoulded to a target of 95% of Standard Maximum Dry density

Failure Criteria: **RESIDUAL @ 6 mm DISPLACEMENT**



Shear Angle (deg.): 39.2		Cohesion (kPa): 14		r: 0.981
Specimen Dimensions(mm):	60 x 60	Normal Stress (kPa)		Shear Stress (kPa)
Rate of Strain(mm/min):	0.06	Stage 1	50.0	42.9
Initial Moisture Content(%):	19.6	Stage 2	100.8	113.0
Initial Wet Density(t/m3):	1.636	Stage 3	200.5	174.3

Remarks: Please review the results if the Cohesion is above 2 kPa when plotted with a line of best fit

Sample/s supplied by the client Note: Graph not to scale Page 1 of 1



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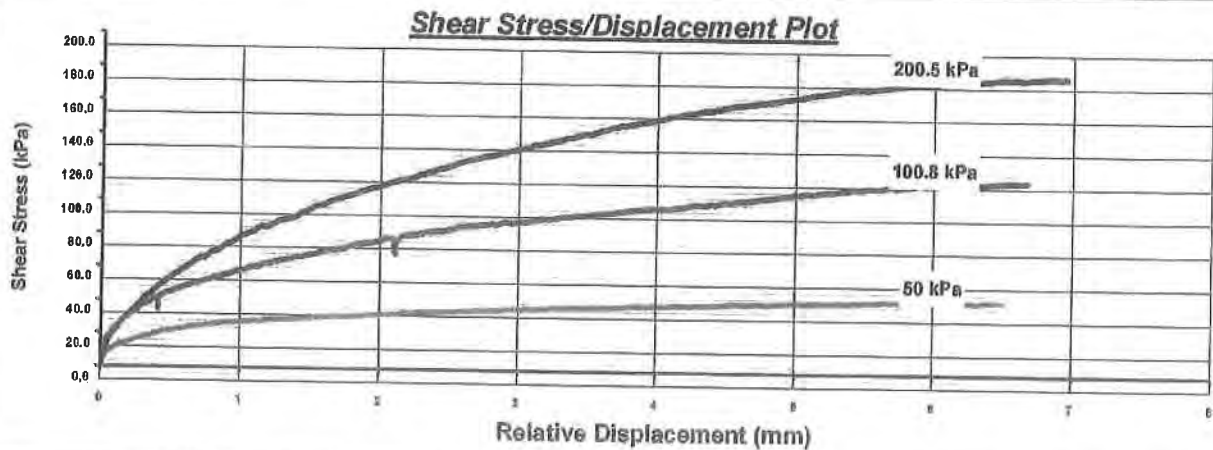
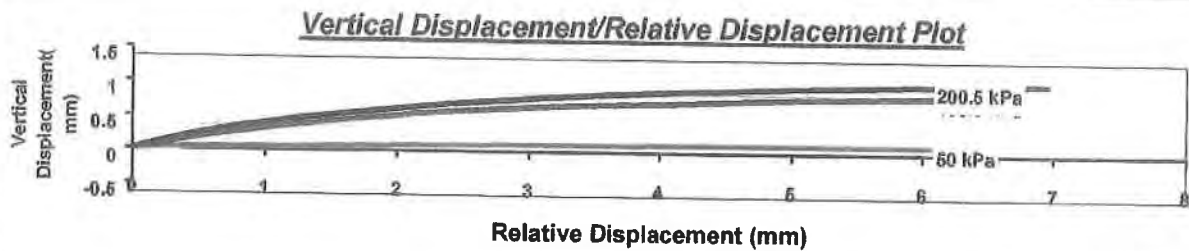


DIRECT SHEAR TEST REPORT

Test Method: AS 1289.6.2.2 / KH2 based on K.H. Head Vol. 2

Client: Morrison Geotechnical Pty Ltd	Report No.: 710491-DS
Project: 207E/186	Test Date: 26/10/2007 Report Date: 29/10/2007
Client Id.: BH 8 (99041)	Depth (m): 3.0-3.5
Description: (SM) SILTY SAND-brown with gravel	Sample Type: Three Individual Specimens remoulded to a target of 95% of Standard Maximum Dry density

Failure Criteria: RESIDUAL @ 6 mm DISPLACEMENT



Specimen Dimensions(mm):	60 x 60	Normal Stress (kPa)		Shear Stress (kPa)
Rate of Strain(mm/min):	0.06	Stage 1	50.0	42.9
Initial Moisture Content(%):	19.6	Stage 2	100.8	113.0
Initial Wet Density(t/m3):	1.636	Stage 3	200.5	174.3

Remarks: Please review the results if the Cohesion is above 2 kPa when plotted with a line of best fit

Sample/s supplied by the client	Note: Graph not to scale	Page 1 of 1
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APPENDIX 'C'

SLOPE STABILITY ASSESSMENT RESULTS

EXISTING BATTER AT SECTION AA

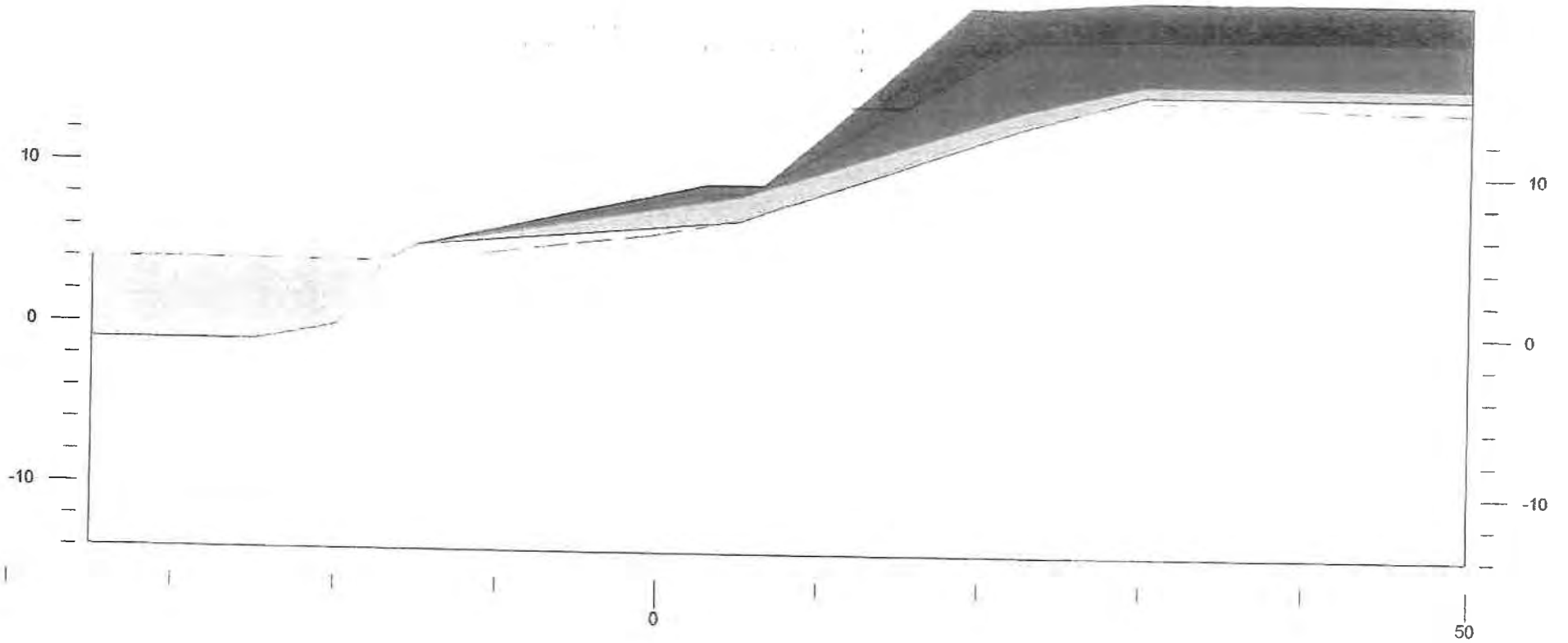
NORMAL GROUNDWATER CONDITIONS

LOAD ?

	Gamma	C	Phi	Piezo
	kN/m ³	kPa	deg	Surf.
Water	9.81	0	0	1
Fill 2 (Cl/CP)	19	2	36	1
Nat Stiff Clay	20	15	25	1
Sandstone	22	15	36	1

Modify using Set/User Name
 207E186
 Riverlink - Stage 2, North Ipswich, Section A-A
 16/11/07
 Global Stability

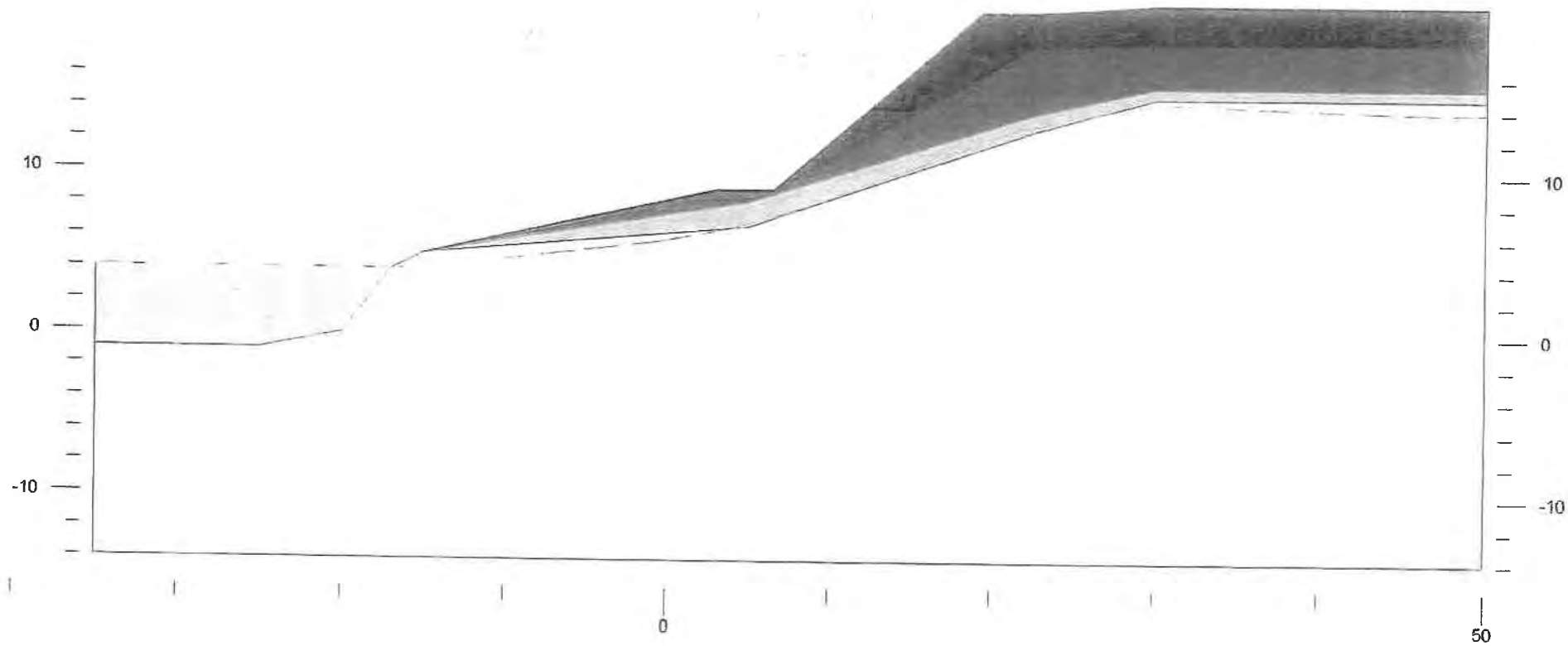
×
 F = 0.933



	Gamma	C	Phi	Piezo
	kN/m ³	kPa	deg	Surf.
Water	9.81	0	0	1
Fill	15	0	31	0
Fill 2 B/CH	19	2	28	1
Nat Stiff Clay	20	15	25	1
Sandstone	22	15	36	1

X
F = 0.957

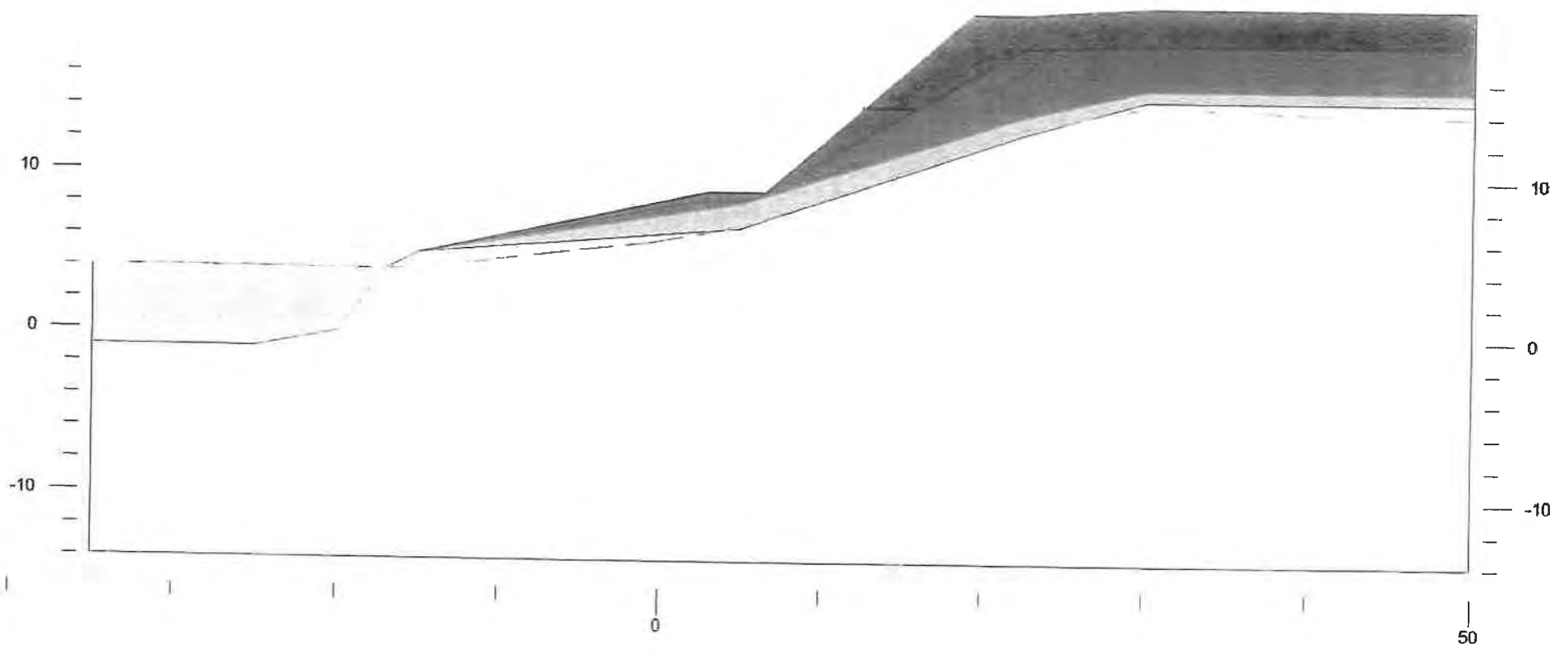
Modify using Set/User Name
207E186
Riverlink - Stage 2, North Ipswich, Section 4-4
16/11/07
Global Stability



×
F = 1.085

	Gamma	C	Phi	Piezo
	kN/m ³	kPa	deg	Surf.
Water	9.81	0	0	1
Fill 2 (1/CH)	19	2	36	1
Nat Stiff Clay	20	15	25	1
Sandstone	22	15	36	1

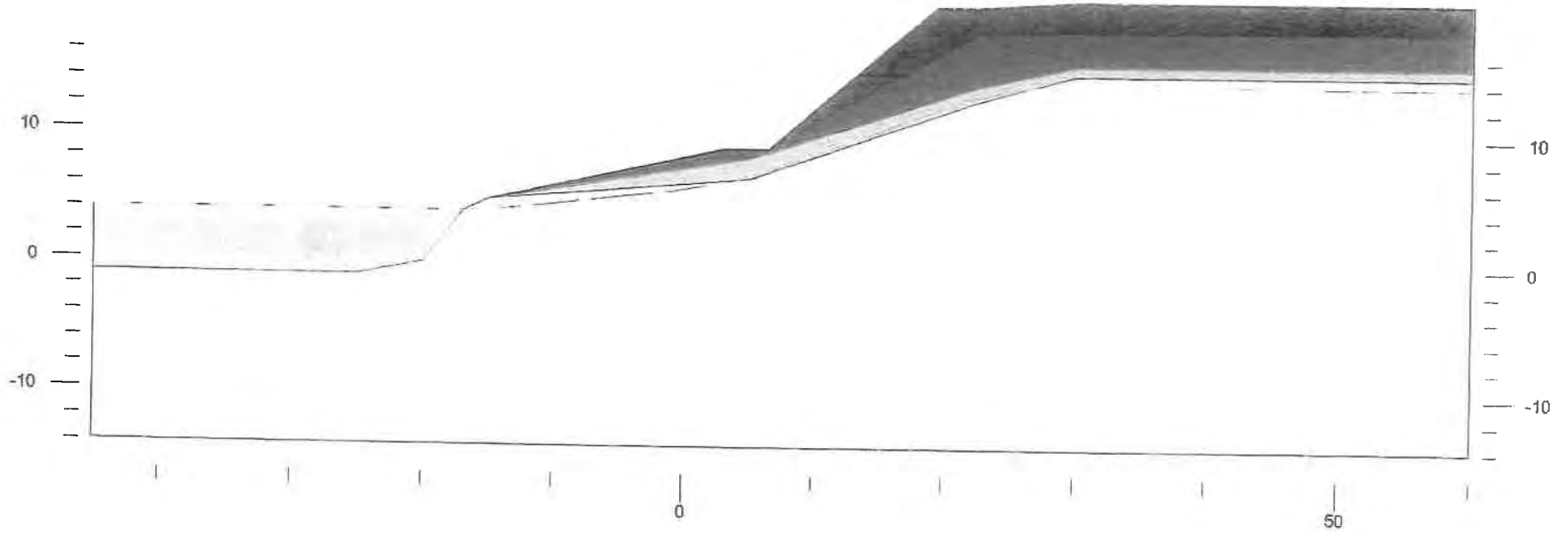
Modify using Set/User Name
207E126
Riverlink - Stage 2, North Ipswich, Section A-A
15/11/07
Global Stability



✕ F = 1.307

	Gamma	C	Phi	Piezo
	kN/m ³	kPa	deg	Surf.
Water	9.81	0	0	1
Fill	19	2	16	1
Nat Stiff Clay	20	15	25	1
Sandstone	22	15	36	1

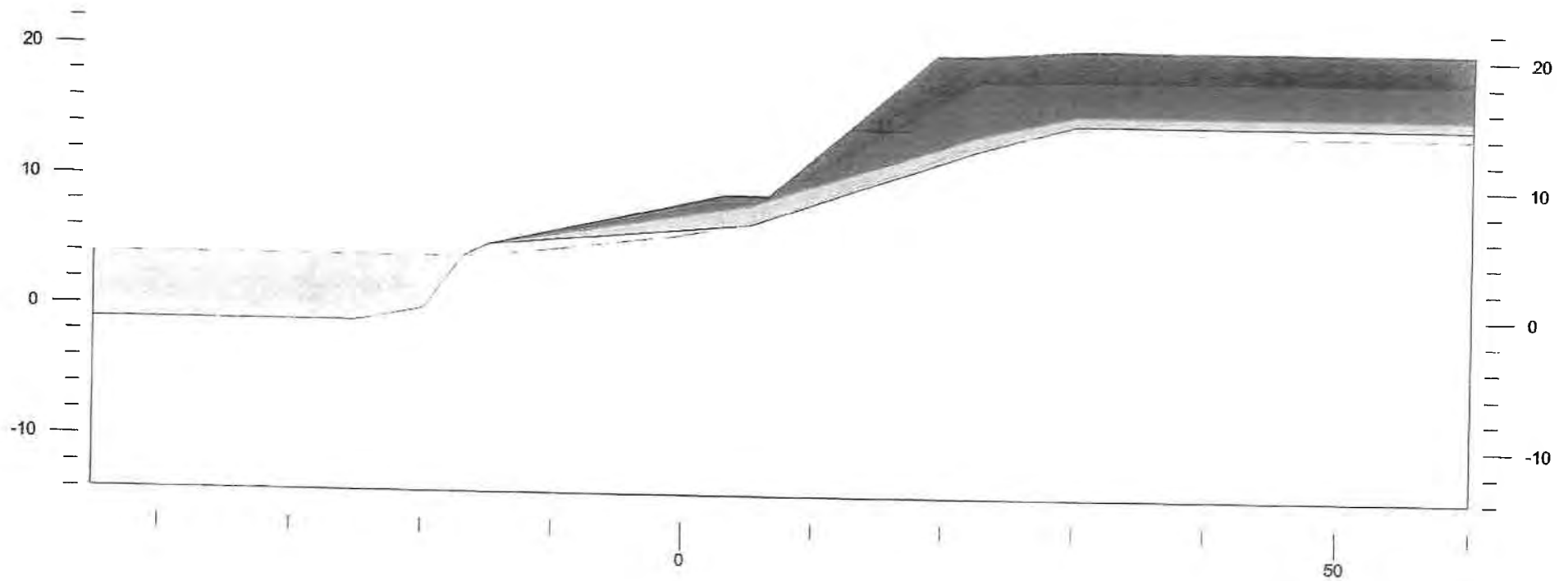
Modify using Set/User Name
207E186
Riverlink - Stage 2, North Ipswich, Section A-A
16/11/07
Global Stability



X
F = 1.488

	Gamma C		Phi	Piezo
	kN/m3	kPa	deg	Surf.
Water	9.81	0	0	1
Fill 3 Cl/Ck	15	2	28	1
Nat Stiff Clay	20	15	25	1
Sandstone	22	15	36	1

Modify using Set/User Name
207E186
Riverlink - Stage 2, North Ipswich, Section A-A
16/11/07
Global Stability



**BATTER TRIMMED BACK AT 25°
TO PRODUCE ADEQUATE STABILITY
NORMAL GROUNDWATER CONDITIONS**

	Gamma C	Phi	Piezo
	kN/m ³	kPa	deg
Water	9.81	0	0
Fill 2 Cl/CF	19	2	33
Nat Stiff Clay	20	15	25
Sandstone	22	15	36

X
F = 1.449

Modify using Set/User Name
207E186
Riverlink - Stage 2, North Ipswich, Section A-A
16/11/07
Global Stability

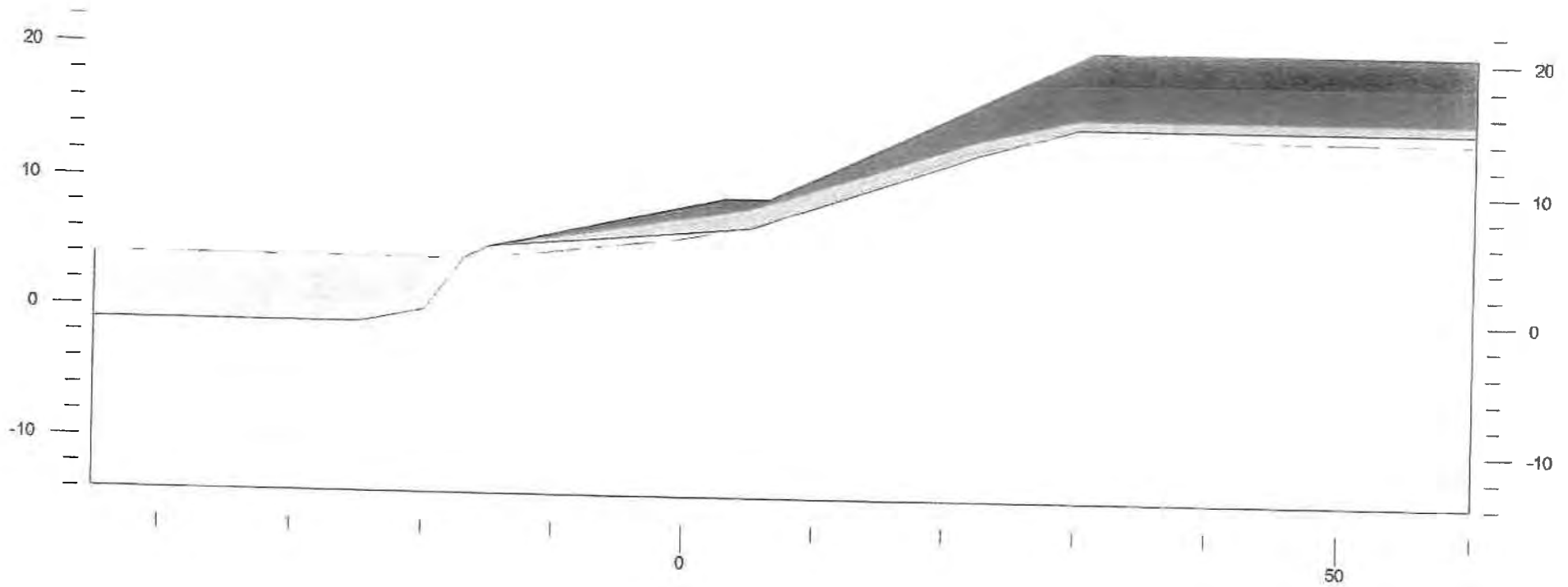
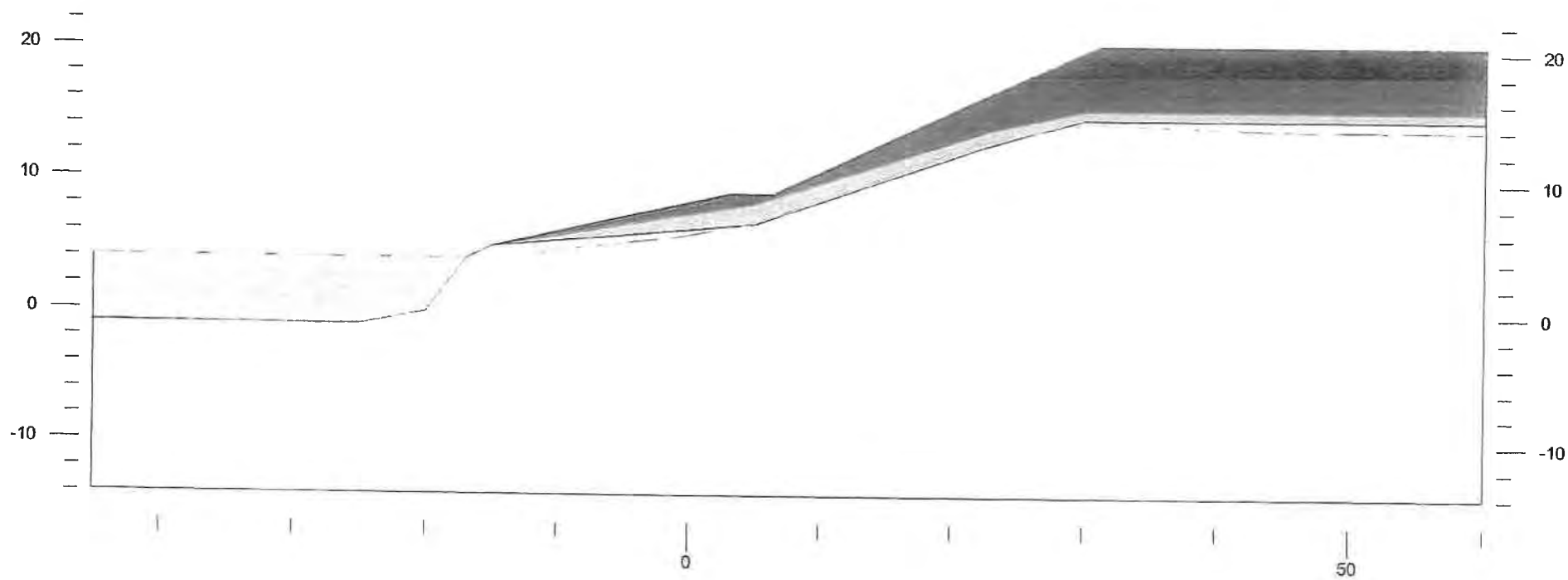


FIG1A

⊗ F = 1.511

	Gamma kN/m ³	C kPa	Phi deg	Piezo Surf.
Water	9.81	0	0	1
Fill (Gravel-S)	13	0	41	2
Fill 2 (Cl/SH)	18	0	28	1
Nat Stiff Clay	20	15	25	1
Sandstone	22	15	36	1

Modify using Set/User Name
207E186
Riverlink - Stage 2, North Ipswich, Section A-A
16/11/07
Global Stability





F = 1.689

	Gamma kN/m ³	C kPa	Phi deg	Piezo Surf.
Water	9.81	0	0	1
Fill 2 (Clay)	19	15	26	1
Nat. Stiff Clay	20	15	25	1
Sandstone	22	15	36	1

Modify using Set/User Name
207E186
Riverlink - Stage 2, North Ipswich, Section A-A
16/11/07
Global Stability

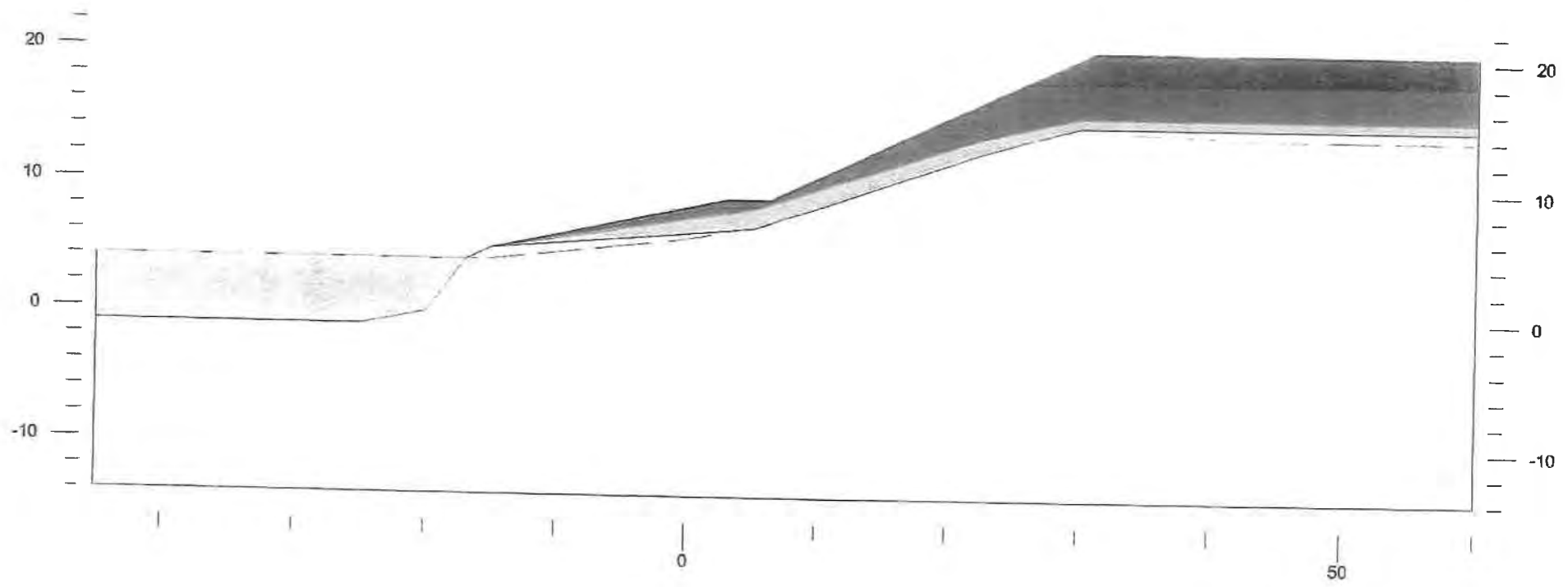


FIG3A

X
F = 1.860

	Gamma	C	Phi	Piezo
	kN/m ³	kPa	deg	Surf.
Water	9.81	0	0	1
Fill	13	2	26	1
Nat Stiff Clay	20	15	25	1
Sandstone	22	15	36	1

Modify using Set/User Name
207E186
Riverlink - Stage 2, North Ipswich, Section A-A
16/11/07
Global Stability

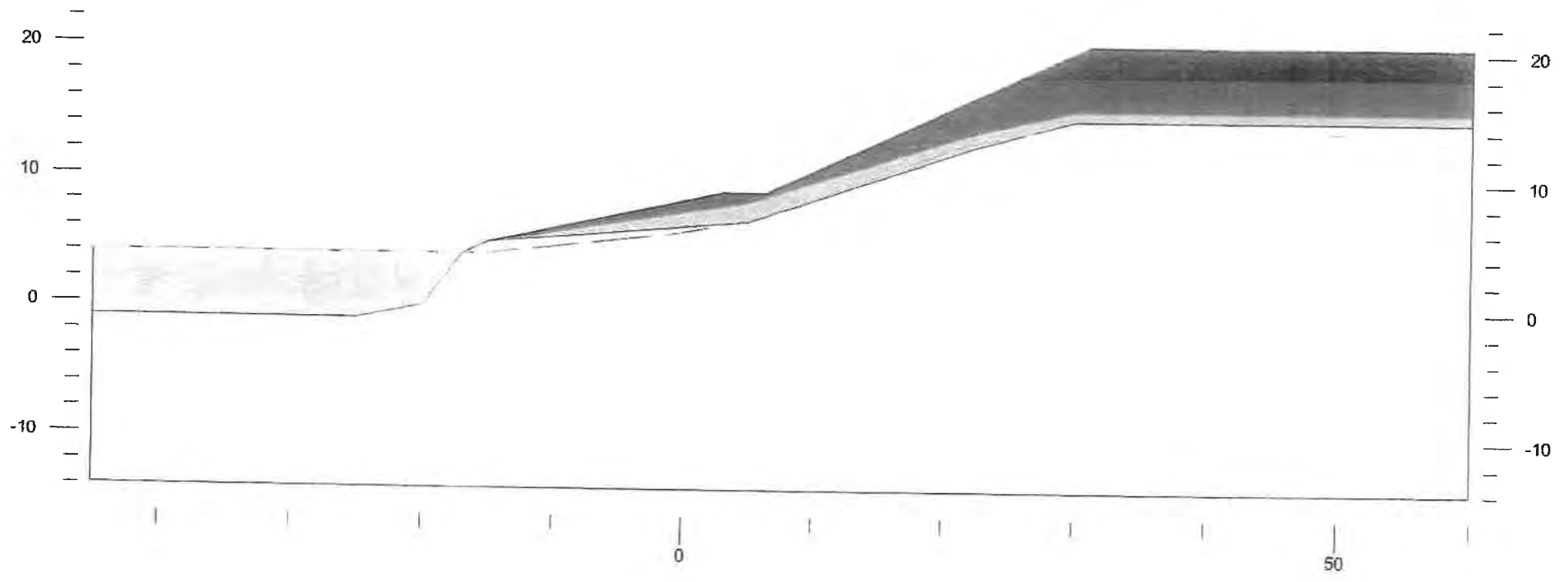


FIG4A

BATTER TRIMMED BACK AT 25°
TO PROVIDE ADEQUATE STABILITY
RAPID DRAWDOWN WITH HIGH GROUNDWATER CONDITIONS

	Gamma C	Phi	Piezo
	kN/m ³	kPa	deg
Water	9.8	0	0
Fill 2/0/CH	12	2	28
Nat Stiff Clay	20	15	25
Sandstone	22	15	36

X
F = 1.104

Modify using Set/User Name
207E186
Riverlink - Stage 2, North Ipswich, Section A-A
16/11/07
Global Stability

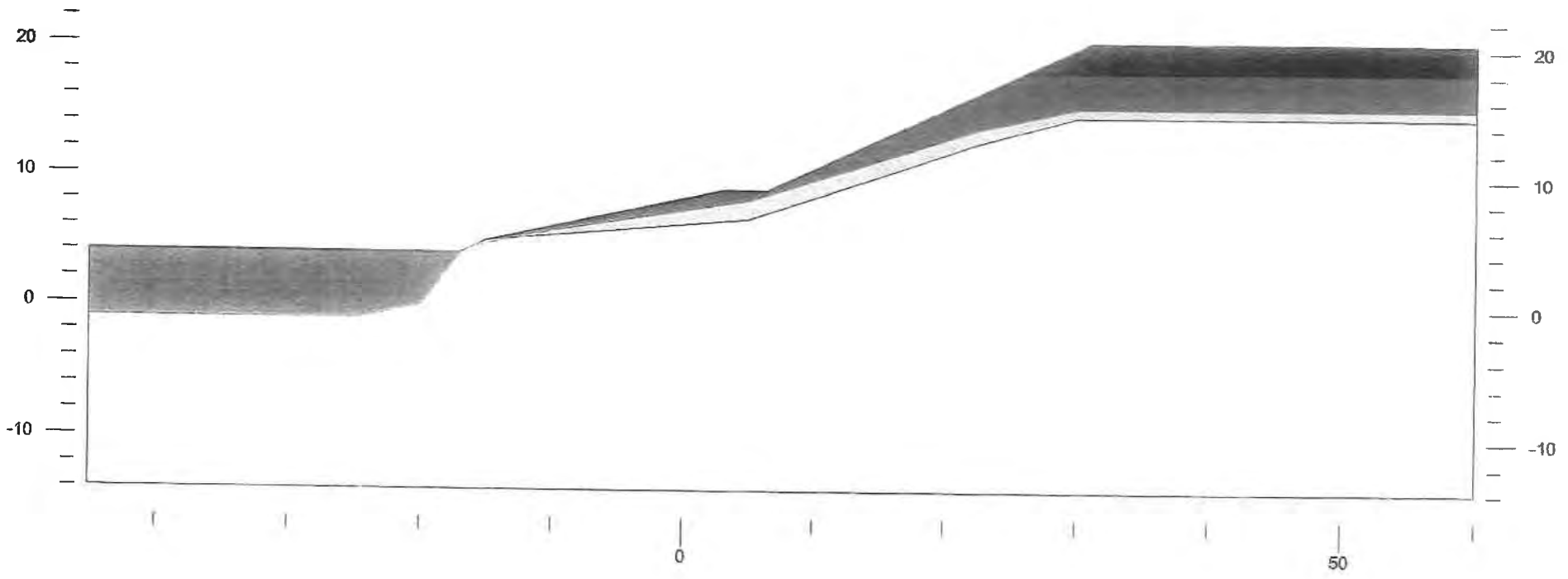


FIG1B

	Gamma C	Phi	Piezo
	kN/m ³	kPa	deg
Water	9.81	0	0
Fill 2 (C/GH)	19	2	28
Nat Stiff Clay	20	15	25
Sandstone	22	15	36

F = 1.566

Modify using Set/User Name
 207E186
 Riverlink - Stage 2, North Ipswich, Section A-A
 16/11/07
 Global Stability

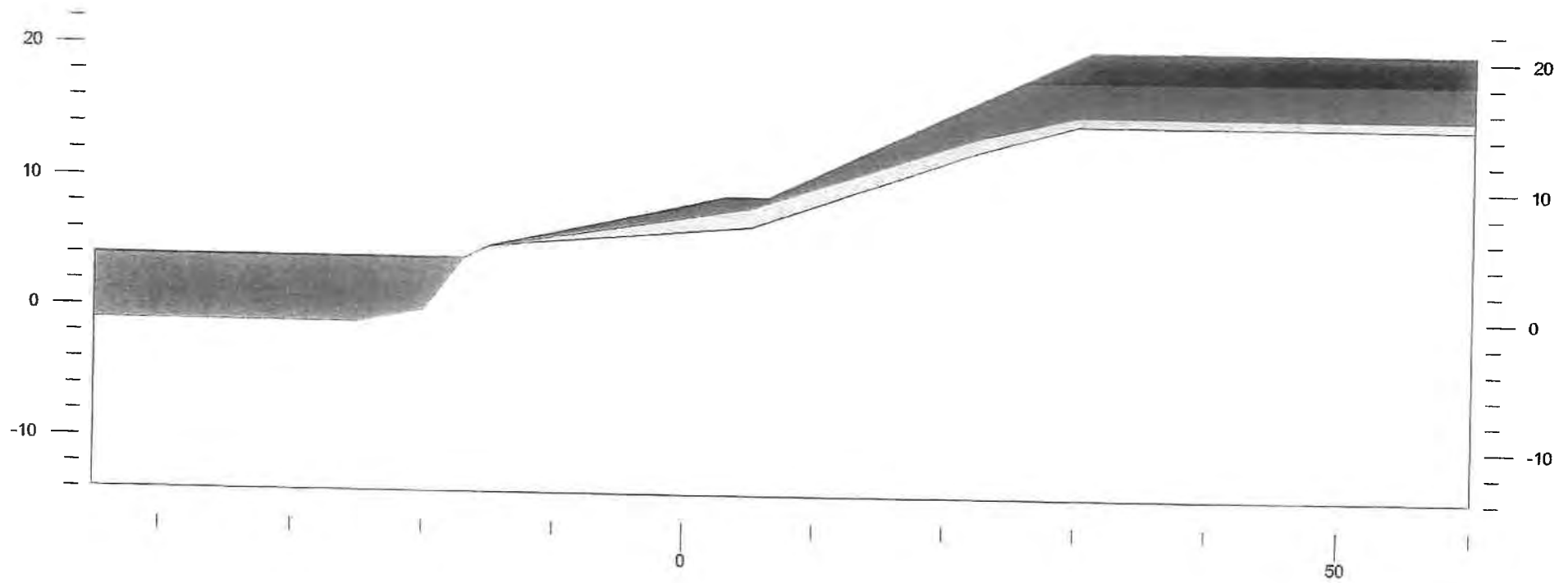


FIG2B

APPENDIX 'D'

GRAVITY RETAINING WALL SCHEME

ENVIROWall

$a = 3.0$ degs

$q_l = 0.0$ kPa

$q_d = 0.0$ kPa

$y_q = 2.487$ m

$y_s = 1.704$ m

3.995

0.250

0.300

137.2 kN

17.2 kN

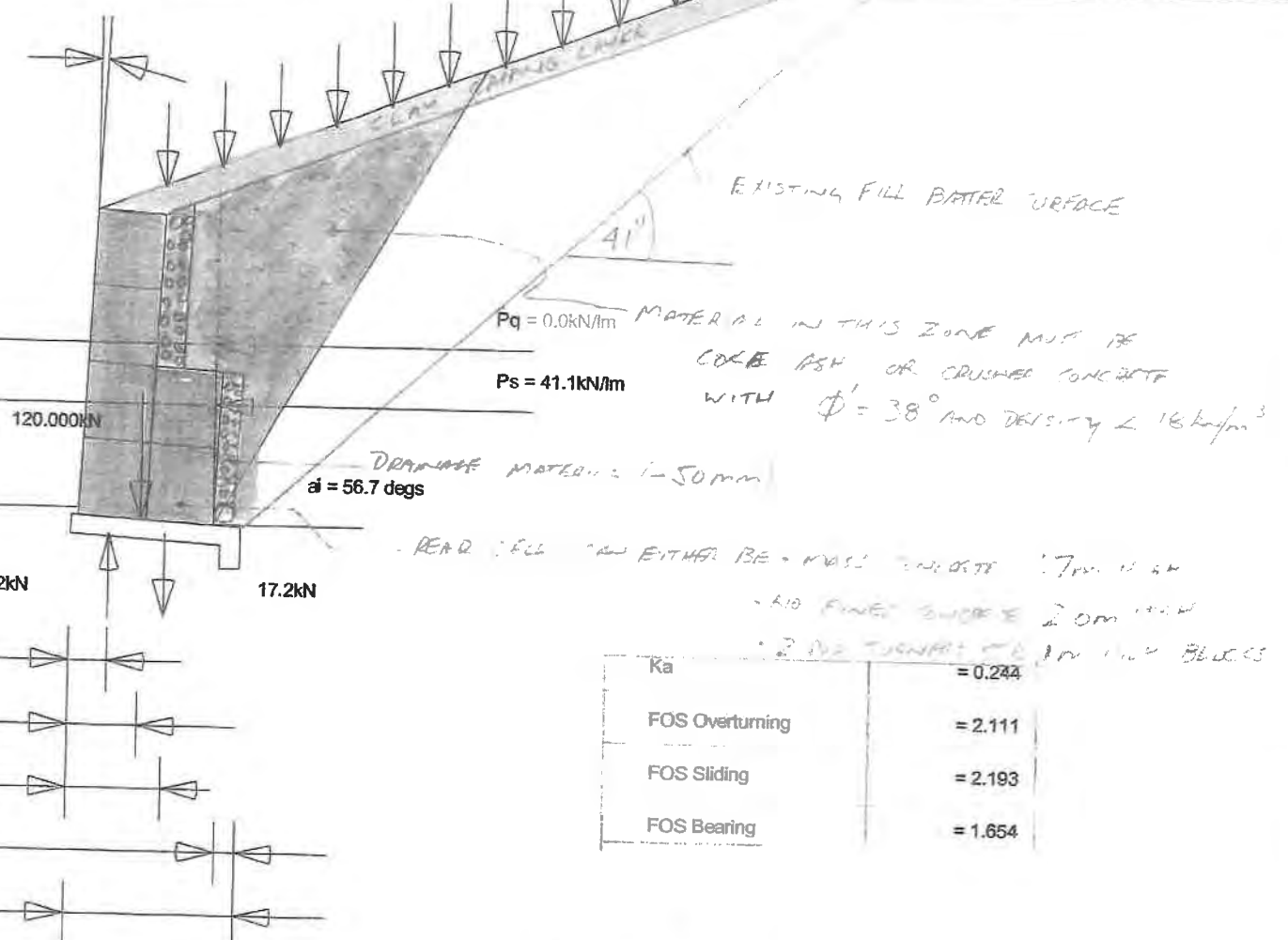
$R = 0.567$ m

$x_w = 1.032$ m

$x_f = 1.394$ m

0.300

2.500



$P_q = 0.0$ kN/m

$P_s = 41.1$ kN/m

$\alpha = 56.7$ degs

K_a	= 0.244
FOS Overturning	= 2.111
FOS Sliding	= 2.193
FOS Bearing	= 1.654

RIVERLINK STAGE 2 - SITE 2 SOUTHERN SECTION
ROCKBLOCK RETAINING WALL DETAILS

Project Name : Ieda

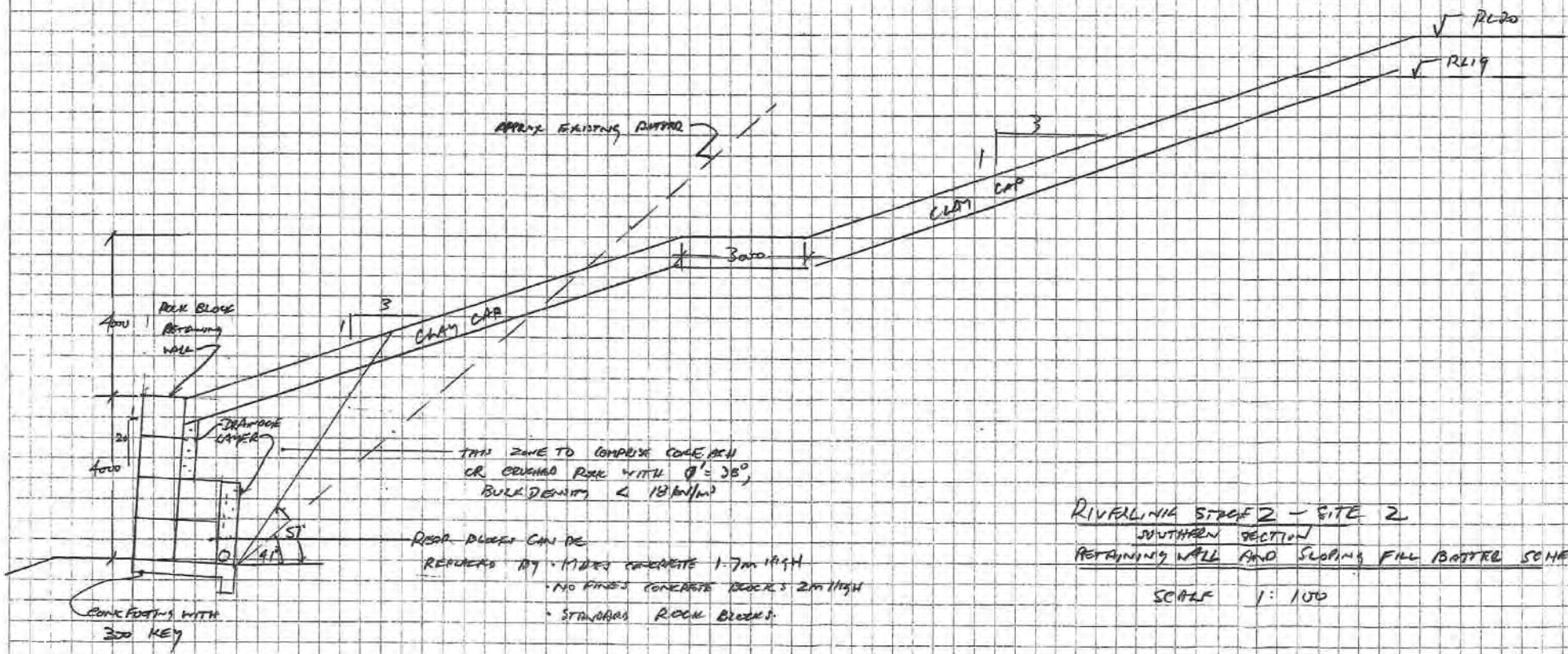
Client : Ieda

Section : geotechnic :

Date : 20/11/2007 :

Designer : Morrison Geotechnic Pty Ltd

Time : 10:33:37 AM



RIVERALING STAGE 2 - SITE 2
 SOUTHERN SECTION
 RETAINING WALL AND SLOPING FILL BATTER SCHEME

SCALE 1:100

South East Excavations innovates with retaining walls

7000 Curved wall
10000 Standard
2m x 1m block

New South Wales based South East Excavations has developed a new retaining wall system which seems to be offering advantages to its residential and industrial developer clients.

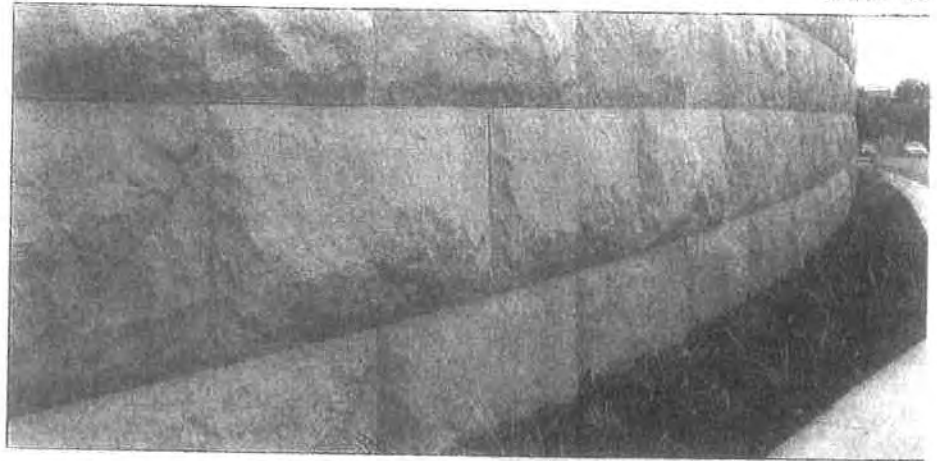
KNOwn AS ROCKBLOCK, the system is designed to manufacture retaining wall blocks on sites where large areas require retaining and particularly where high walls are required.

Suitable for industrial and residential subdivisions, infrastructure and capital works, the Rockblocks feature a sandstone face texture that can be coloured to client's requirements and protected against graffiti.

The retaining wall blocks cover a large surface area, 2m² for the standard block and 4m² for the double block.

Brian Turner of South East Excavations said, "We generally lay the standard block with a 30t excavator and the double block (weighing 4.8t) with a large integrated tool carrier with forks."

The blocks are made in a series of moulds that are transported to site, each mould able to produce single or two double blocks. The blocks are poured face down and the doors on the moulds are hydraulically lowered each morning. They are then lifted, rotated and placed for painting and sealing. The moulds are then reassembled and repoured. There is one concrete pour per day. The mandrels that create the cavity are extracted from the moulds each afternoon.



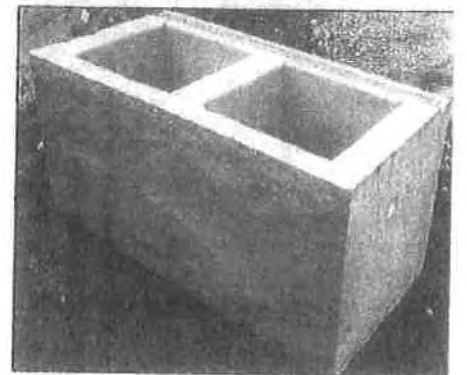
The blocks form part of a running bond pattern with a standard size of 2m long and 1m high. All the different varieties relate to making the system fit different applications.

"We make quarter, half and three-quarter high blocks, together with 8:1 raked blocks, double length blocks and capping blocks," said Turner.

Rockblocks are currently being used at a 50-lot residential subdivision at Bilambil, comprising approximately 2500m² of retaining walls, and an 80 hectare industrial subdivision at Yatala with approximately 15,000m² of retaining walls up to 12m in height.

"At Yatala, we have 10 moulds and we make 80 square face metres per day that use approximately 40m³ of concrete," said Brian Turner.

The cost to manufacture the Rockblock system will vary with the cost of materials and labour in each area, however the company does believe it is competitive with other retaining systems on the market.



The tradespeople required to manufacture the blocks can be employed locally, as the system is designed to utilise concreters already on project sites. Quality control can also be provided on-site to meet the project specification.

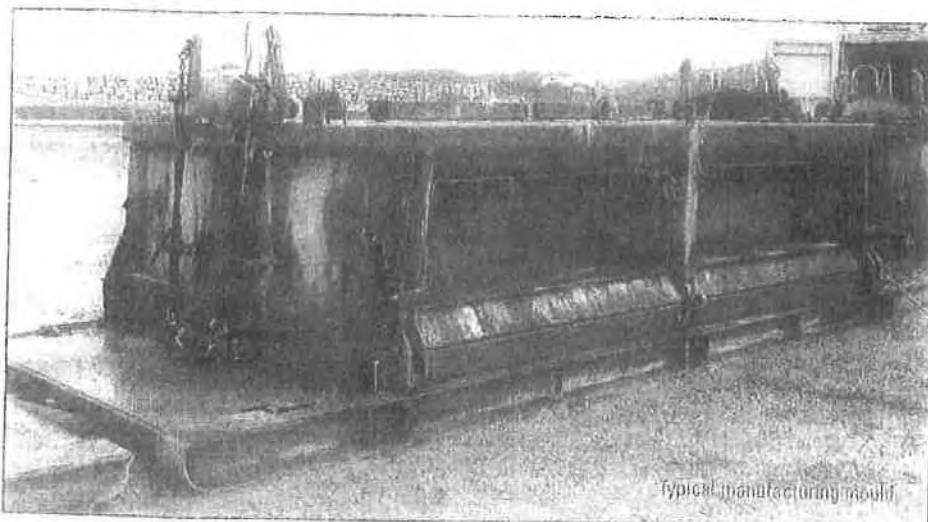
At the Yatala site, South East Excavations placed up to 80 blocks in a day's shift, that equated to more than 300m² of wall face.

"We also produced the aggregates and ready-mix concrete on-site to manufacture the blocks," said Turner.

"We believe the system is less labour intensive than other walls due to size of the blocks, it requires less tie-backs, soil nails or other support due to its mass," said Turner.

"On the Yatala site, the upper three metres of all walls are free of tie-backs, allowing the services to be laid close to the rear of the blocks. The blocks are also placed almost vertical (2 per cent rake back), maximising the land that can be utilised."

The system has potential to be used in infrastructure projects such as road and rail corridors. It can be used anywhere retaining is required, and can be engineered to meet project specific requirements and blends favourably with surrounding landscape.

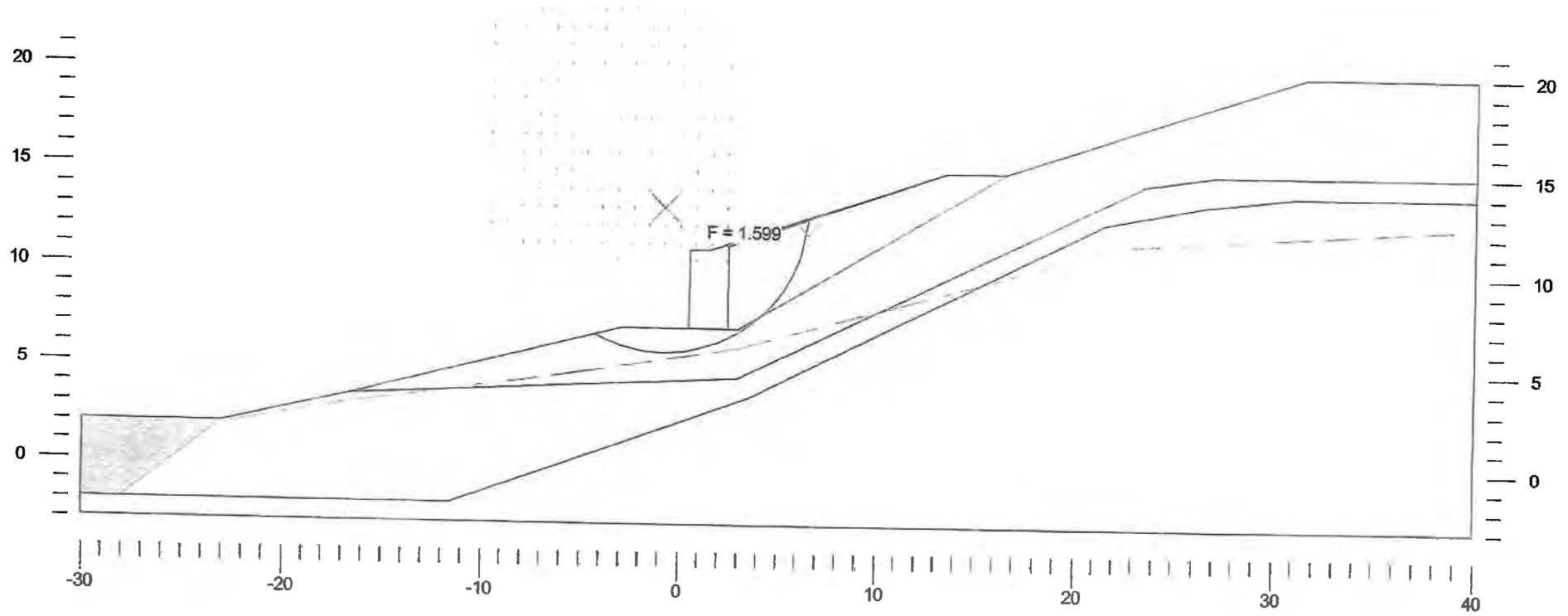


Typical manufacturing mould

**GLOBAL STABILITY ANALYSIS
OF RETAINING WALL SCHEME**

	Gamma	C	Phi	Piezo
	kN/m ³	kPa	deg	Surf.
Water	9.81	0	0	1
Retaining Wall	19	20	40	1
Coke Ash	16	0	41	1
General Fill	19	3	28	1
Clay Soil	20	15	25	1
XW Rock	22	15	36	1

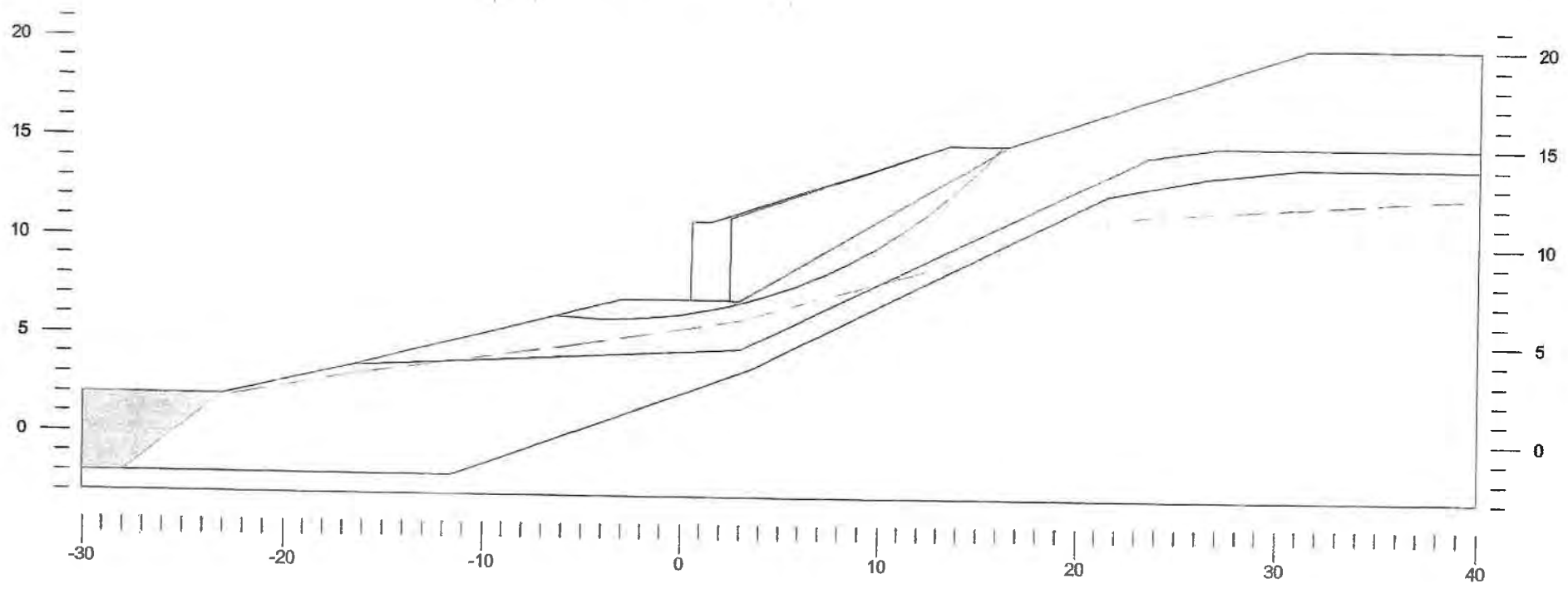
Modify using Set/User Name
 Riverlink
 Retaining Wall
 22/11/07
 Global Stability



	Gamma	C	Phi	Piezo
	kN/m ³	kPa	deg	Surf.
Water	9.81	0	0	1
Retaining Wall	19	20	40	1
Coke Ash	16	0	41	1
General Fill	19	3	28	1
Clay Soil	20	15	25	1
XW Rock	22	15	36	1

Modify using Set/User Name
 Riverlink
 Retaining Wall
 22/11/07
 Global Stability

✕
 F = 1.528



	Gamma kN/m ³	C kPa	Phi deg	Piezo Surf.
Water	9.81	0	0	1
Retaining Wall	19	20	40	1
Coke Ash	16	0	41	1
General Fill	19	3	28	1
Clay Soil	20	15	25	1
XW Rock	22	15	36	1

X
F = 1.588

Modify using Set/User Name
Riverlink
Retaining Wall
22/11/07
Global Stability

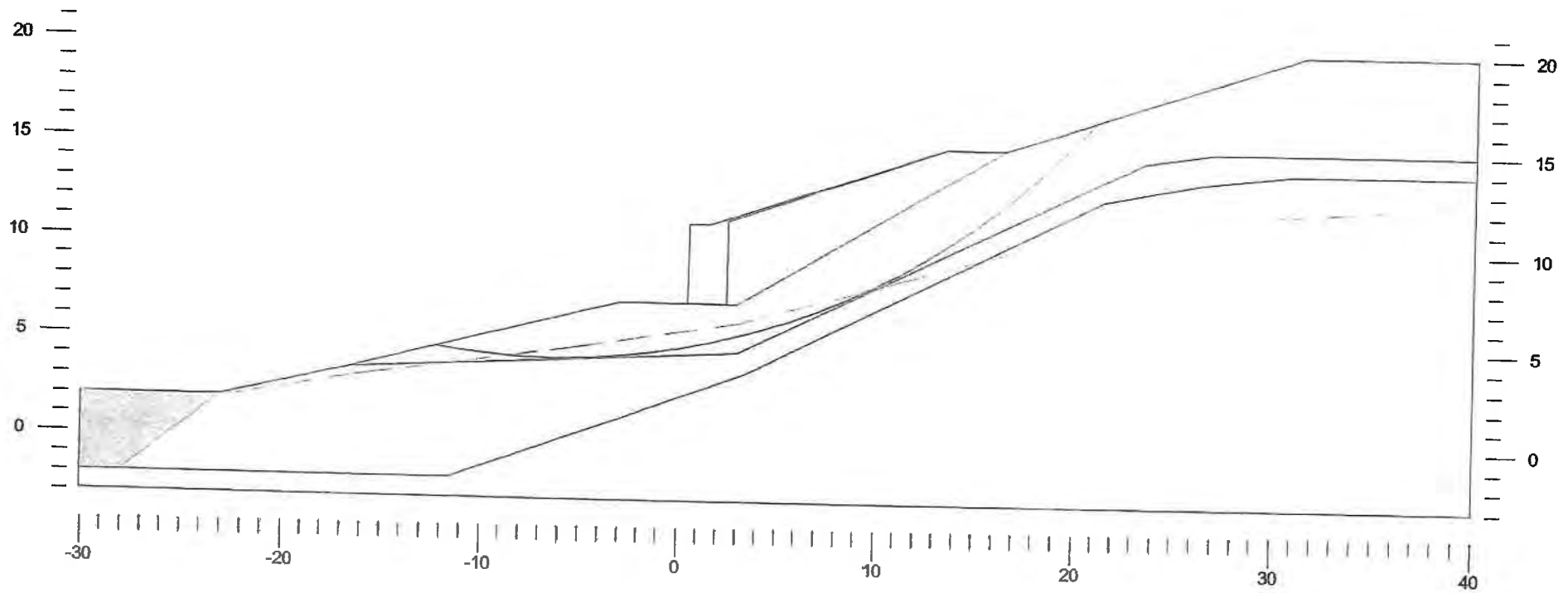
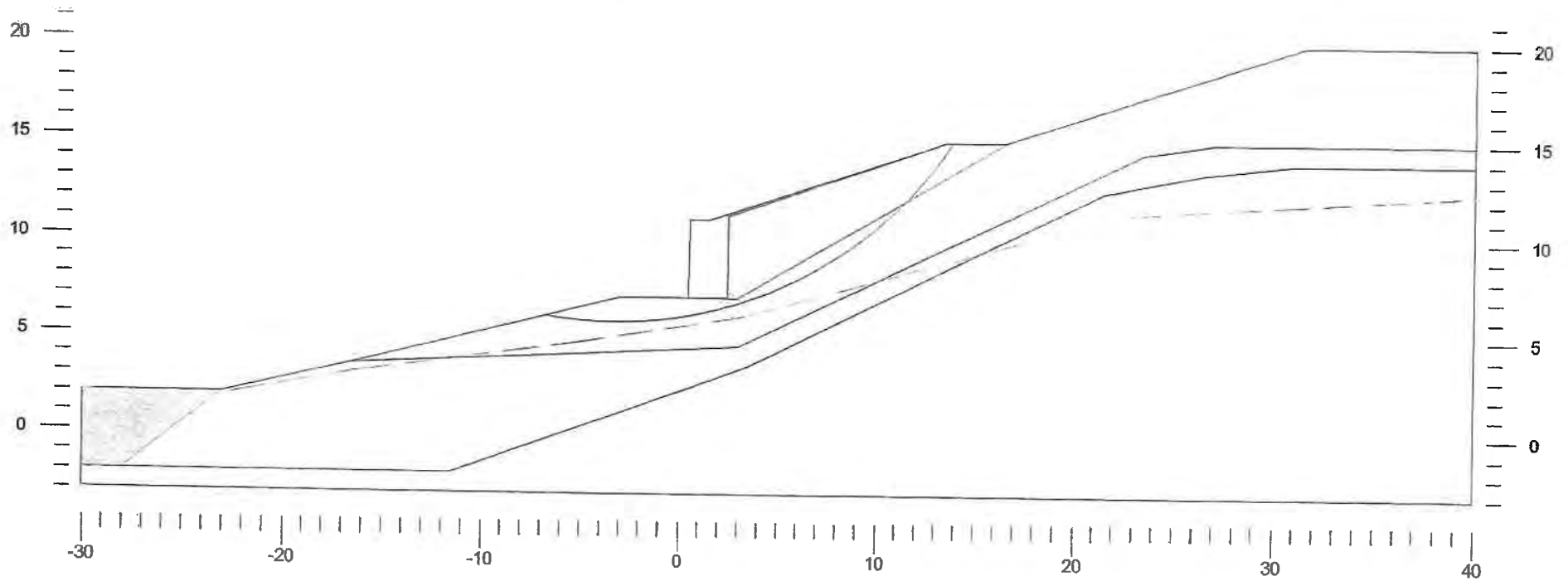
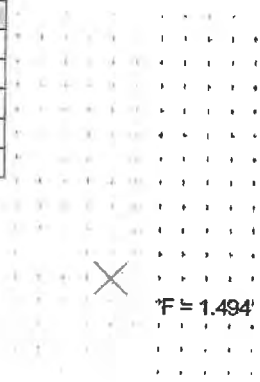


FIG 3D

	Gamma	C	Phi	Piezo
	kN/m ³	kPa	deg	Surf.
Water	9.81	0	0	1
Retaining Wall	19	20	40	1
Coke Ash	16	0	41	1
General Fill	19	3	28	1
Clay Soil	20	15	25	1
XW Rock	22	15	36	1

Modify using Set/User Name
 Riverlink
 Retaining Wall
 22/11/07
 Global Stability



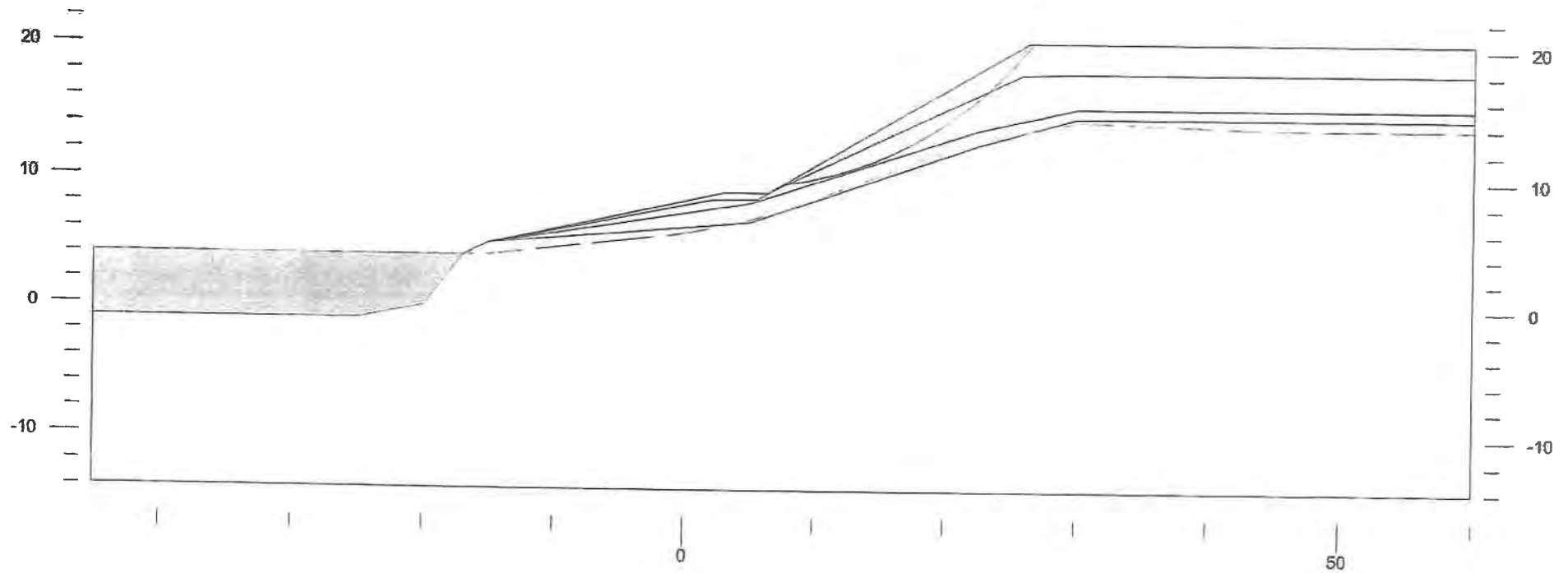
APPENDIX 'E'

STABILITY ANALYSES OF NORTHERN TRANSITION BATTER

	Gamma	C	Phi	Piezo
	kN/m ³	kPa	deg	Surf.
Water	9.81	0	0	1
Fill 1 Coke Ash	16	0	41	1
Fill 2 C/CH	19	2	28	1
Nat Stiff Clay	20	15	25	1
Sandstone	22	15	36	1

Modify using Set/User Name
 207E186
 Riverlink - Stage 2 Transition Batter at 30 degrees
 16/11/07
 Global Stability

✕
 F = 1.197



× F = 1.263

	Gamma	C	Phi	Piezo
	kN/m3	kPa	deg	Surf.
Water	9.81	0	0	1
Fill 1 Coke Ash	16	0	41	1
Fill 2 Cl/CH	19	2	28	1
Nat Stiff Clay	20	15	25	1
Sandstone	22	15	36	1

Modify using Set/User Name
 207E186
 Riverlink - Stage 2 Transition Batter at 30 degrees
 16/11/07
 Global Stability

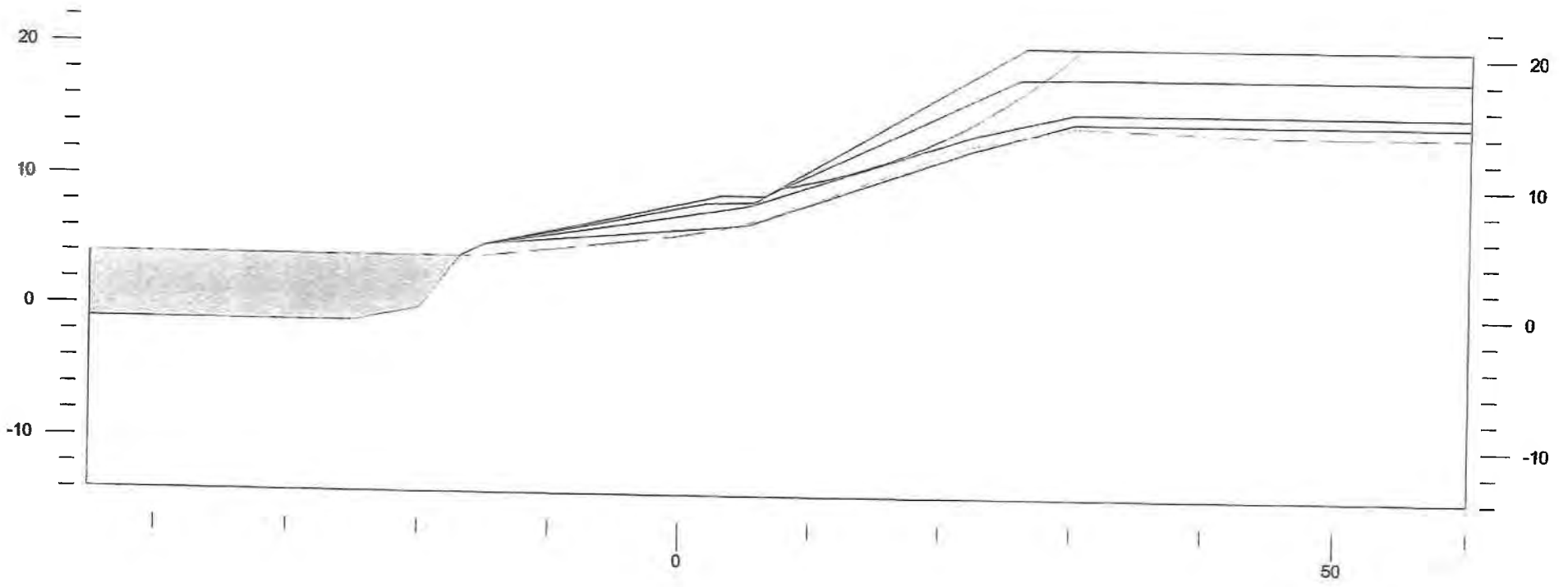


FIG 2C



F = 1.459

	Gamma kN/m ³	C kPa	Phi deg	Piezo Surf.
Water	9.81	0	0	1
Fill 1 Coke Ash	16	0	41	1
Fill 2 Cl/CH	19	2	28	1
Nat Stiff Clay	20	15	25	1
Sandstone	22	15	36	1

Modify using Set/User Name

207E186

Riverlink - Stage 2 Transition Batter at 30 degrees

16/11/07

Global Stability

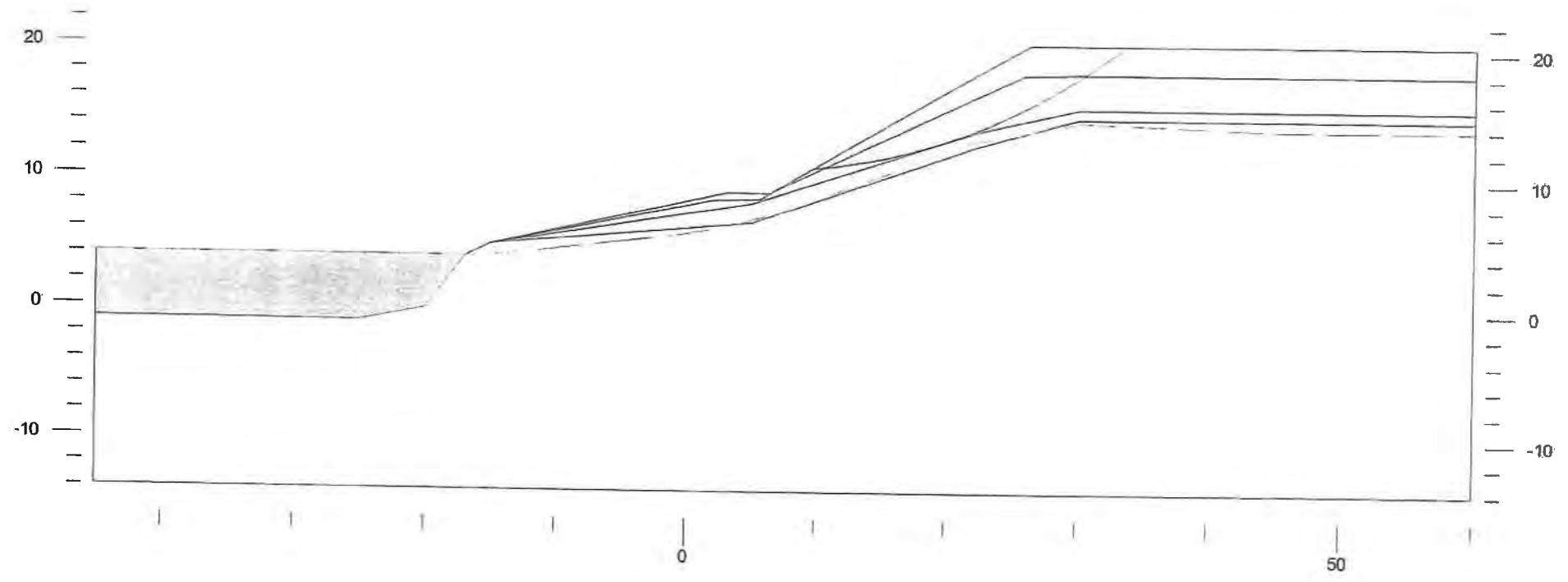


FIG 3C

Appendix 10

Previous DTMR Referral Responses and DTMR Advice on Current Application.



**Queensland
Government**

B/c The Manager
Lipoma Pty Ltd
C/- Yeats Consulting Engineers
PO Box 9122
Gold Coast MC Qld 9726

For your information.



Principal Advisor (Development Control)

10 May 2010

INCOMING	
DATE 12/5/10	
JOB No. YCO176	
JOB DESC. Riverlink WM Hughes	
ATTN.	INITIAL
BY	[REDACTED]



**Queensland
Government**

10 May 2010

Mr Carl Wulff
Chief Executive Officer
Ipswich City Council
PO Box 191
Ipswich Qld 4305

Attention: Aaron Katt

Dear Sir

REFERRAL AGENCY'S RESPONSE

**Ipswich City: Ipswich - Warrego Highway Connection Road
Proposed Operational Works
Council Application No: 6294/2009/OW**

Situated at [REDACTED] Hughes Street North Ipswich

I refer to the above application received by the Department of Transport and Main Roads (TMR).

Pursuant to section 3.3.16 of the *Integrated Planning Act 1997*, TMR as a *Concurrence Agency*, has assessed the impact of the proposed development on the state-controlled road network and advises council it has no requirements with respect to the subject application.

If this letter is not included in a development permit within two years, it is to be treated as a preliminary approval only and conditions may be reviewed, amended and new conditions applied.

This is a response from the Department of Transport and Main Roads as a referral agency for state-controlled roads previously under the control of the former Department of Main Roads. Please note you may receive further referral responses relating to other transport matters previously under the control of former Queensland Transport.

Department of Transport and Main Roads
Assets and Operations
Metropolitan Region
183 Wharf Street
Spring Hill Queensland 4000
PO Box 70 Spring Hill Queensland 4004

Our ref 830/2577
Your ref 6294/2009/OW
Enquiries **Stephen Smaha**
Telephone +61 7 3137 8120
Facsimile +61 7 3137 8363
Website www.tmr.qld.gov.au
Email developmentcontrol@tmr.qld.gov.au

A copy of this letter has been sent to Lipoma Pty Ltd c/- Yeats Consulting Engineers.

Yours sincerely

A large black rectangular redaction box covering the signature of the sender.A black rectangular redaction box covering the name of the sender.

Principal Advisor (Development Control)



**Queensland
Government**

B/c The Manager
Burchill VDM Pty Limited
PO Box 3766
Australia Fair Qld 4215



For your information.



Principal Advisor (Development Control)

10 May 2010



**Queensland
Government**

10 May 2010

Mr Carl Wulff
Chief Executive Officer
Ipswich City Council
PO Box 191
Ipswich Qld 4305

Attention: Aaron Katt

Dear Sir/

REFERRAL AGENCY'S RESPONSE

**Ipswich City: Ipswich - Warrego Highway Connection Road
Proposed Operational Works
Council Application No: 6670/2009/OW**

Situated at [REDACTED] Hughes Street North Ipswich

I refer to the above application received by the Department of Transport and Main Roads (TMR).

Pursuant to section 3.3.16 of the *Integrated Planning Act 1997*, TMR as a *Concurrence Agency*, has assessed the impact of the proposed development on the state-controlled road network and advises council it has no requirements with respect to the subject application.

If this letter is not included in a development permit within two years, it is to be treated as a preliminary approval only and conditions may be reviewed, amended and new conditions applied.

This is a response from the Department of Transport and Main Roads as a referral agency for state-controlled roads previously under the control of the former Department of Main Roads. Please note you may receive further referral responses relating to other transport matters previously under the control of former Queensland Transport.

Department of Transport and Main Roads
Assets and Operations
Metropolitan Region
183 Wharf Street
Spring Hill Queensland 4000
PO Box 70 Spring Hill Queensland 4004

Our ref 830/2579
Your ref 6670/2009/OW
Enquiries S. Smaha
Telephone +61 7 3137 8120
Facsimile +61 7 3137 8363
Website www.tmr.qld.gov.au
Email developmentcontrol@tmr.qld.gov.au

A copy of this letter has been sent to Lipoma Pty Ltd c/- Yeats Consulting Engineers.

Yours sincerely



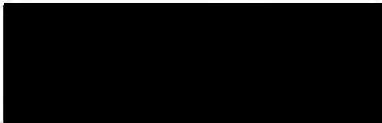
Principal Advisor (Development Control)



**Queensland
Government**

B/c The Manager
Lipoma Pty Ltd
C/- Yeats Consulting Engineers
PO Box 9122
Gold Coast MC Qld 9726

For your information.



Principal Advisor (Development Control)

10 May 2010

INCOMING	
DATE 12/5/10	
JOB No. YCO175	
JOB DESC. Riverlink North Street	
ATTN.	INITIALS
BY	



**Queensland
Government**

10 May 2010

Mr Carl Wulff
Chief Executive Officer
Ipswich City Council
PO Box 191
Ipswich Qld 4305

Attention: Aaron Katt

Dear Sir/

REFERRAL AGENCY'S RESPONSE

**Ipswich City: Ipswich - Warrego Highway Connection Road
Proposed Operational Works
Council Application No: 6291/2009/OW**

Situated at 21a North Street North Ipswich

I refer to the above application received by the Department of Transport and Main Roads (TMR).

Pursuant to section 3.3.16 of the *Integrated Planning Act 1997*, TMR as a *Concurrence Agency*, has assessed the impact of the proposed development on the state-controlled road network and advises council it has no requirements with respect to the subject application.

If this letter is not included in a development permit within two years, it is to be treated as a preliminary approval only and conditions may be reviewed, amended and new conditions applied.

This is a response from the Department of Transport and Main Roads as a referral agency for state-controlled roads previously under the control of the former Department of Main Roads. Please note you may receive further referral responses relating to other transport matters previously under the control of former Queensland Transport.

Department of Transport and Main Roads
Assets and Operations
Metropolitan Region
183 Wharf Street
Spring Hill Queensland 4000
PO Box 70 Spring Hill Queensland 4004

Our ref 830/2578
Your ref
Enquiries S. Smaha
Telephone +61 7 3137 8120
Facsimile +61 7 3137 8363
Website www.tmr.qld.gov.au
Email developmentcontrol@tmr.qld.gov.au

A copy of this letter has been sent to Lipoma Pty Ltd c/- Yeats Consulting Engineers.

Yours sincerely

A solid black rectangular box used to redact the signature of the Principal Advisor.

Principal Advisor (Development Control)

Appendix 1

**Bulk Earthworks Plans Related to Lots 51, 52 &
53 by Yeats Consulting Engineers (Drawing
No's YC0176-BE00 – YC0176-BE15).**

RIVERLINK DEVELOPMENT SITE

CIVIL ENGINEERING WORKS BULK EARTHWORKS WM HUGHES STREET, IPSWICH

DRAWING SCHEDULE

DWG. No.	DESCRIPTION
YC0176-BE00	DRAWING SCHEDULE & LOCALITY PLAN
YC0176-BE01	SURVEY PLAN
YC0176-BE02	SITE LAYOUT / KEY SHEET PLAN
YC0176-BE03	BULK EARTHWORKS CONTAMINATED LAND REMOVAL PLAN
YC0176-BE04-1	EROSION & SEDIMENT CONTROL PLAN STAGE 1 - PRE CONSTRUCTION
YC0176-BE04-2	EROSION & SEDIMENT CONTROL PLAN STAGE 2 - BULK EARTHWORKS
YC0176-BE04-3	EROSION & SEDIMENT CONTROL PLAN STAGE 3 - POST EARTHWORKS
YC0176-BE05-1	EROSION & SEDIMENT CONTROL DETAILS
YC0176-BE05-2	EROSION & SEDIMENT CONTROL - SEDIMENT BASIN DETAILS
YC0176-BE05-3	EROSION & SEDIMENT CONTROL - SEDIMENT BASIN OUTLET DETAILS
YC0176-BE05-4	EROSION & SEDIMENT CONTROL - SEDIMENT BASIN SIZING CALCULATIONS
YC0176-BE06	BULK EARTHWORKS NOTES & LEGEND
YC0176-BE07	BULK EARTHWORKS LAYOUT PLAN -SHEET 1 OF 4
YC0176-BE08	BULK EARTHWORKS LAYOUT PLAN -SHEET 2 OF 4
YC0176-BE09	BULK EARTHWORKS LAYOUT PLAN -SHEET 3 OF 4
YC0176-BE10	BULK EARTHWORKS LAYOUT PLAN -SHEET 4 OF 4
YC0176-BE11	BULK EARTHWORKS CUT FILL PLAN
YC0176-BE12	BULK EARTHWORKS DETAILS
YC0176-BE13	BULK EARTHWORKS CROSS SECTIONS - SHEET 1 OF 3
YC0176-BE14	BULK EARTHWORKS CROSS SECTIONS - SHEET 2 OF 3
YC0176-BE15	BULK EARTHWORKS CROSS SECTIONS - SHEET 3 OF 3



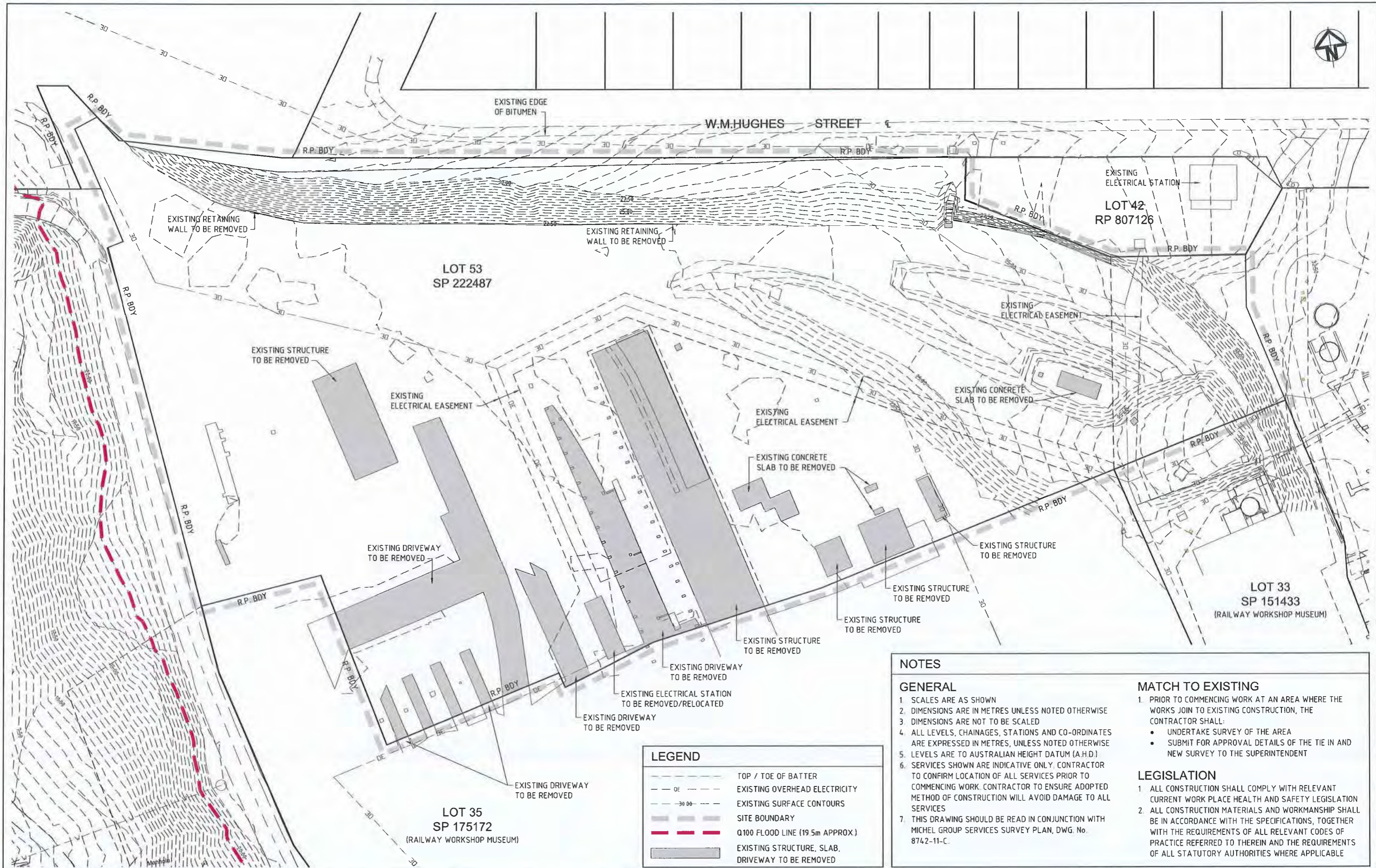
LOCALITY PLAN
SCALE N.T.S

LEVELS & GRID
LEVELS TO AHD
(AUSTRALIAN HEIGHT DATUM)
GRID ASSUMED LOCAL

EXTERNAL DRAWINGS

DWG. No.	DESCRIPTION
8742-11 - F	PLAN OF OVERALL LEVEL & FEATURE SURVEY OF RAILWAY AREA & ADJOINING SURROUNDS IPSWICH RIVERLINK CENTRAL

STATUS COUNCIL SUBMISSION		THIS DESIGN AND PLAN IS COPYRIGHT AND IS NOT TO BE USED OR REPRODUCED WHOLLY OR IN PART OR TO BE USED ON ANY PROJECT WITHOUT THE WRITTEN PERMISSION OF YEATS CONSULTING PTY LTD		CLIENT	PROJECT	TITLE DRAWING SCHEDULE & LOCALITY PLAN						
DRAWING IS NOT TO BE SCALED		SCALE (AT ORIGINAL SHEET SIZE)			RIVER LINK DEVELOPMENT SITE BULK EARTHWORKS WM HUGHES ST & NORTH ST, IPSWICH							
N/A		A1				LEVEL 2, 9 OUYAN STREET BUNDALL QLD 4217 AUSTRALIA T 07 5570 4877 F 07 5570 4977 info@yeats.com.au www.yeats.com.au						
B	COUNCIL RFI AMENDMENTS					TASK	BY	INITIAL	DATE	APPROVED	RPEQ No	7825
A	ORIGINAL ISSUE					REVIEW			23.07.09			
REV	DESCRIPTION					DESIGN			23.07.09			
						DRAWN			23.07.09			
						DRAWING NUMBER		YC0176-BE00		REVISION		B



LEGEND

	TOP / TOE OF BATTER
	EXISTING OVERHEAD ELECTRICITY
	EXISTING SURFACE CONTOURS
	SITE BOUNDARY
	Q100 FLOOD LINE (19.5m APPROX.)
	EXISTING STRUCTURE, SLAB, DRIVEWAY TO BE REMOVED

NOTES

GENERAL

1. SCALES ARE AS SHOWN
2. DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE
3. DIMENSIONS ARE NOT TO BE SCALED
4. ALL LEVELS, CHAINAGES, STATIONS AND CO-ORDINATES ARE EXPRESSED IN METRES, UNLESS NOTED OTHERWISE
5. LEVELS ARE TO AUSTRALIAN HEIGHT DATUM (A.H.D.)
6. SERVICES SHOWN ARE INDICATIVE ONLY. CONTRACTOR TO CONFIRM LOCATION OF ALL SERVICES PRIOR TO COMMENCING WORK. CONTRACTOR TO ENSURE ADOPTED METHOD OF CONSTRUCTION WILL AVOID DAMAGE TO ALL SERVICES
7. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH MICHEL GROUP SERVICES SURVEY PLAN, DWG. No. 8742-11-C.

MATCH TO EXISTING

1. PRIOR TO COMMENCING WORK AT AN AREA WHERE THE WORKS JOIN TO EXISTING CONSTRUCTION, THE CONTRACTOR SHALL:
 - UNDERTAKE SURVEY OF THE AREA
 - SUBMIT FOR APPROVAL DETAILS OF THE TIE IN AND NEW SURVEY TO THE SUPERINTENDENT

LEGISLATION

1. ALL CONSTRUCTION SHALL COMPLY WITH RELEVANT CURRENT WORK PLACE HEALTH AND SAFETY LEGISLATION
2. ALL CONSTRUCTION MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS, TOGETHER WITH THE REQUIREMENTS OF ALL RELEVANT CODES OF PRACTICE REFERRED TO THEREIN AND THE REQUIREMENTS OF ALL STATUTORY AUTHORITIES WHERE APPLICABLE

STATUS		COUNCIL SUBMISSION	
REV	DESCRIPTION	DATE	DRAWN
B	COUNCIL RFI AMENDMENTS	16.03.10	S.S.
A	ORIGINAL ISSUE	23.07.09	N.M.

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DRAWING IS NOT TO BE SCALED

SCALE (AT ORIGINAL SHEET SIZE)

SCALE 10 0 10 20 1:500

ORIGINAL SHEET SIZE

A1

CLIENT

LEDA
Developments Pty Ltd

PROJECT

RIVER LINK DEVELOPMENT SITE
WM HUGHES ST & NORTH ST, IPSWICH

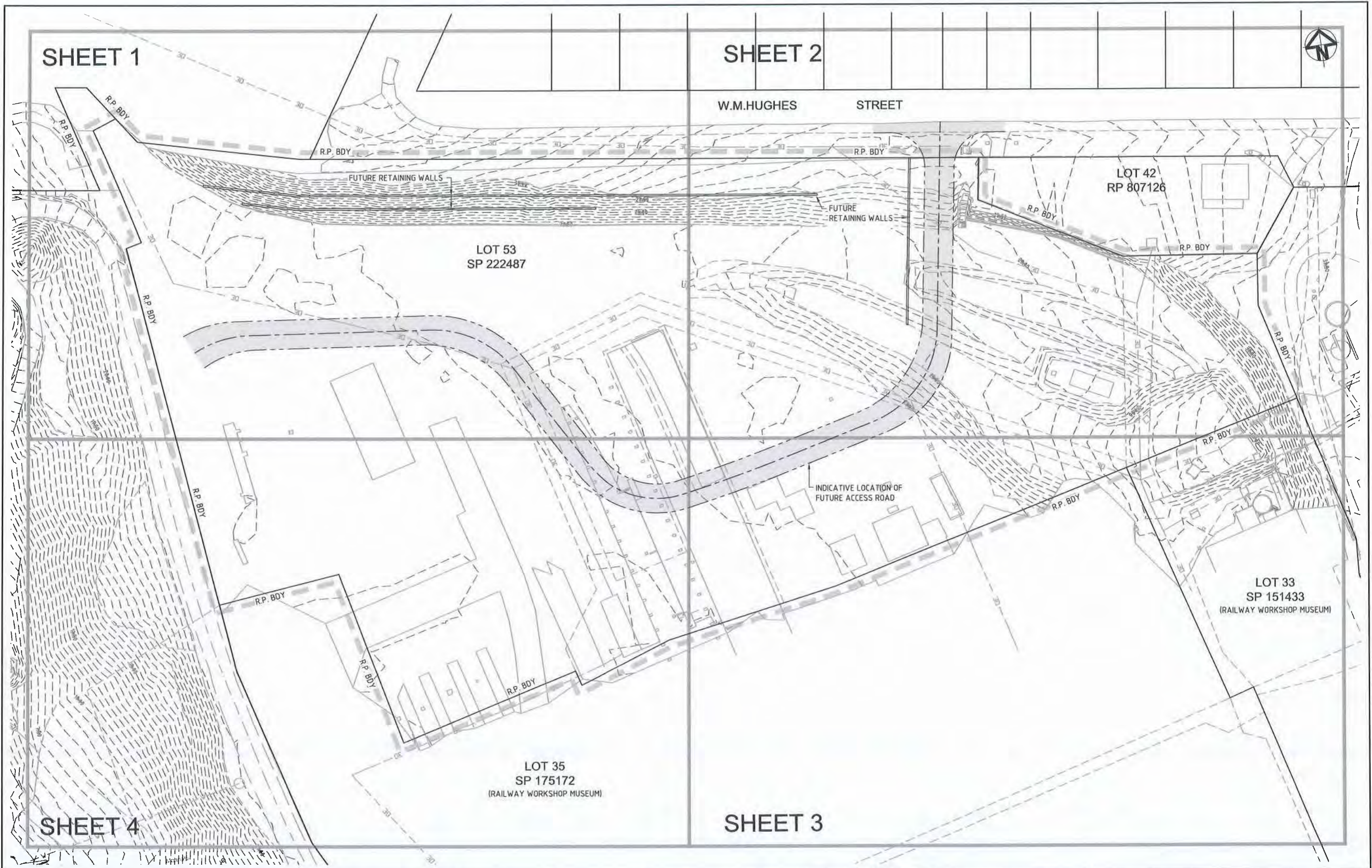
LEVEL 2, 9 OUYAN STREET BUNDALL QLD 4217 AUSTRALIA
T 07 5570 4877 F 07 5570 4977 info@yeats.com.au www.yeats.com.au

TITLE SURVEY PLAN

TASK	BY	INITIAL	DATE	APPROVED	RPED No	7825
REVIEW			23.07.09			
DESIGN			23.07.09			
DRAWN			23.07.09			

DRAWING NUMBER: YC0176-BE01

REVISION: B



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Developments Pty Ltd

PROJECT

RIVER LINK DEVELOPMENT SITE
BULK EARTHWORKS
WM HUGHES ST & NORTH ST, IPSWICH



LEVEL 2, 9 CUYAN STREET BUNDALL QLD 4217 AUSTRALIA
T 07 5570 4877 F 07 5570 4977 info@yeats.com.au www.yeats.com.au

TITLE SITE LAYOUT / KEY SHEET PLAN

REV	DESCRIPTION
B	COUNCIL RFI AMENDMENTS
A	ORIGINAL ISSUE

DRAWING IS NOT TO BE SCALED

SCALE (AT ORIGINAL SHEET SIZE)

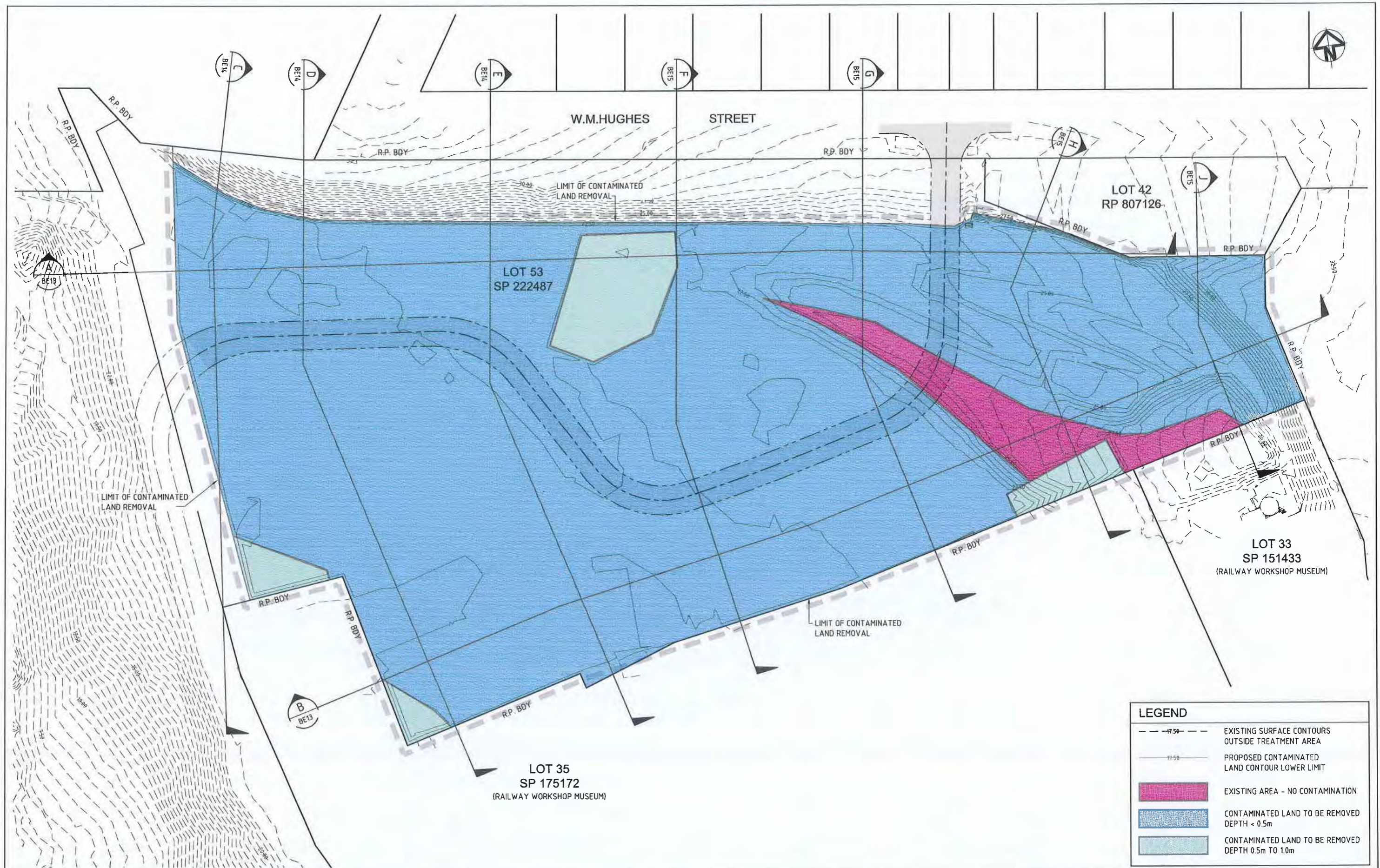


ORIGINAL SHEET SIZE

A1

TASK	BY	INITIAL	DATE	APPROVED	RPEQ No	7825
REVIEW			23.07.09			
DESIGN			23.07.09			
DRAWN			23.07.09			

DRAWING NUMBER YC0176-BE02 REVISION B



STATUS		COUNCIL SUBMISSION	
REV	DESCRIPTION	DATE	
B	COUNCIL RPI AMENDMENTS	16.03.10	
A	ORIGINAL ISSUE	23.07.09	

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DRAWING IS NOT TO BE SCALED

SCALE (AT ORIGINAL SHEET SIZE)

SCALE 10 0 10 20 1:500

ORIGINAL SHEET SIZE

A1

CLIENT

LEDA
Developments Pty Ltd

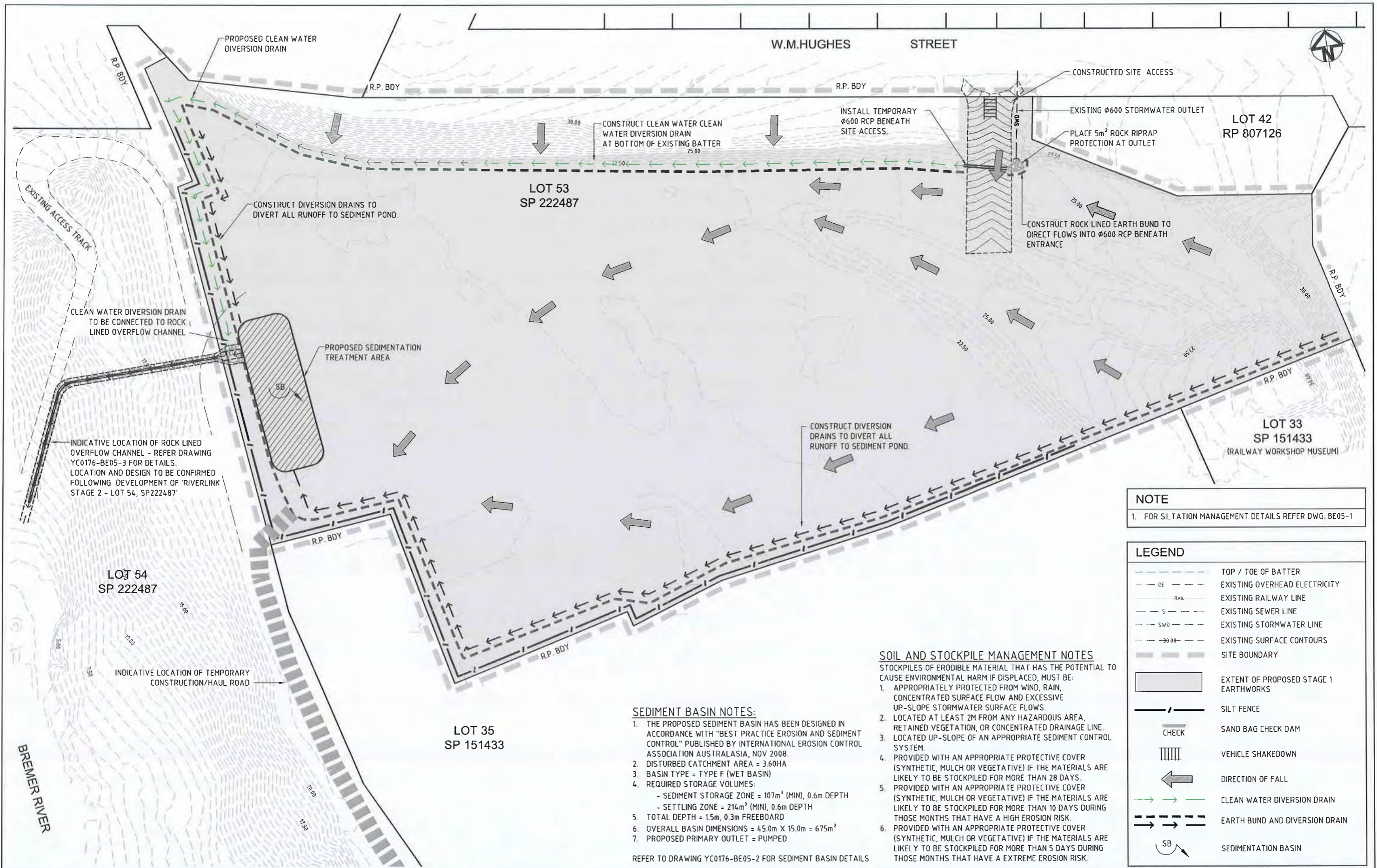
PROJECT

**RIVER LINK DEVELOPMENT SITE
BULK EARTHWORKS
WM HUGHES ST & NORTH ST, IPSWICH**

YEATS
CONSULTING ENGINEERS

LEVEL 2, 9 OUYAN STREET BUNDALL QLD 4217 AUSTRALIA
T 07 5570 4877 F 07 5570 4977 info@yeats.com.au www.yeats.com.au

TITLE		BULK EARTHWORKS CONTAMINATED LAND REMOVAL PLAN			
TASK	BY	INITIAL	DATE	APPROVED	RPEQ No 7825
REVIEW			23.07.09		
DESIGN			23.07.09		
DRAWN			23.07.09		
				DRAWING NUMBER	REVISION
				YC0176-BE03	B



NOTE
 1. FOR SILTATION MANAGEMENT DETAILS REFER DWG. BE05-1

LEGEND

---	TOP / TOE OF BATTER
---OE---	EXISTING OVERHEAD ELECTRICITY
---RAIL---	EXISTING RAILWAY LINE
---S---	EXISTING SEWER LINE
---SWD---	EXISTING STORMWATER LINE
---30.00---	EXISTING SURFACE CONTOURS
---	SITE BOUNDARY
[Shaded Area]	EXTENT OF PROPOSED STAGE 1 EARTHWORKS
---	SILT FENCE
CHECK	SAND BAG CHECK DAM
	VEHICLE SHAKEDOWN
←	DIRECTION OF FALL
→	CLEAN WATER DIVERSION DRAIN
→	EARTH BUND AND DIVERSION DRAIN
SB	SEDIMENTATION BASIN

SOIL AND STOCKPILE MANAGEMENT NOTES
 STOCKPILES OF ERODIBLE MATERIAL THAT HAS THE POTENTIAL TO CAUSE ENVIRONMENTAL HARM IF DISPLACED, MUST BE:
 1. APPROPRIATELY PROTECTED FROM WIND, RAIN, CONCENTRATED SURFACE FLOW AND EXCESSIVE UP-SLOPE STORMWATER SURFACE FLOWS.
 2. LOCATED AT LEAST 2M FROM ANY HAZARDOUS AREA, RETAINED VEGETATION, OR CONCENTRATED DRAINAGE LINE.
 3. LOCATED UP-SLOPE OF AN APPROPRIATE SEDIMENT CONTROL SYSTEM.
 4. PROVIDED WITH AN APPROPRIATE PROTECTIVE COVER (SYNTHETIC, MULCH OR VEGETATIVE) IF THE MATERIALS ARE LIKELY TO BE STOCKPILED FOR MORE THAN 28 DAYS.
 5. PROVIDED WITH AN APPROPRIATE PROTECTIVE COVER (SYNTHETIC, MULCH OR VEGETATIVE) IF THE MATERIALS ARE LIKELY TO BE STOCKPILED FOR MORE THAN 10 DAYS DURING THOSE MONTHS THAT HAVE A HIGH EROSION RISK.
 6. PROVIDED WITH AN APPROPRIATE PROTECTIVE COVER (SYNTHETIC, MULCH OR VEGETATIVE) IF THE MATERIALS ARE LIKELY TO BE STOCKPILED FOR MORE THAN 5 DAYS DURING THOSE MONTHS THAT HAVE A EXTREME EROSION RISK.

SEDIMENT BASIN NOTES:
 1. THE PROPOSED SEDIMENT BASIN HAS BEEN DESIGNED IN ACCORDANCE WITH "BEST PRACTICE EROSION AND SEDIMENT CONTROL" PUBLISHED BY INTERNATIONAL EROSION CONTROL ASSOCIATION AUSTRALASIA, NOV 2008.
 2. DISTURBED CATCHMENT AREA = 3.60HA
 3. BASIN TYPE = TYPE F (WET BASIN)
 4. REQUIRED STORAGE VOLUMES:
 - SEDIMENT STORAGE ZONE = 107m³ (MIN), 0.6m DEPTH
 - SETTLING ZONE = 214m³ (MIN), 0.6m DEPTH
 5. TOTAL DEPTH = 1.5m, 0.3m FREEBOARD
 6. OVERALL BASIN DIMENSIONS = 45.0m X 15.0m = 675m²
 7. PROPOSED PRIMARY OUTLET = PUMPED
 REFER TO DRAWING YC0176-BE05-2 FOR SEDIMENT BASIN DETAILS

STATUS		COUNCIL SUBMISSION	
B	COUNCIL RFI AMENDMENTS	16.03.10	
A	ORIGINAL ISSUE	23.07.09	
REV	DESCRIPTION	DRAWN	DATE

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DRAWING IS NOT TO BE SCALED

SCALE (AT ORIGINAL SHEET SIZE)

SCALE 10 0 10 20 1500

ORIGINAL SHEET SIZE

A1

CLIENT

LEDA
 Developments Pty Ltd

PROJECT

RIVER LINK DEVELOPMENT SITE
 BULK EARTHWORKS
 WM HUGHES ST & NORTH ST, IPSWICH

YEATS
 CONSULTING ENGINEERS

LEVEL 2, 9 OUYAN STREET BUNDALL QLD 4217 AUSTRALIA
 T 07 5570 4877 F 07 5570 4977 info@yeats.com.au www.yeats.com.au

TITLE

EROSION & SEDIMENT CONTROL PLAN
 STAGE 1 - PRE CONSTRUCTION &
 CONTAMINATED MATERIAL REMOVAL

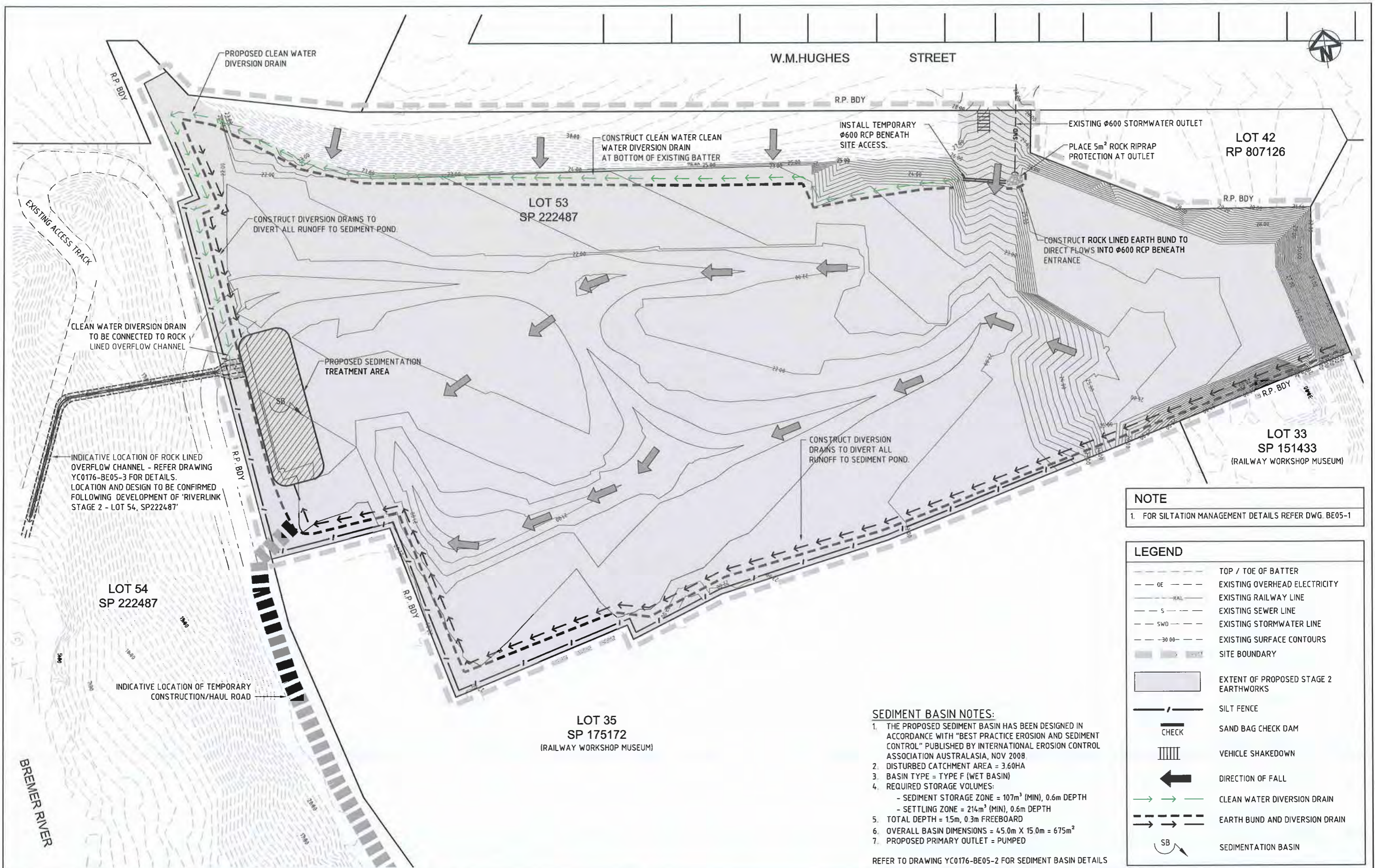
TASK	BY	INITIAL	DATE	APPROVED	RPEP No	7825
REVIEW			23.07.09			
DESIGN			23.07.09			
DRAWN			23.07.09			

DRAWING NUMBER

YC0176-BE04-1

REVISION

B



NOTE
 1. FOR SILTATION MANAGEMENT DETAILS REFER DWG BE05-1

LEGEND	
	TOP / TOE OF BATTER
	EXISTING OVERHEAD ELECTRICITY
	EXISTING RAILWAY LINE
	EXISTING SEWER LINE
	EXISTING STORMWATER LINE
	EXISTING SURFACE CONTOURS
	SITE BOUNDARY
	EXTENT OF PROPOSED STAGE 2 EARTHWORKS
	SILT FENCE
	SAND BAG CHECK DAM
	VEHICLE SHAKEDOWN
	DIRECTION OF FALL
	CLEAN WATER DIVERSION DRAIN
	EARTH BUND AND DIVERSION DRAIN
	SEDIMENTATION BASIN

SEDIMENT BASIN NOTES:

- THE PROPOSED SEDIMENT BASIN HAS BEEN DESIGNED IN ACCORDANCE WITH "BEST PRACTICE EROSION AND SEDIMENT CONTROL" PUBLISHED BY INTERNATIONAL EROSION CONTROL ASSOCIATION AUSTRALASIA, NOV 2008
- DISTURBED CATCHMENT AREA = 3.60HA
- BASIN TYPE = TYPE F (WET BASIN)
- REQUIRED STORAGE VOLUMES:
 - SEDIMENT STORAGE ZONE = 107m³ (MIN), 0.6m DEPTH
 - SETTLING ZONE = 214m³ (MIN), 0.6m DEPTH
- TOTAL DEPTH = 1.5m, 0.3m FREEBOARD
- OVERALL BASIN DIMENSIONS = 45.0m X 15.0m = 675m²
- PROPOSED PRIMARY OUTLET = PUMPED

REFER TO DRAWING YC0176-BE05-2 FOR SEDIMENT BASIN DETAILS

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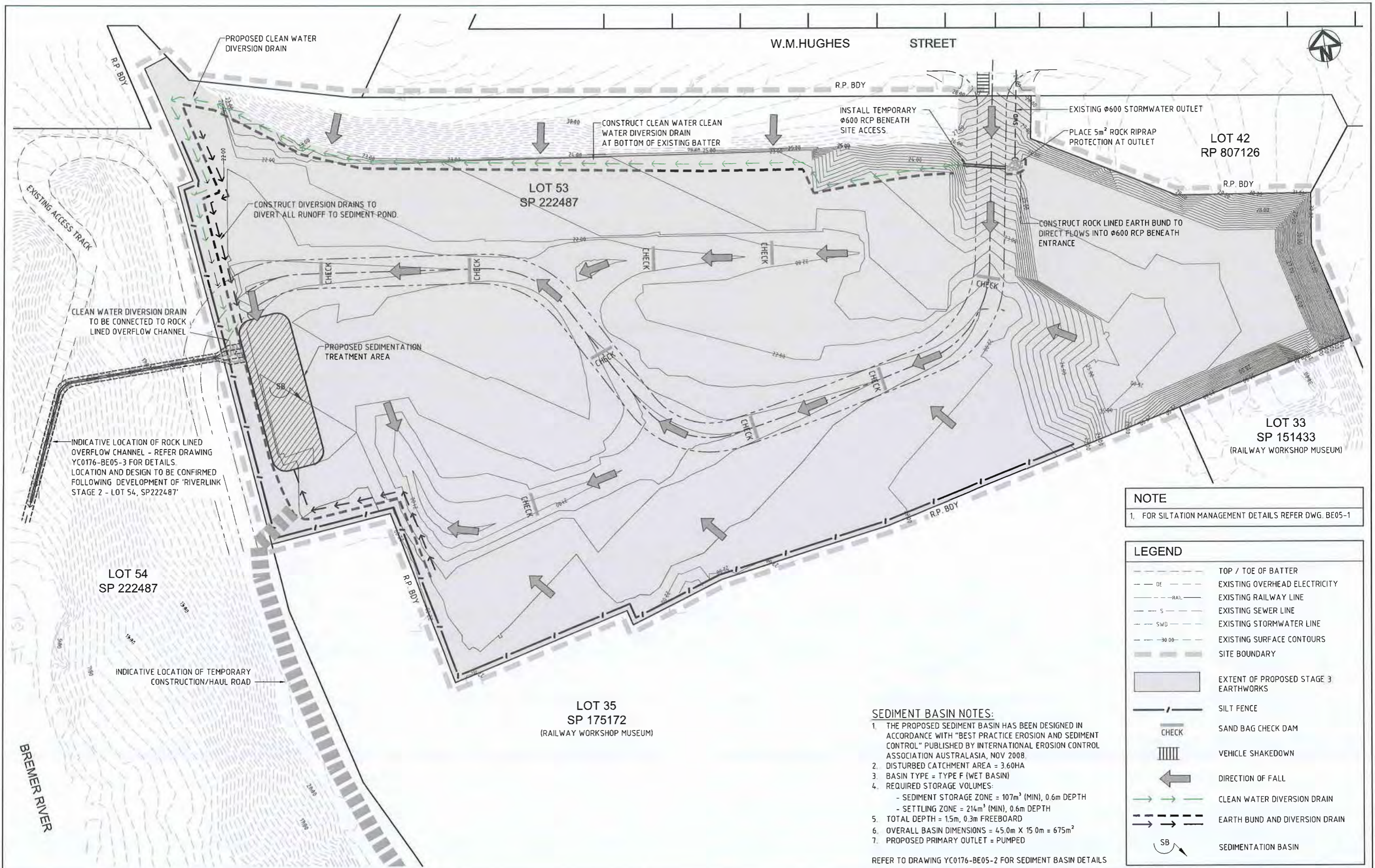
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PROJECT

RIVER LINK DEVELOPMENT SITE
 BULK EARTHWORKS
 WM HUGHES ST & NORTH ST, IPSWICH

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TITLE		EROSION & SEDIMENT CONTROL PLAN STAGE 2 - BULK EARTHWORKS			
TASK	BY	INITIAL	DATE	APPROVED	RPEP No 7825
REVIEW			16.03.10		
DESIGN			16.03.10		
DRAWN			16.03.10		
DRAWING NUMBER				YC0176-BE04-2	
REVISION				A	



NOTE
 1. FOR SILTATION MANAGEMENT DETAILS REFER DWG. BE05-1

LEGEND

	TOP / TOE OF BATTER
	EXISTING OVERHEAD ELECTRICITY
	EXISTING RAILWAY LINE
	EXISTING SEWER LINE
	EXISTING STORMWATER LINE
	EXISTING SURFACE CONTOURS
	SITE BOUNDARY
	EXTENT OF PROPOSED STAGE 3 EARTHWORKS
	SILT FENCE
	SAND BAG CHECK DAM
	VEHICLE SHAKEDOWN
	DIRECTION OF FALL
	CLEAN WATER DIVERSION DRAIN
	EARTH BUND AND DIVERSION DRAIN
	SEDIMENTATION BASIN

SEDIMENT BASIN NOTES:

- THE PROPOSED SEDIMENT BASIN HAS BEEN DESIGNED IN ACCORDANCE WITH "BEST PRACTICE EROSION AND SEDIMENT CONTROL" PUBLISHED BY INTERNATIONAL EROSION CONTROL ASSOCIATION AUSTRALASIA, NOV 2008.
- DISTURBED CATCHMENT AREA = 3.60HA
- BASIN TYPE = TYPE F (WET BASIN)
- REQUIRED STORAGE VOLUMES:
 - SEDIMENT STORAGE ZONE = 107m³ (MIN), 0.6m DEPTH
 - SETTLING ZONE = 214m³ (MIN), 0.6m DEPTH
- TOTAL DEPTH = 1.5m, 0.3m FREEBOARD
- OVERALL BASIN DIMENSIONS = 45.0m X 15.0m = 675m²
- PROPOSED PRIMARY OUTLET = PUMPED

REFER TO DRAWING YC0176-BE05-2 FOR SEDIMENT BASIN DETAILS

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TITLE						EROSION & SEDIMENT CONTROL PLAN STAGE 3 - POST EARTHWORKS	
TASK	BY	INITIAL	DATE	APPROVED	RPEQ No		7825
REVIEW			23.07.09		DRAWING NUMBER		REVISION
DESIGN			23.07.09		YC0176-BE04-3		B
DRAWN			23.07.09				

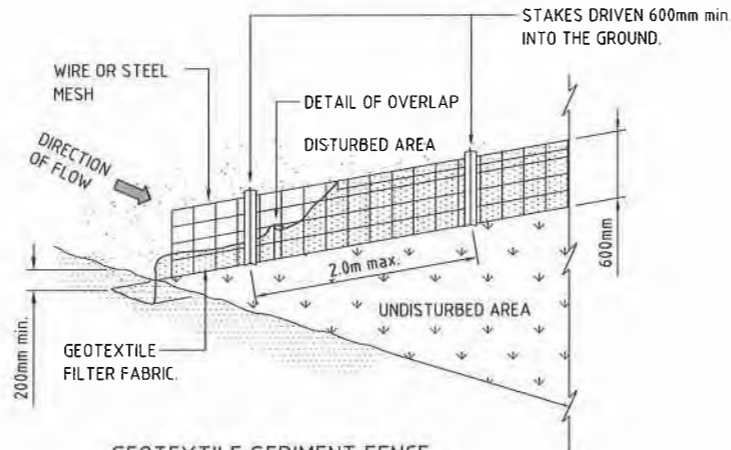
SILT MANAGEMENT PROGRAM

PHASE	DESCRIPTION
ALL WORKS	• SILT FENCES TO BE ERECTED ALONG TOE OF FILL BATTERS OR AS DIRECTED BY SUPERINTENDENT.
SEWER/WATER STORMWATER/SERVICES.	• EXCAVATED MATERIAL TO BE PLACED ON HIGH SIDE OF TRENCH IN ORDER TO PROTECT PIPE WORK AND DIRECT SURFACE FLOW AWAY FROM EXCAVATIONS
ROADWORKS	• MEASURES ARE TO BE TAKEN TO PREVENT SILT INGRESS TO STORMWATER SYSTEM
MAINTENANCE PERIOD	• EROSION CONTROL MEASURES ARE TO BE INSPECTED AFTER MAJOR EVENTS (> 25mm) ANY REPAIRS REQUIRED ARE TO BE EFFECTED IMMEDIATELY

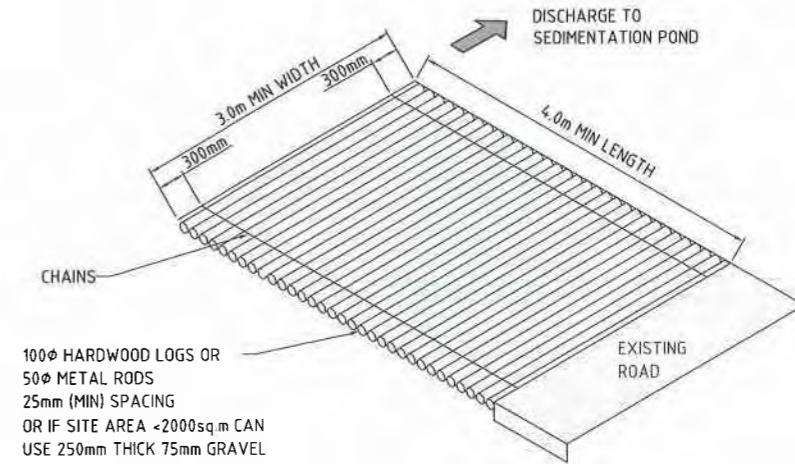
GENERAL NOTES

1. THE CONTRACTOR IS TO TAKE ALL NECESSARY PRECAUTIONS TO CONTROL EROSION AND DOWNSTREAM SEDIMENTATION DURING ALL STAGES OF CONSTRUCTION INCLUDING THE MAINTENANCE PERIOD
2. ALL SEDIMENT CONTROL DEVICES SHALL BE MONITORED, CLEANED AND/OR REPAIRED WHENEVER THE ACCUMULATED SEDIMENT REDUCES THE CAPACITY BY 50%
3. ALL PERIMETER BANK/SWALE SHALL HAVE UNINTERRUPTED POSITIVE GRADE TO AN OUTLET.
4. THE EXTENT OF GRASSING SHALL BE DETERMINED BY THE SUPERINTENDENT AND SHALL BE SEEDED, AS SPECIFIED, WITHIN SEVEN DAYS OF FINAL TRIMMING
5. EXTENT AND POSITION OF SILT FENCE CONTROL MEASURES TO BE DETERMINED ON SITE BY SUPERINTENDENT. MEASURES SHOWN ON THIS DRAWING ARE MINIMUM REQUIREMENTS ONLY
6. SCOUR PROTECTION AND SILT MANAGEMENT MEASURES TO BE PROVIDED AT STORMWATER OUTLET HEADWALLS.
7. PROVISION TO BE MADE FOR DIRT/SAND REMOVAL FROM CONSTRUCTION VEHICLES PRIOR TO TRAVEL ON PUBLIC ROADS. METHOD TO BE APPROVED BY SUPERINTENDENT PRIOR TO COMMENCEMENT OF WORK
8. ANY SILT OR SEDIMENT CAUSED BY THE MOVEMENT OF CONSTRUCTION TRAFFIC ON EXISTING ROADS IS TO BE REMOVED DAILY
9. THE CONTRACTOR SHALL IMPLEMENT EROSION AND SEDIMENT CONTROL PROCEDURES DURING CONSTRUCTION AND MAINTENANCE STAGES OF THE DEVELOPMENT AND SHALL TAKE ALL NECESSARY ACTIONS TO COMPLY WITH THE OBJECTIVES OF THE IPSWICH CITY COUNCIL EROSION AND SEDIMENT CONTROL POLICIES.
10. THE CONTRACTOR IS TO BE RESPONSIBLE FOR THE DAILY REMOVAL OF SILT FOR THE DURATION OF THE CONSTRUCTION AND MAINTENANCE PERIOD, THAT HAS BEEN BLOWN, WASHED OR TRACKED FROM THE SITE ONTO COUNCIL ROADS OR INTO COUNCIL DRAINAGE SYSTEMS, WATERCOURSES AND ANY PRIVATE PROPERTY.
11. THE CONTRACTOR IS TO BE RESPONSIBLE FOR THE CONTROL OF DUST EMANATING FROM THE SITE AT ALL TIMES, INCLUDING ON WEEKENDS AND PUBLIC HOLIDAYS, FOR THE DURATION OF THE CONSTRUCTION AND MAINTENANCE PERIOD.
12. ALL RUBBISH, WASTE MATERIALS, OILS AND FUELS ARE TO BE CONTAINED APPROPRIATELY. OIL AND FUEL SPILLS ARE NOT TO ENTER ANY DRAINAGE SYSTEM OR WATERCOURSE
13. THE CONTRACTOR IS TO ENSURE THAT NO SILT REACHES THE DOWNSTREAM WATER COURSE AND IS TO PROVIDE ADEQUATE PROTECTION TO PREVENT THIS OCCURRING.
14. WHERE TOPSOIL STOCKPILES ARE TO REMAIN IN PLACE FOR A PERIOD OF MORE THAN 14 DAYS, THE STOCKPILE SHALL BE GRASSED WITH A SUITABLE QUICK STRIKING CEREAL GRASS. PROVIDE A DIVERSION DRAIN OR BUND ON THE UPHILL SIDE AND A SEDIMENT FENCE ON THE DOWNHILL SIDE OF ALL STOCKPILES.

DRAINAGE AREA 0.6ha MAX. SLOPE GRADIENT 1 : 2 MAX. SLOPE LENGTH 60m MAX.

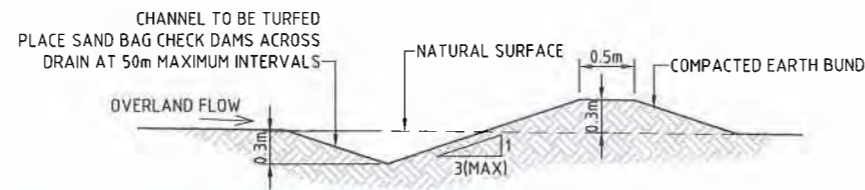


GEOTEXTILE SEDIMENT FENCE
SCALE N.T.S.

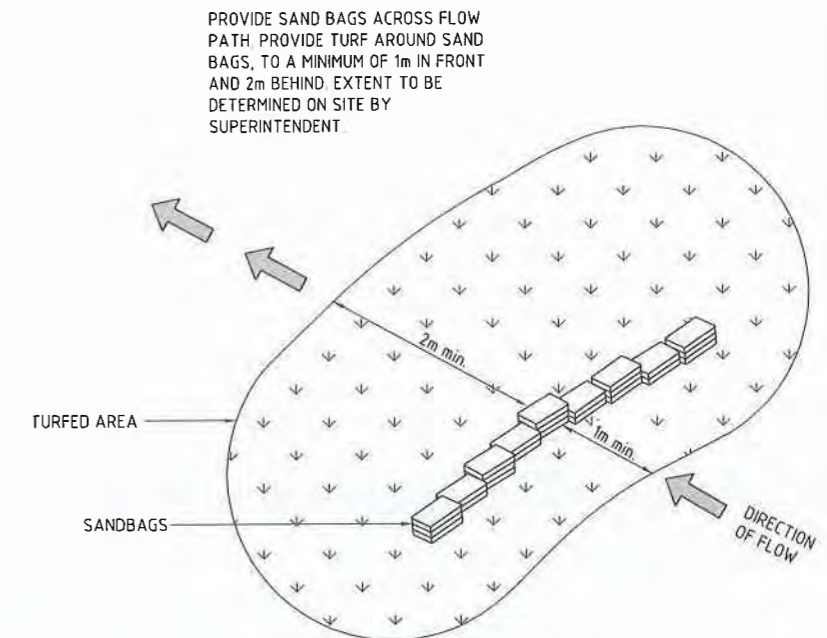


100Ø HARDWOOD LOGS OR
50Ø METAL RODS
25mm (MIN) SPACING
OR IF SITE AREA >2000sq m CAN
USE 250mm THICK 75mm GRAVEL

METAL GRID SHAKE DOWN (OR APPROVED EQUIVALENT)
SCALE N.T.S.



DIVERSION DRAIN
SCALE N.T.S.



PROVIDE SAND BAGS ACROSS FLOW PATH. PROVIDE TURF AROUND SAND BAGS, TO A MINIMUM OF 1m IN FRONT AND 2m BEHIND. EXTENT TO BE DETERMINED ON SITE BY SUPERINTENDENT.

SAND BAG CHECK DAM
SCALE N.T.S.

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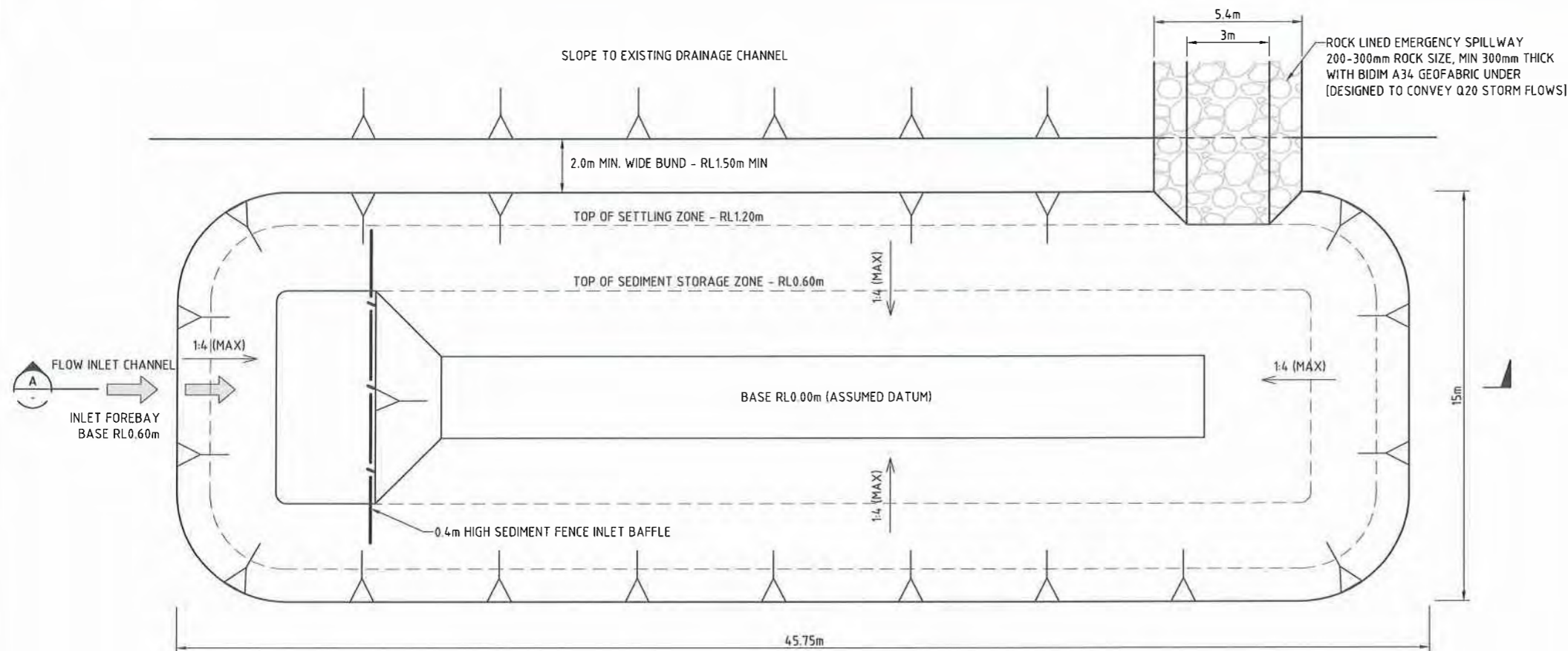
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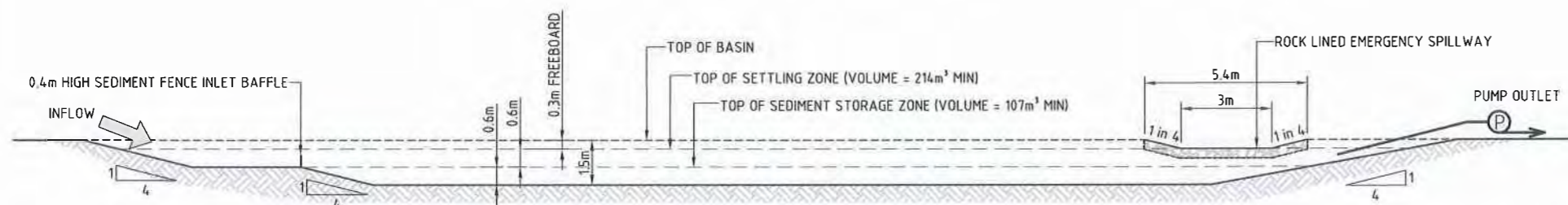
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BULK EARTHWORKS
WM HUGHES ST & NORTH ST, IPSWICH

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TITLE						EROSION & SEDIMENT CONTROL DETAILS	
TASK	BY	INITIAL	DATE	APPROVED	RPEO No		7825
REVIEW			16.03.10		DRAWING NUMBER		REVISION
DESIGN			16.03.10		YC0176-BE05-1		A
DRAWN			16.03.10				



TYPICAL SEDIMENT BASIN LAYOUT PLAN
INDICATIVE ONLY - LAYOUT TO BE CONFIRMED ONSITE
SCALE 1:100



SECTION A SEDIMENT BASIN ARRANGEMENT
1:100

WATER QUALITY CONTROL

1. WATER QUALITY SAMPLES MUST BE TAKEN AND ANALYSED PRIOR TO RELEASE OF ANY WATER FROM THE SEDIMENT PONDS.
2. WATER QUALITY MUST SATISFY THE FOLLOWING CRITERIA AT ALL TIMES:
 - TOTAL SUSPENDED SOLIDS (TSS) = 50 mg/L
 - pH BETWEEN 6.5 AND 8.5
3. IF REQUIRED, ALL WATERS CAPTURED SHALL BE TREATED WITH AN APPROVED FLOCCULATING AGENT TO ACHIEVE THE SPECIFIED WATER QUALITY BEFORE WATER IS DISCHARGED. REFER TABLE B17 OF THE IECA BEST PRACTICE GUIDELINES FOR APPROVED FLOCCULATING AGENTS.
4. EROSION PROTECTED SHALL BE PROVIDED AT THE OUTFLOW FROM ANY OUTLET SYSTEM TO PREVENT SCOUR.
5. ALL WATER QUALITY DATA INCLUDING DATES OF RAINFALL, DATES OF TESTING AND WATER RELEASE MUST BE CONTAINED WITHIN AN ONSITE REGISTER. THIS REGISTER MUST BE MAINTAINED FOR THE DURATION OF THE APPROVED WORKS, AND BE AVAILABLE ONSITE FOR INSPECTION BY COUNCIL OFFICERS ON REQUEST.

SEDIMENT BASIN NOTES:

1. THE PROPOSED SEDIMENT BASIN HAS BEEN DESIGNED IN ACCORDANCE WITH "BEST PRACTICE EROSION AND SEDIMENT CONTROL" PUBLISHED BY INTERNATIONAL EROSION CONTROL ASSOCIATION AUSTRALASIA, NOV 2008.
2. POND GEOMETRY REQUIREMENTS INCLUDE:
 - MAXIMUM EARTH BATTER SLOPES OF 4(H):1(V)
 - POND LENGTH:WIDTH RATIO 3:1 MINIMUM, OTHERWISE BAFFLES SHALL BE INSTALLED
3. WATER LEVEL SHOULD BE KEPT AS LOW AS POSSIBLE BETWEEN STORM EVENTS AND SHOULD BE DISCHARGED IF IT FILLS 20% OF THE STORAGE CAPACITY
4. ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN 10% OF THE STORAGE CAPACITY HAS BEEN LOST. DISPOSE OF SEDIMENT SUCH THAT IT WILL NOT CAUSE FURTHER POLLUTION TO DOWNSTREAM LANDS AND WATERWAYS.
5. REQUIRED DRAINAGE, EROSION AND SEDIMENT CONTROL MEASURES DURING THE DECOMMISSIONING AND REHABILITATION OR A SEDIMENT BASIN MUST COMPLY WITH SAME STANDARDS SPECIFIED FOR THE NORMAL CONSTRUCTION WORKS.
6. UPON DECOMMISSIONING OF A SEDIMENT BASIN, ALL WATER AND SEDIMENT MUST BE REMOVED FROM THE BASIN PRIOR TO REMOVAL OF THE EMBANKMENT (IF ANY). ANY SUCH MATERIAL, LIQUID OR SOLID, MUST BE DISPOSED OF IN A MANNER THAT WILL NOT CREATE AN EROSION OR POLLUTION HAZARD.
7. IF AN ALTERNATIVE, PERMANENT, OUTLET STRUCTURE IS TO BE CONSTRUCTED PRIOR TO STABILISATION OF THE UP-SLOPE CATCHMENT AREA, THEN THIS OUTLET STRUCTURE MUST NOT BE MADE OPERATIONAL IF IT WILL ADVERSELY AFFECT THE REQUIRED OPERATION OF THE SEDIMENT BASIN.
8. A SEDIMENT BASIN MUST NOT BE DECOMMISSIONED UNTIL ALL UP-SLOPE SITE STABILISATION MEASURES HAVE BEEN IMPLEMENTED AND ARE APPROPRIATELY WORKING TO CONTROL SOIL EROSION AND SEDIMENT RUNOFF IN ACCORDANCE WITH THE SPECIFIED ESC STANDARD.
9. IMMEDIATELY PRIOR TO THE CONSTRUCTION OF THE PERMANENT STORMWATER TREATMENT DEVICE, APPROPRIATE FLOW BYPASS CONDITIONS MUST BE ESTABLISHED TO PREVENT SEDIMENT-LADEN WATER ENTERING THE DEVICE.

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RIVER LINK DEVELOPMENT SITE
BULK EARTHWORKS
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TITLE						EROSION AND SEDIMENT CONTROL SEDIMENT BASIN DETAILS	
TASK	BY	INITIAL	DATE	APPROVED	RPEQ No 7825		
REVIEW			16.03.10		DRAWING NUMBER	REVISION	
DESIGN			16.03.10		YC0176-BE05-2	A	
DRAWN			16.03.10				

IECA SEDIMENT BASIN DESIGN



Project:	RIVERLINK - W.M. HUGHES STREET
Date:	11-Mar-10
Designed:	S.S
Comments:	Stage 1, 2 & 3 Sediment Basin Design

Design in accordance with IECA (Australasia) 'Best Practice Erosion and Sediment Control' Appendix B - Sediment basin design and operation

1 - Assess the need for a Sediment Basin

Note: Table 4.5.1 recommends the use of Type 1 Sediments Traps within sub-catchments with a catchment area exceeding 2,500m² and an estimated soil loss rate that exceeds the equivalent of 150t/ha/yr

Revised Universal Soil Loss Equation (RUSLE) - Appendix E - Soil Loss Estimation

$$A = \text{Annual Soil Loss due to erosion (t/ha/yr)} = R \times K \times LS \times C \times P$$

R = Rainfall erosivity factor =	3705 [Table E1]
K = Soil erodibility factor =	0.047 [Table E5]
LS = topographic factor =	1 [Table E3]
C = Cover and Management factor =	1.00 [Table E9]
P = Erosion control practice factor =	1.2 [Table E11]

$$A = 208.96 \text{ t/ha/yr}$$

2 - Select Basin Type

Table B2 - Selection of Basin Type

Adopt Type F Basin (subject to onsite testing to confirm soil dispersive % and whether flocculation is required to achieve the required water quality objectives)

3 - Determine Basin Location

Refer to Erosion and Sediment Control Plan for proposed basin locations

4 - Sizing Type F Basins - SETTLING ZONE

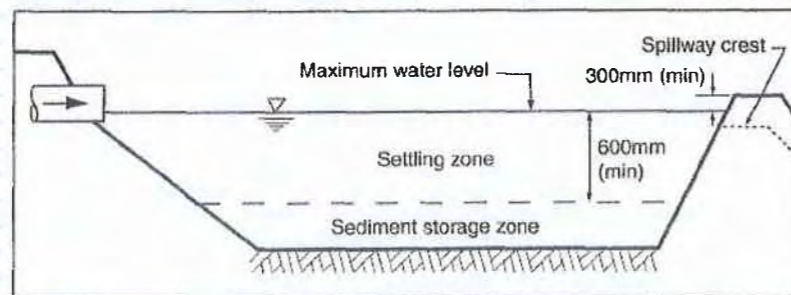


Figure B7 - Settling zone and sediment storage zone

$$V_s = \text{Volume of Settling Zone (m}^3\text{)} = 10 \times R_{(Y\%, 5\text{-day})} \times C_v \times A$$

$$R_{(Y\%, 5\text{-day})} = Y\%, 5 \text{ day rainfall depth} = K_1 \times I_{(1\text{yr}, 120\text{hr})} + K_2$$

Table B4 - Basin with a design life less than 6 months

Y%	75
K ₁	12.9
K ₂	9.9
I _(1yr, 120hr)	0.94 mm/hr [Table B5]
Therefore, R _(Y%, 5-day)	22.0 mm

$$C_v = \text{Volumetric Runoff Coefficient} = 0.27 \text{ [Table B7 - Group C, Loamy Clay]}$$

$$A = \text{Effective Catchment Area} = 3.60 \text{ Ha}$$

$$\text{Therefore, } V_s = 214.1 \text{ m}^3$$

5 - SEDIMENT STORAGE VOLUME

Table B8 - For Type F Basin, Sediment Storage Volume = 50% of Settling Volume

$$V_{ss} = 107.0 \text{ m}^3$$

6 - BASIN LAYOUT AND DIMENSIONS

Length:Width Ratio =	3 L:1W
Basin Batter Slope	4 : 1
Settling Zone Depth, d _s =	0.6 m
Sediment Storage Zone Depth, d _{ss} =	0.6 m
Spillway Freeboard	0.3 m
TOTAL DEPTH	1.5 m

TOP OF BASIN DIMENSIONS

Width	15 m
Length	45 m
AREA, A _c	675 m ²

VOLUME ABOVE SPILLWAY OVERFLOW

Lower Width	12.6 m
Lower Length	42.6 m
Lower Area	536.76 m ²
TOTAL VOLUME	181.4 m ³

VOLUME OF SETTLING ZONE

Lower Width	7.8 m
Lower Length	37.8 m
Lower Area	294.84 m ²
TOTAL VOLUME	245.9 m ³

OK

VOLUME OF SEDIMENT STORAGE ZONE

Basin Base Width	3 m
Basin Base Length	33 m
Basin Base Area	99 m ²
TOTAL VOLUME	112.9 m ³

OK

7 - DESIGN OF EMERGENCY SPILLWAY

Table B12, Design Life = 3 to 12 Months.

Therefore, minimum design standard for Emergency Spillway = 1 in 20yr ARI Storm
Refer attached Rational Calculation for peak flow calculation

$$Q_{20} = 1.005 \text{ m}^3/\text{s}$$

Emergency Spillway Design - Trapezoidal Channel

$$Q = 0.57(2g)^{1/2}(2/3Lh^{3/2} + 8/15Zh^{5/2}) \text{ - solve by Trial and Error}$$

$$h = \text{Depth of flow at design flow} = 0.3 \text{ m}$$

$$Z = \text{Horizontal/Vertical side slope} = 4 \text{ H:1V}$$

$$L = \text{Horizontal bottom width} = 3 \text{ m}$$

$$Q = \text{Discharge through spillway} = 1.10 \text{ m}^3/\text{s} > Q_{20} \text{ Therefore OK}$$

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PROJECT	RIVER LINK DEVELOPMENT SITE BULK EARTHWORKS WM HUGHES ST & NORTH ST, IPSWICH
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TITLE				EROSION AND SEDIMENT CONTROL SEDIMENT BASIN SIZING CALCULATIONS			
TASK	BY	INITIAL	DATE	APPROVED	RPEP No 7825		
REVIEW			16.03.10		DRAWING NUMBER		
DESIGN			16.03.10		YC0176-BE05-4		
DRAWN			16.03.10		REVISION A		

EARTHWORKS VOLUMES	
CONTAMINATED MATERIAL EARTHWORKS	
CUT	16,675m ³
'CLEAN' MATERIAL EARTHWORKS	
CUT	9,770m ³
FILL	9,626m ³
REQUIRED FILL IMPORT	143m ³

NOTE:
EARTHWORKS VOLUMES ARE SUBJECT TO FULL SURVEY OF
CONTAMINATED SOILS ON SITE.

LEGEND	
	NOMINAL ROAD EDGE
	PROPOSED ROAD CENTRE LINE
	PROPOSED STORMWATER FLOWPATH
	PROPOSED SWALE DRAIN
	PROPOSED EARTHWORKS FINISHED SURFACE LEVEL
	EXISTING SURFACE LEVEL
	PROPOSED FINISHED SURFACE CONTOURS (0.25m INTERVAL)
	EXISTING SURFACE CONTOURS
	SITE BOUNDARY
	FUTURE RETAINING WALL

NOTES	
1.	EARTHWORKS FIGURES ABOVE EXCLUDE ALLOWANCE FOR ROAD BASE.
2.	ALL EARTHWORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH I.C.C. STANDARD SPECIFICATIONS AND AS3798 UNDER LEVEL 1 SUPERVISION.
3.	UNLESS DIRECTED OTHERWISE BY THE SUPERINTENDENT ALL FILL SHALL BE PLACED AT BETWEEN +2% AND -2% OF OPTIMUM MOISTURE CONTENT.
4.	EARTHWORKS ARE NOT TO ENCROACH BEYOND DEFINED PROPERTY BOUNDARIES OR LIMIT OF WORKS UNLESS NOTED OTHERWISE.
5.	EARTHWORKS BATTERS ARE TO BE CONSTRUCTED AT 1:2 MAXIMUM UNLESS NOTED OTHERWISE.
6.	ALL OF THE SITE SHALL BE KEPT FREE DRAINING DURING ALL PHASES OF THE PROJECT.
7.	THE CONTRACTOR SHALL CONFIRM LOCATION OF ALL EXISTING SERVICES AND PROTECT THESE SERVICES DURING CONSTRUCTION. DAMAGED SERVICES SHALL BE REPAIRED AT THE CONTRACTORS EXPENSE.
8.	ALL SURFACE AREAS OF COMPLETED EARTHWORKS AND DISTURBED AREAS TO BE TOP SOILED (100mm MIN. DEPTH) AND GRASSED (TO BE SPECIFIED)
9.	FUTURE RETAINING WALL LOCATIONS ARE INDICATIVE ONLY AND ARE SUBJECT TO FULL DETAIL DESIGN.
10.	EARTHWORKS CUT FILL VOLUMES ARE TO THE PROPOSED CONTAMINATED SOILS SURFACE, NOT THE EXISTING SURFACE.
11.	CONTAMINATED MATERIAL TO BE REMOVED OFF SITE AND PLACED IN ACCORDANCE WITH COUNCIL CONDITIONS.

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A	ORIGINAL ISSUE
REV	DESCRIPTION

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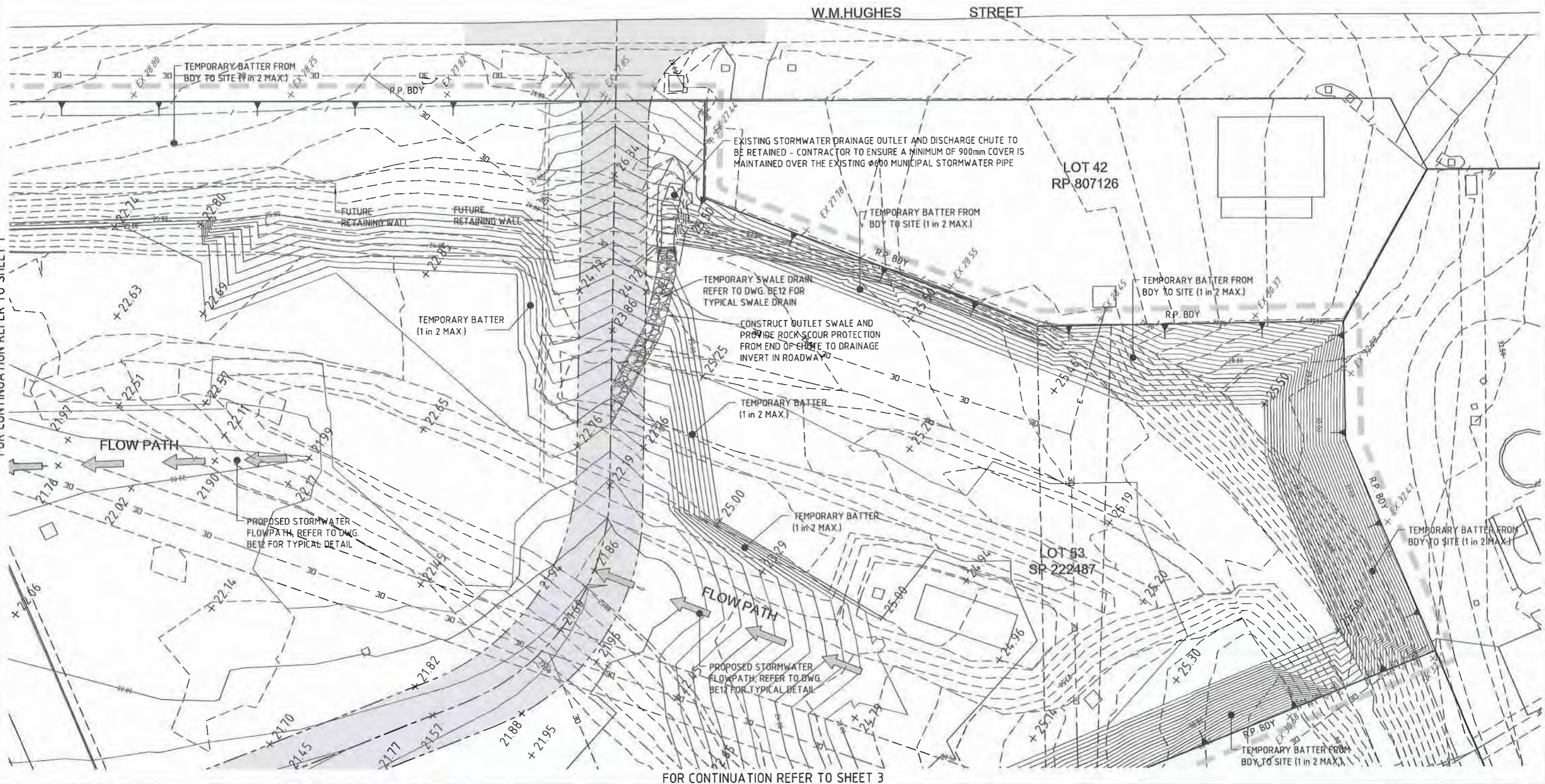
PROJECT

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TITLE	
BULK EARTHWORKS NOTES AND LEGEND	
TASK	BY
REVIEW	DATE
DESIGN	DATE
DRAWN	DATE
APPROVED	RPEQ No
DRAWING NUMBER	REVISION
YC0176-BE06	B

NOTE:
REFER TO DWG. BE06 FOR STANDARD NOTES AND LEGEND



FOR CONTINUATION REFER TO SHEET 1

FOR CONTINUATION REFER TO SHEET 3

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PROJECT
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TITLE **BULK EARTHWORKS
LAYOUT PLAN SHEET 2 OF 4**

REV	DESCRIPTION	DATE
B	COUNCIL RFI AMENDMENTS	16.03.10
A	ORIGINAL ISSUE	23.07.09

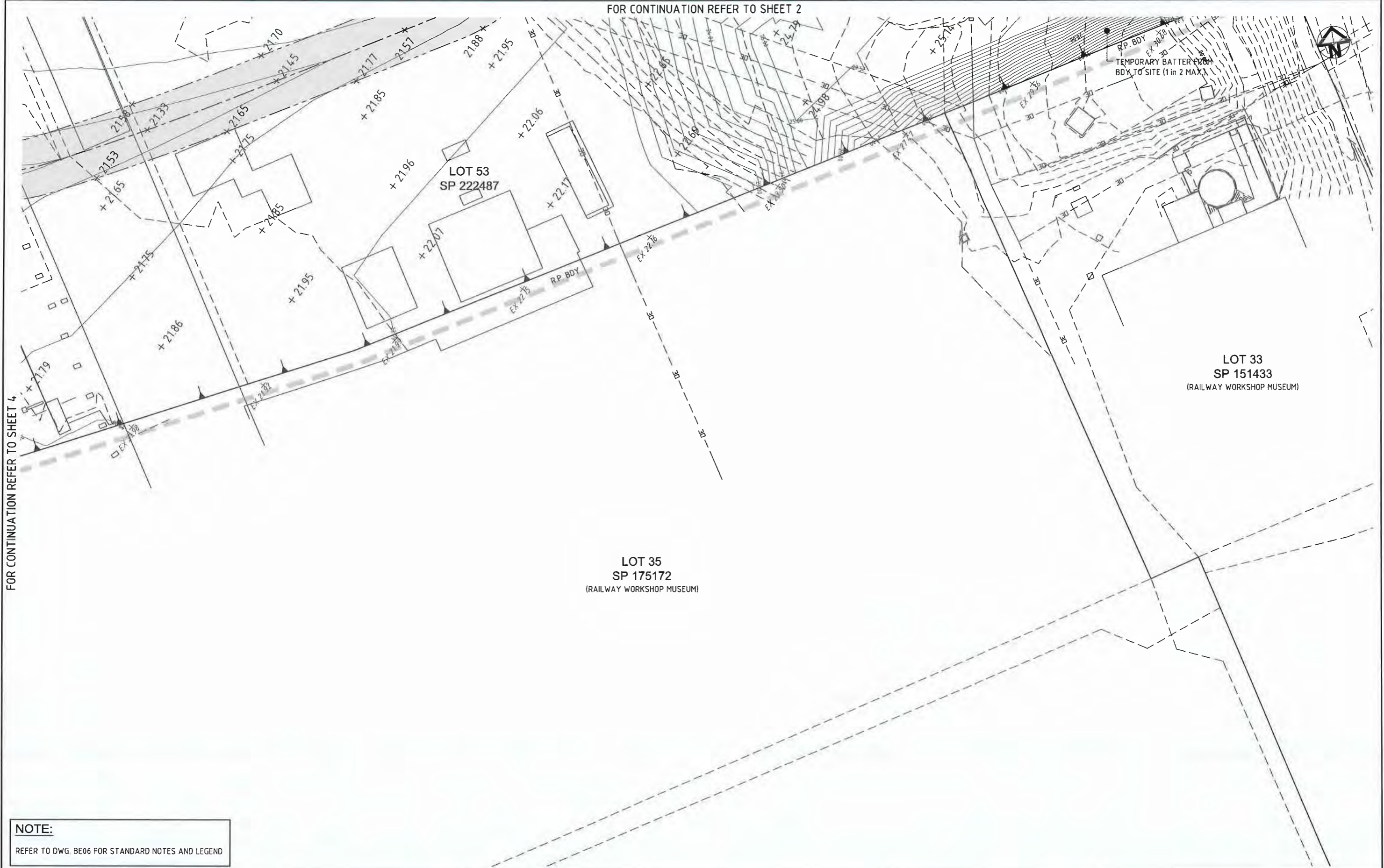
DRAWING IS NOT TO BE SCALED
SCALE (AT ORIGINAL SHEET SIZE)

ORIGINAL SHEET SIZE
A1

TASK	BY	INITIAL	DATE	APPROVED	RPE No	7825
REVIEW			23.07.09			
DESIGN			23.07.09			
DRAWN			23.07.09			

DRAWING NUMBER **YC0176-BE08** REVISION **B**

FOR CONTINUATION REFER TO SHEET 2



FOR CONTINUATION REFER TO SHEET 4

NOTE:
REFER TO DWG. BE06 FOR STANDARD NOTES AND LEGEND

STATUS		COUNCIL SUBMISSION	
REV	DESCRIPTION	DRAWN	DATE
B	COUNCIL RFI AMENDMENTS		16 03 10
A	ORIGINAL ISSUE		23 07 09

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DRAWING IS NOT TO BE SCALED

SCALE (AT ORIGINAL SHEET SIZE)

SCALE 1:250

ORIGINAL SHEET SIZE

A1

CLIENT

LEDA
Developments Pty Ltd

PROJECT

RIVER LINK DEVELOPMENT SITE
BULK EARTHWORKS
WM HUGHES ST & NORTH ST, IPSWICH

YEATS
CONSULTING ENGINEERS

LEVEL 2, 9 OUYAN STREET BUNDALL QLD 4217 AUSTRALIA
T 07 5570 4877 F 07 5570 4977 info@yeats.com.au www.yeats.com.au

TITLE		BULK EARTHWORKS LAYOUT PLAN SHEET 3 OF 4	
TASK	BY	INITIAL	DATE
REVIEW			23 07 09
DESIGN			23 07 09
DRAWN			23 07 09
APPROVED		RPEO No 7825	
DRAWING NUMBER		REVISION	
YC0176-BE09		B	

FOR CONTINUATION REFER TO SHEET 1



FOR CONTINUATION REFER TO SHEET 3

PROPOSED STORMWATER FLOWPATH REFER TO DWG. BE12 FOR TYPICAL DETAIL

LOT 35
SP 175172
(RAILWAY WORKSHOP MUSEUM)

NOTE:
REFER TO DWG. BE06 FOR STANDARD NOTES AND LEGEND

STATUS COUNCIL SUBMISSION		THIS DESIGN AND PLAN IS COPYRIGHT AND IS NOT TO BE USED OR REPRODUCED WHOLLY OR IN PART OR TO BE USED ON ANY PROJECT WITHOUT THE WRITTEN PERMISSION OF YEATS CONSULTING PTY LTD DRAWING IS NOT TO BE SCALED SCALE (AT ORIGINAL SHEET SIZE) SCALE 1:250		CLIENT 		PROJECT RIVER LINK DEVELOPMENT SITE BULK EARTHWORKS WM HUGHES ST & NORTH ST, IPSWICH				TITLE BULK EARTHWORKS LAYOUT PLAN SHEET 4 OF 4	
B COUNCIL RFI AMENDMENTS 16.03.10		A ORIGINAL ISSUE 23.07.09		A1		LEVEL 2, 9 OUYAN STREET BUNDALL QLD 4217 AUSTRALIA T 07 5570 4877 F 07 5570 4977 info@yeats.com.au www.yeats.com.au		TASK BY INITIAL DATE APPROVED RPEO No 7825		REVIEW 23.07.09 DRAWING NUMBER DESIGN 23.07.09 YC0176-BE10 DRAWN 23.07.09 B	



STATUS	COUNCIL SUBMISSION		
REV	DESCRIPTION	DATE	
B	COUNCIL RFI AMENDMENTS	16.03.10	
A	ORIGINAL ISSUE	23.07.09	

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SCALE (AT ORIGINAL SHEET SIZE)

SCALE 1:1750

ORIGINAL SHEET SIZE A1

CLIENT

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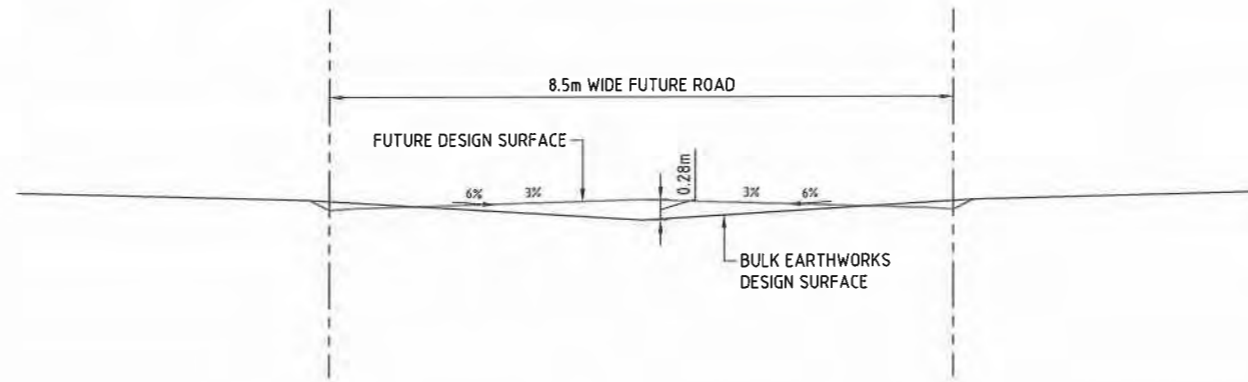
PROJECT

RIVER LINK DEVELOPMENT SITE
BULK EARTHWORKS
WM HUGHES ST & NORTH ST, IPSWICH

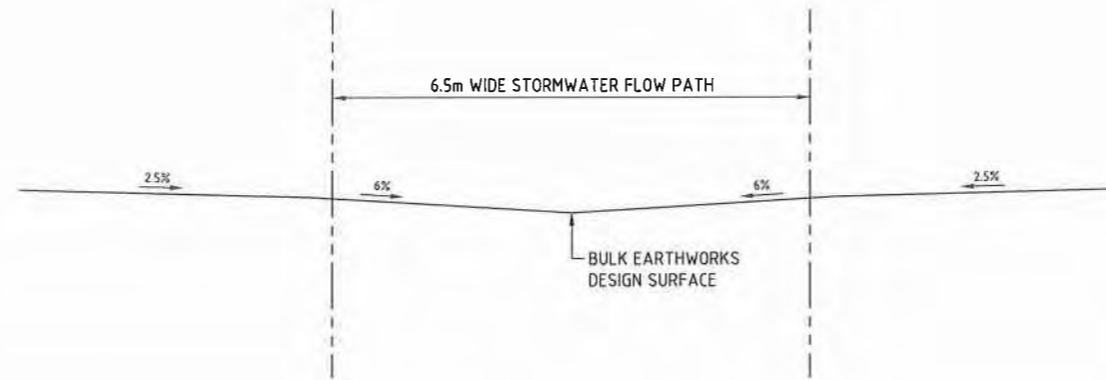
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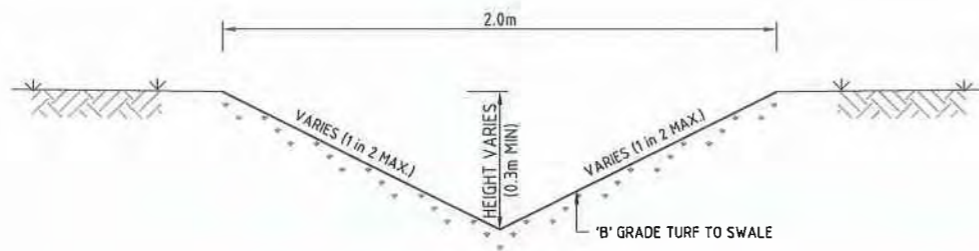
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TASK	BY	INITIAL	DATE	APPROVED
REVIEW			23.07.09	RPED No 7825
DESIGN			23.07.09	DRAWING NUMBER
DRAWN			23.07.09	YC0176-BE11
				REVISION B



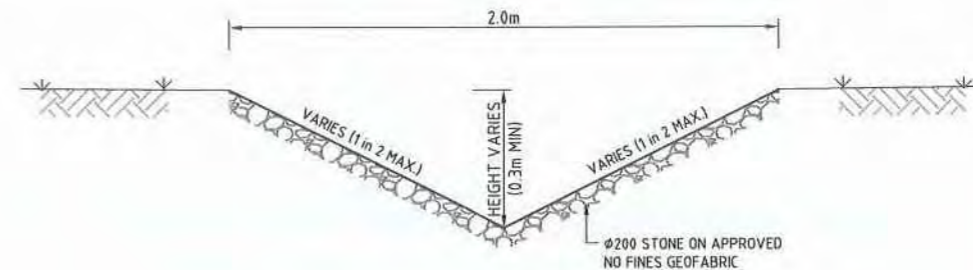
TYPICAL SECTION
FUTURE ROAD
 PROPOSED DRAINAGE PATH ALONG FUTURE ACCESS ROAD
 SCALE 1:50



TYPICAL SECTION
OVERLAND FLOW PATH
 ALONG POSSIBLE FUTURE ROAD
 SCALE 1:50



DETAIL
TEMPORARY SWALE DRAIN
 SHOWING TYPICAL GRASS LINED SWALE
 N.T.S.



DETAIL
TEMPORARY SWALE DRAIN
 SHOWING TYPICAL ROCK LINED SWALE
 N.T.S.

STATUS		COUNCIL SUBMISSION	
REV	DESCRIPTION	DRAWN	DATE
B	COUNCIL RFI AMENDMENTS		16.03.10
A	ORIGINAL ISSUE		23.07.09

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DRAWING IS NOT TO BE SCALED

SCALE (AT ORIGINAL SHEET SIZE)
AS SHOWN

ORIGINAL SHEET SIZE
A1

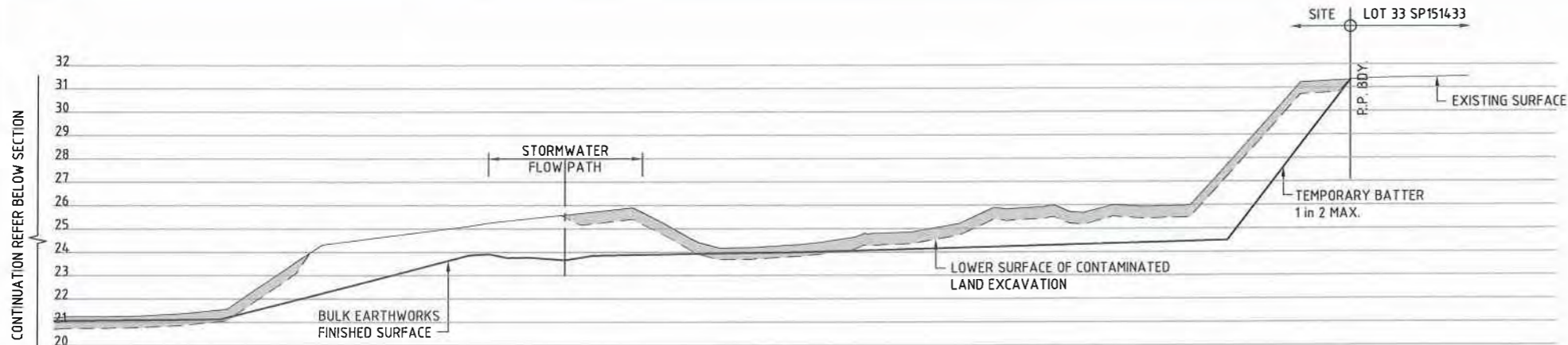
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PROJECT

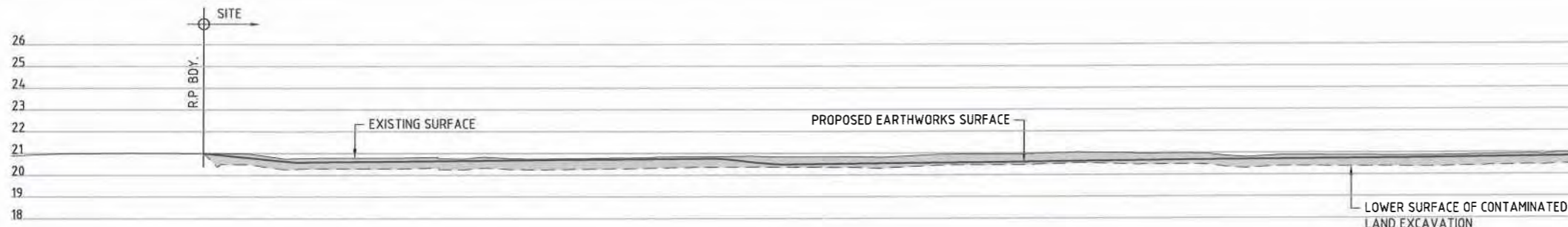
RIVER LINK DEVELOPMENT SITE
 BULK EARTHWORKS
 WM HUGHES ST & NORTH ST, IPSWICH

LEVEL 2, 9 OUYAN STREET BUNDALL QLD 4217 AUSTRALIA
 T 07 5570 4877 F 07 5570 4977 Info@yeats.com.au www.yeats.com.au

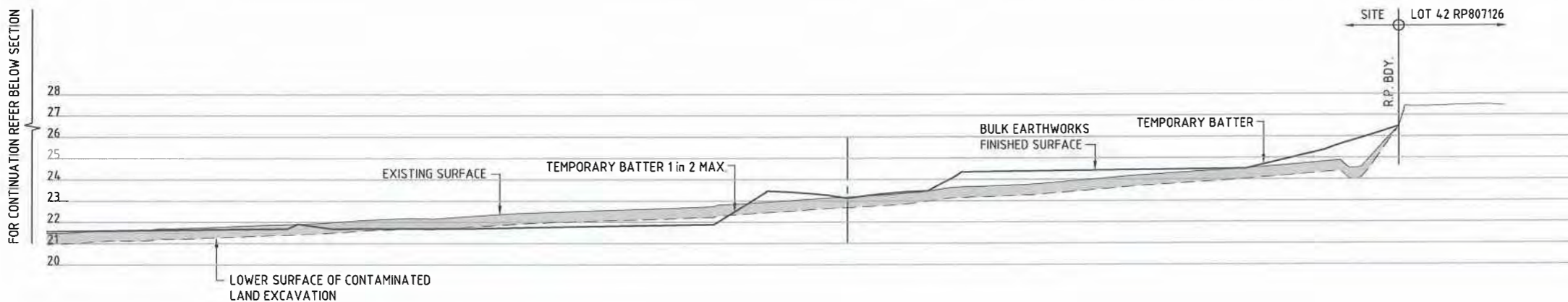
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TASK	BY	INITIAL	DATE
REVIEW			23.07.09
DESIGN			23.07.09
DRAWN			23.07.09
APPROVED		RPEQ No 7825	
DRAWING NUMBER		YC0176-BE12	
REVISION		B	



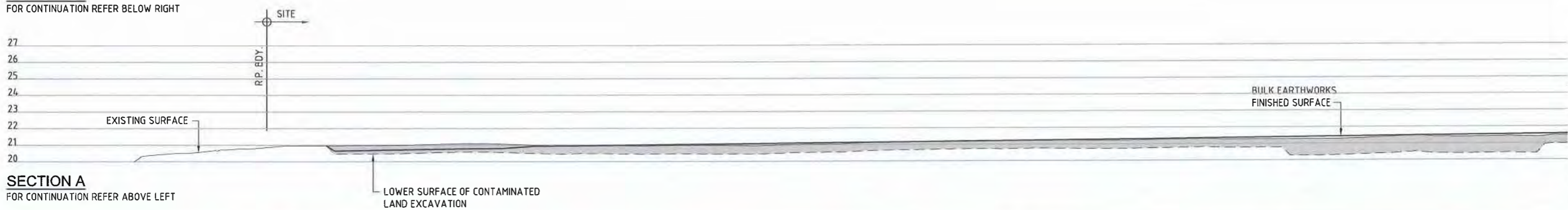
SECTION B
FOR CONTINUATION REFER BELOW RIGHT



SECTION B
FOR CONTINUATION REFER ABOVE LEFT



SECTION A
FOR CONTINUATION REFER BELOW RIGHT



SECTION A
FOR CONTINUATION REFER ABOVE LEFT

STATUS	COUNCIL SUBMISSION		
REV	DESCRIPTION	DRAWN	DATE
B	COUNCIL RFI AMENDMENTS		16.03.10
A	ORIGINAL ISSUE		23.07.09

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DRAWING IS NOT TO BE SCALED

SCALE (AT ORIGINAL SHEET SIZE)

HORZ: 1:250 (0, 5, 10)

VERT: 1:125 (0, 2.5, 5)

ORIGINAL SHEET SIZE: A1

CLIENT

LEDA
Developments Pty Ltd

PROJECT

RIVER LINK DEVELOPMENT SITE
BULK EARTHWORKS
WM HUGHES ST & NORTH ST, IPSWICH

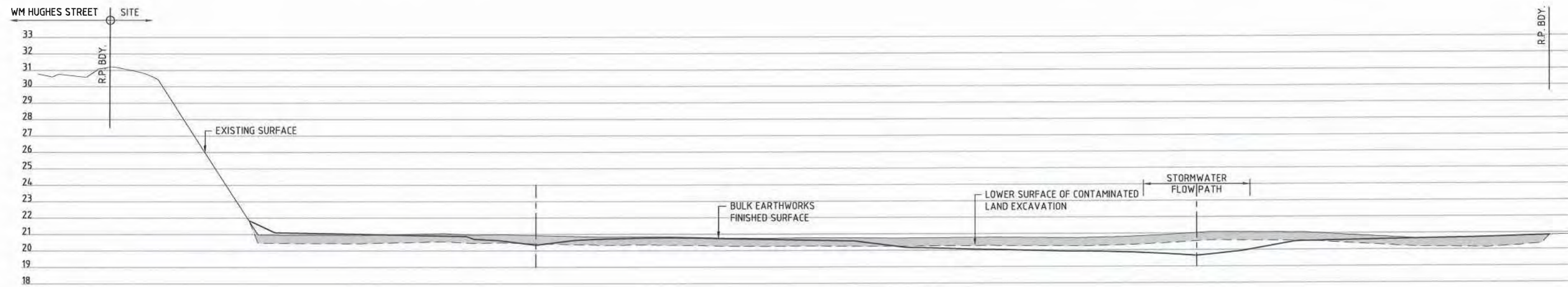
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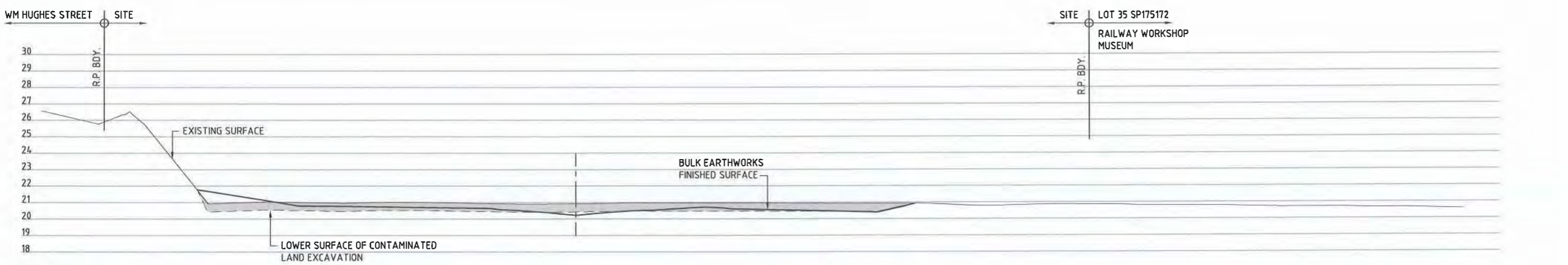
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TASK	BY	INITIAL	DATE	APPROVED
REVIEW			23.07.09	
DESIGN			23.07.09	
DRAWN			23.07.09	
DRAWING NUMBER			YC0176-BE13	REVISION
RPEQ No			7825	B



SECTION E



SECTION D



SECTION C

STATUS		COUNCIL SUBMISSION	
REV	DESCRIPTION	DATE	
B	COUNCIL RFI AMENDMENTS	16.03.10	
A	ORIGINAL ISSUE	23.07.09	

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SCALE (AT ORIGINAL SHEET SIZE)

HORZ 1:250
VERT 1:125

ORIGINAL SHEET SIZE
A1

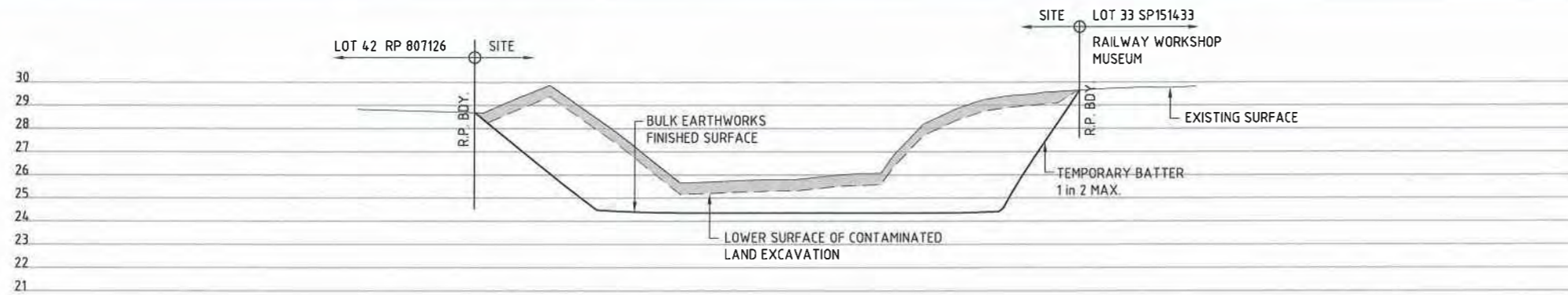
CLIENT

PROJECT

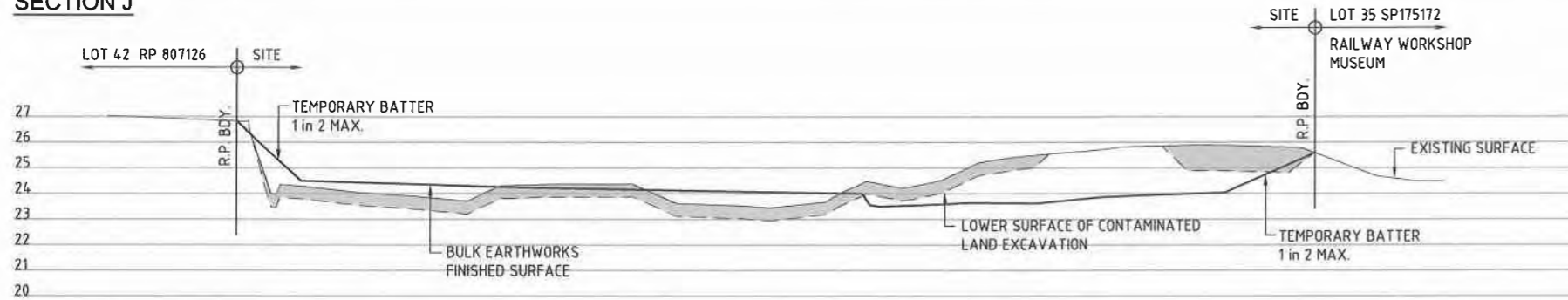
**RIVER LINK DEVELOPMENT SITE
BULK EARTHWORKS
WM HUGHES ST & NORTH ST, IPSWICH**

LEVEL 2, 9 OUYAN STREET BUNDALL QLD 4217 AUSTRALIA
T 07 5570 4877 F 07 5570 4977 info@yeats.com.au www.yeats.com.au

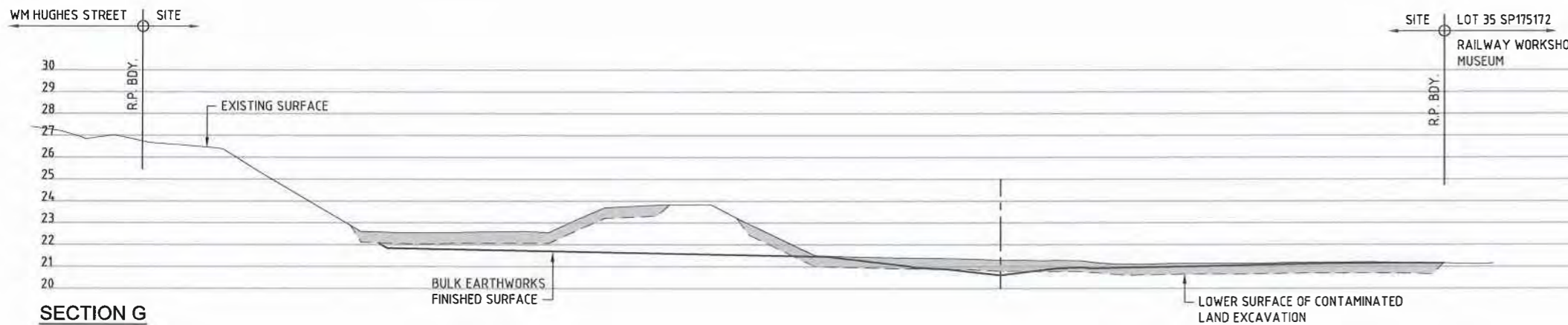
TITLE		BULK EARTHWORKS CROSS SECTIONS SHEET 2 OF 3	
TASK	BY	INITIAL	DATE
REVIEW			23.07.09
DESIGN			23.07.09
DRAWN			23.07.09
APPROVED		RPEQ No 7825	
DRAWING NUMBER		REVISION	
YC0176-BE14		B	



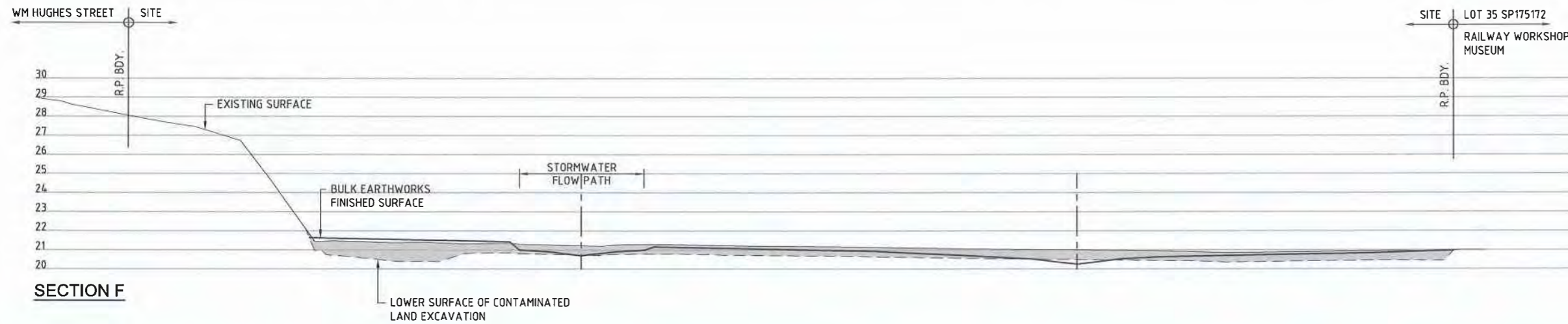
SECTION J



SECTION H



SECTION G



SECTION F

STATUS		COUNCIL SUBMISSION	
REV	DESCRIPTION	DATE	
B	COUNCIL RFI AMENDMENTS	16.03.10	
A	ORIGINAL ISSUE	23.07.09	

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DRAWING IS NOT TO BE SCALED

SCALE (AT ORIGINAL SHEET SIZE)

HORZ: 1:250 (0, 5, 10)

VERT: 1:125 (0, 2.5, 5)

ORIGINAL SHEET SIZE: A1

CLIENT

PROJECT

RIVER LINK DEVELOPMENT SITE
BULK EARTHWORKS
WM HUGHES ST & NORTH ST, IPSWICH

LEVEL 2, 9 OUYAN STREET BUNDALL QLD 4217 AUSTRALIA
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TITLE		BULK EARTHWORKS CROSS SECTIONS SHEET 3 OF 3			
TASK	BY	INITIAL	DATE	APPROVED	RPEQ No 7825
REVIEW			23.07.09		
DESIGN			23.07.09		
DRAWN			23.07.09		
DRAWING NUMBER				YC0176-BE15	REVISION B

Appendix 2

**Bulk Earthworks Plans Related to the Northern
Section of Lot 54 by VDM Consulting.**



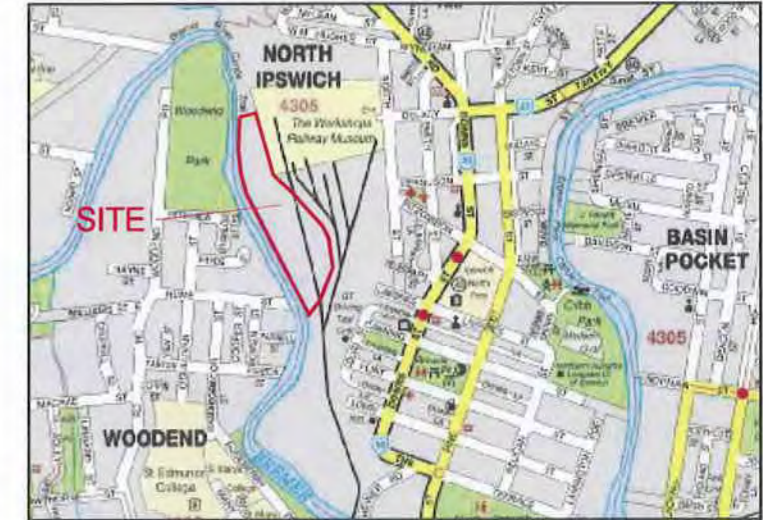
RIVERSIDE CENTRAL

NORTHERN BULK EARTHWORKS CONTRACT QC00:3754:03



LOCALITY PLAN

SCHEDULE OF DRAWINGS	
Drawing No.	Drawing Title
SK03	BULK EARTHWORKS OVERALL LAYOUT PLAN
SK04	BULK EARTHWORKS FINISHED SURFACE LEVELS
SK05	BULK EARTHWORKS BORROW PIT
SK06	BULK EARTHWORKS CROSS SECTIONS No. 1
SK07	BULK EARTHWORKS CROSS SECTIONS No. 2
SK08	BULK EARTHWORKS CROSS SECTIONS No. 3
SK09	BULK EARTHWORKS CROSS SECTIONS No. 4
SK10	BULK EARTHWORKS CROSS SECTIONS No. 5
SK11	BULK EARTHWORKS CROSS SECTIONS No. 6
SK12	BULK EARTHWORKS CROSS SECTIONS No. 7
SK13	BULK EARTHWORKS CROSS SECTIONS No. 8
SK30	SERVICES ALTERATION DETAILS LAYOUT PLAN
SK31	SERVICES ALTERATION DETAILS STORMWATER LONGITUDINAL SECTIONS
SK32	SERVICES ALTERATION DETAILS CULVERT HEADWALL AND RENO MATTRESS BATTER PROTECTION DETAILS
SK90	EARTHWORKS VOLUMES SUMMARY SHEET 1
SK91	EARTHWORKS VOLUMES MASS HAUL SHEET 2
SK92	EARTHWORKS CONSTRUCTION SEQUENCE SHEET 1 PHASE 1 CONSTRUCTION
SK93	EARTHWORKS CONSTRUCTION SEQUENCE SHEET 2 PHASE 2 CONSTRUCTION
SK94	EARTHWORKS CONSTRUCTION SEQUENCE SHEET 3 PHASE 3 CONSTRUCTION
SK95	EARTHWORKS CONSTRUCTION SEQUENCE SHEET 4 PHASE 4 CONSTRUCTION
SK100	EROSION AND SEDIMENT CONTROL SHEET 1 PRE DEVELOPMENT
SK101	EROSION AND SEDIMENT CONTROL SHEET 2 TECHNICAL NOTES AND DETAILS
SK102	EROSION AND SEDIMENT CONTROL SHEET 3 CONSTRUCTION PERIOD STAGE 1
SK103	EROSION AND SEDIMENT CONTROL SHEET 4 CONSTRUCTION PERIOD STAGE 2
SK104	EROSION AND SEDIMENT CONTROL SHEET 5 CONSTRUCTION PERIOD STAGE 3
SK105	EROSION AND SEDIMENT CONTROL SHEET 6 CONSTRUCTION PRIOR TO ESTABLISHMENT
SK200	BULK EARTHWORKS AND PRECINCT PLAN
SK400	SURVEY PLAN WITH STOCK PILES OVERLAIN
SK500	SP222487



NEIGHBOURHOOD PLAN

PREPARED FOR

LEDA DEVELOPMENTS PTY LTD

PREPARED BY



BURCHILL

Consulting Engineers & Planners

Level 8, Australia Fair Office Tower
42 Marine Parade, Southport QLD 4215
PO Box 3766, Australia Fair, Southport QLD 4215

Phone +61 7 5509 6400

Fax +61 7 5509 6411

Email goldcoast@vdmgroup.com.au

ASSOCIATED CONSULTANTS

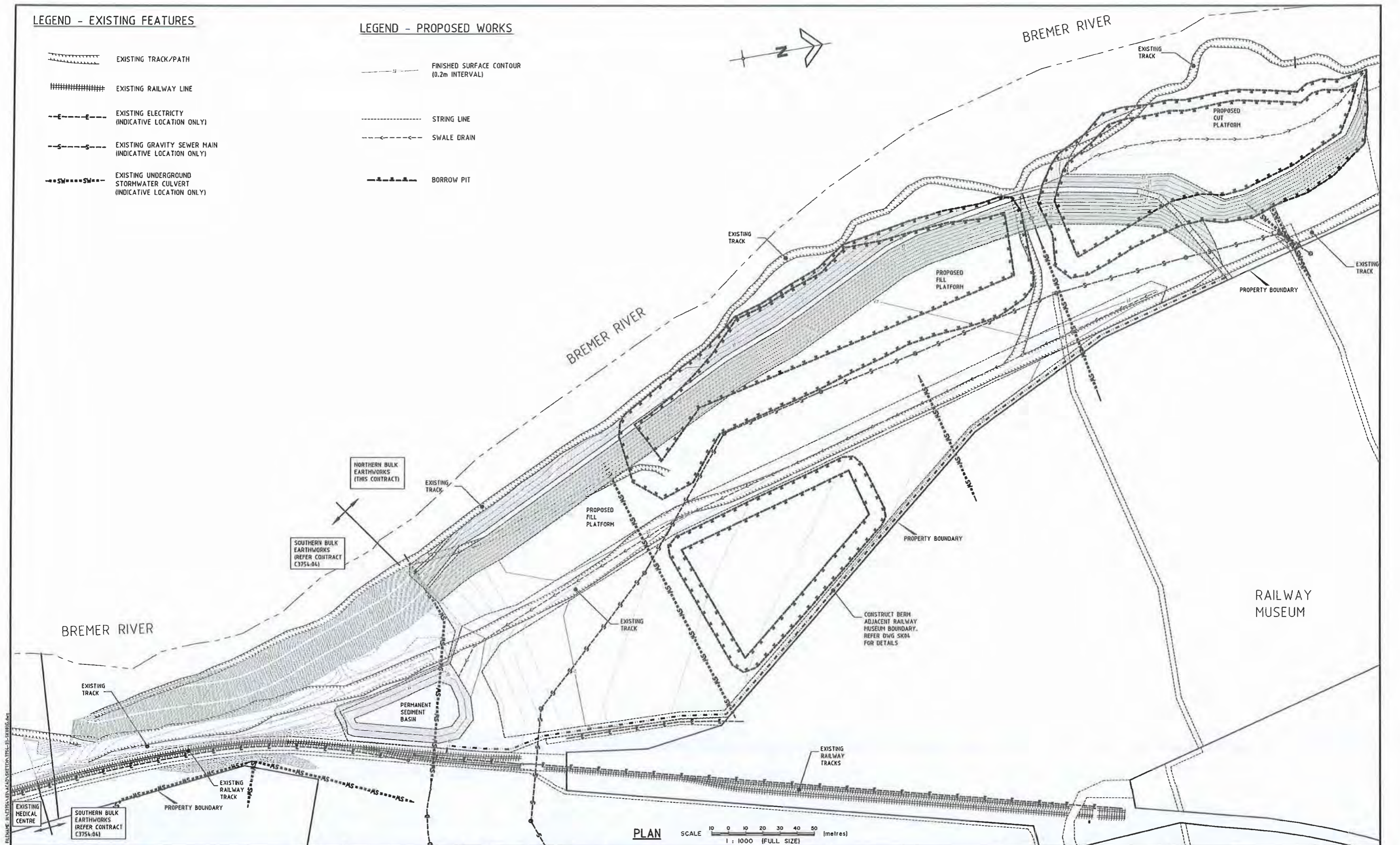
PROJECT No.:	DRAWING No.:	AMENDMENT:
QC003754:03	C000	B

LEGEND - EXISTING FEATURES

- EXISTING TRACK/PATH
- EXISTING RAILWAY LINE
- EXISTING ELECTRICITY (INDICATIVE LOCATION ONLY)
- EXISTING GRAVITY SEWER MAIN (INDICATIVE LOCATION ONLY)
- EXISTING UNDERGROUND STORMWATER CULVERT (INDICATIVE LOCATION ONLY)

LEGEND - PROPOSED WORKS

- FINISHED SURFACE CONTOUR (0.2m INTERVAL)
- STRING LINE
- SWALE DRAIN
- BORROW PIT



PLAN SCALE 1 : 1000 (FULL SIZE) (metres)

Riverside Central
for
LEDA DEVELOPMENTS PTY LTD

REV.	DESCRIPTION	APPR.	DATE
G	LEVELS AMENDED, BORROW PIT #2 ADDED		15.03.10
F	BERM NOTE ADDED		18.11.09
E	INTERIM ISSUE TO CLIENT		03.11.09
D	BORROW PIT AMENDED		18.10.09
C	NEW DRAWING		06.10.09
B	NOT ISSUE		05.08.09
A	NOT ISSUE		27.07.07

VDM CONSULTING
BURCHILL
Consulting Engineers & Planners
Level 8, Australia Fair Office Tower
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Fax +81 7 5509 8411
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PROJECT:
RIVERSIDE CENTRAL
NORTHERN
BULK EARTHWORKS

DRAWING TITLE:
BULK
EARTHWORKS
OVERALL LAYOUT
PLAN

DEVEL. APPLIC. No.:	DATE: 23.07.07
PROJECT LEADER:	
DRAFTSPERSON:	
SCALE:	DATUM: AHD
PROJECT No.: C3754:03	FULL SIZE: A1
DRAWING No.: SK03	REVISION: G

RIVERSIDE CENTRAL

for
LEDA DEVELOPMENTS PTY LTD

REV.	DESCRIPTION	APPR.	DATE
G	LEVELS AND VOLUMES AMENDED, BORROW PIT #2 ADDED		15.03.10
F	BERM NOTE ADDED		10.11.09
E	INTERIM ISSUE TO CLIENT		03.11.09
D	NOTE ADDED		10.10.09
C	LEVELS AND VOLUMES AMENDED, TEMP SEDIMENT BASIN AMENDED		06.10.09
B	LEVELS AND VOLUMES AMENDED, TEMP SEDIMENT BASIN ADDED		05.08.09
A	VOLUMES ADDED		27.07.07

VDM CONSULTING
BURCHILL
Consulting Engineers & Planners
Evandale Place, 142 Bundall Road
Surfers Paradise QLD 4217
Phone +61 7 5574 0511
Fax Civil +61 7 5574 0011
Fax Structural +61 7 5574 0505
Email burchillvdm@vdmgroup.com.au

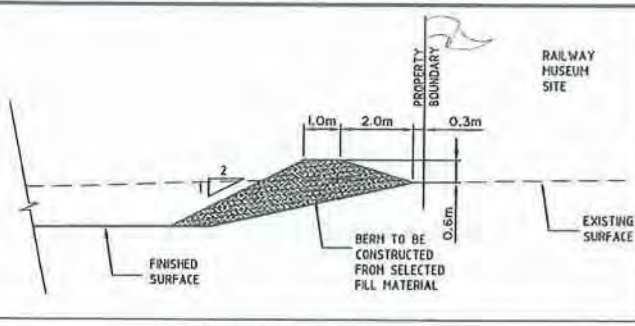
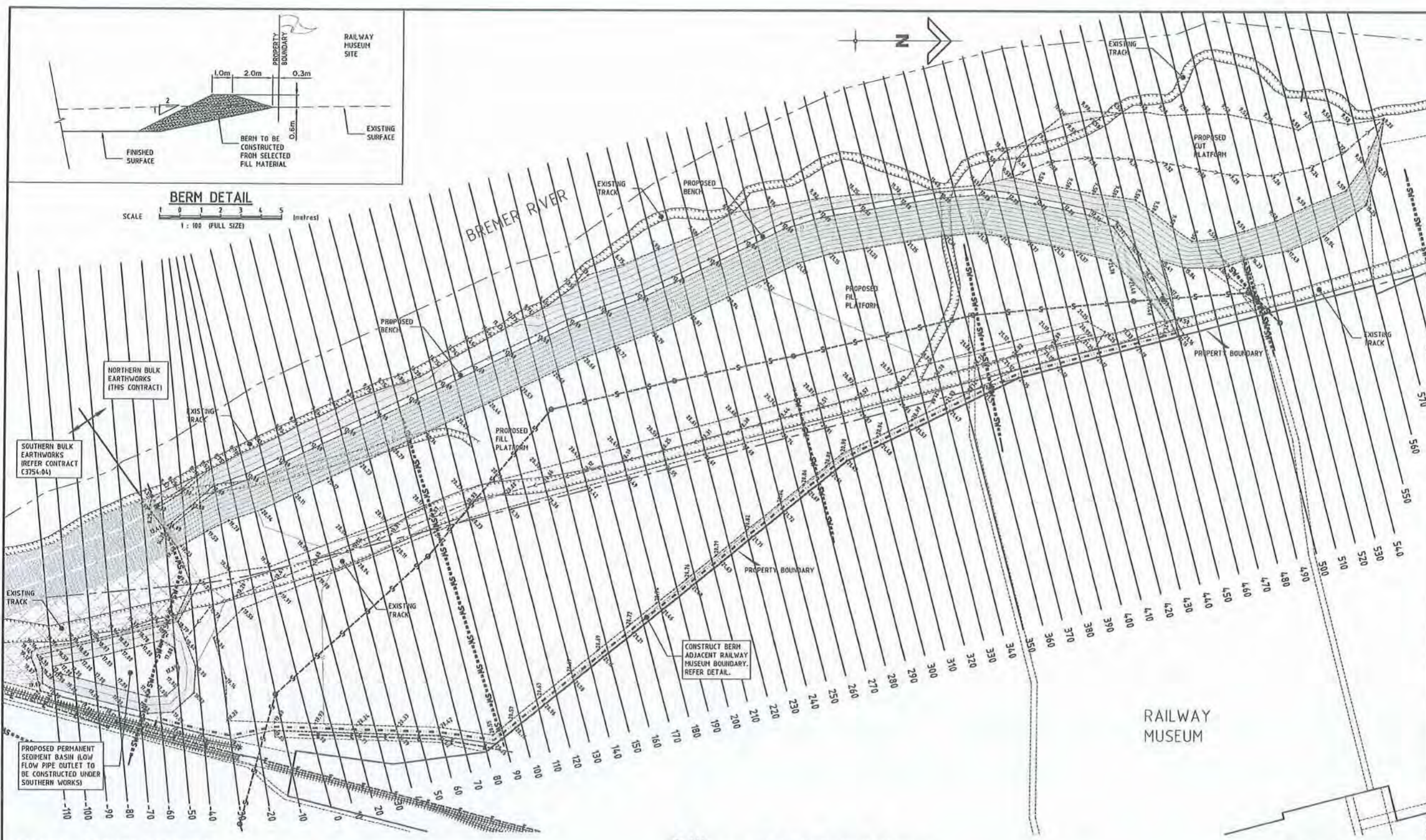
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PROJECT:
**RIVERSIDE CENTRAL
NORTHERN
BULK EARTHWORKS**

DRAWING TITLE:
**BULK
EARTHWORKS
FINISHED
SURFACE LEVELS**

DEVEL. APPLIC. No.:	DATE: 23.07.07
PROJECT LEADER:	
DESIGNER:	
DRAFTSPERSON:	
CHECKED:	

SCALE: AS SHOWN	DATUM: AHD	FULL SIZE: A1
PROJECT No.: C3754:03	DRAWING No.: SK04	REVISION: G



BERM DETAIL
SCALE 1 : 100 (FULL SIZE)

PLAN
SCALE 1 : 1000 (FULL SIZE)

LEGEND - EXISTING FEATURES

- EXISTING TRACK/PATH
- ===== EXISTING RAILWAY LINE
- - - - - EXISTING ELECTRICITY (INDICATIVE LOCATION ONLY)
- - - - - EXISTING GRAVITY SEWER MAIN (INDICATIVE LOCATION ONLY)
- - - - - EXISTING UNDERGROUND STORMWATER CULVERT (INDICATIVE LOCATION ONLY)

EARTHWORK VOLUMES (PROVISIONAL):

AVAILABLE CUT	CLAY	OTHER	IMPORTED TOPSOIL		
SOLID CUT FROM BORROW PITS AND PLATFORMS:	133,370 cu.m.	93,270 cu.m.	10,020 cu.m.		
COMPACTION LOSS:	85%	85%	FILL REQUIRED	CLAY	OTHER
GIVING AVAILABLE FILL:	113,370 cu.m.	79,280 cu.m.	COMPACTED CLAY CAPPING LAYER:	82,020 cu.m.	-
VOLUME OF EXISTING STOCKPILES (APPROX):	-	130,090 cu.m.	COMPACTED FILL BELOW CAPPING (INCLUDING BACKFILL TO BORROW PITS):	-	247,690 cu.m.
COMPACTION LOSS:	-	80%	REPLACEMENT MATERIAL TO NORTH ST, HUGHES ST & WIDE GULLY SITES:	20,210 cu.m.	-
GIVING AVAILABLE FILL:	-	104,070 cu.m.	TOTAL FILL REQUIRED:	102,230 cu.m.	247,690 cu.m.
VOLUME OF UNSUITABLE FROM NORTH ST, HUGHES ST & WIDE GULLY SITES:	-	49,340 cu.m.	BALANCE:	SURPLUS	DEFICIT
COMPACTION LOSS:	-	85%		11,940 cu.m. TO SOUTHERN CAPPING	22,400 cu.m. FROM SOUTHERN EXCAVATION
GIVING AVAILABLE FILL:	-	41,940 cu.m.			
TOTAL AVAILABLE FILL:	113,370 cu.m.	225,290 cu.m.			

NOTE:
VOLUME EXCLUDES SOIL AMENDMENT TO EXISTING UNCONTROLLED FILL AREA OUTSIDE OF BORROW AREAS.

LEGEND - PROPOSED WORKS

- FINISHED SURFACE CONTOUR (0.2m INTERVAL)
- FINISHED SURFACE LEVEL AND LOCATION
- STRING LINE
- SWALE DRAIN
- EXTENT OF SOUTHERN BULK EARTHWORKS (REFER CONTRACT C3754.04)

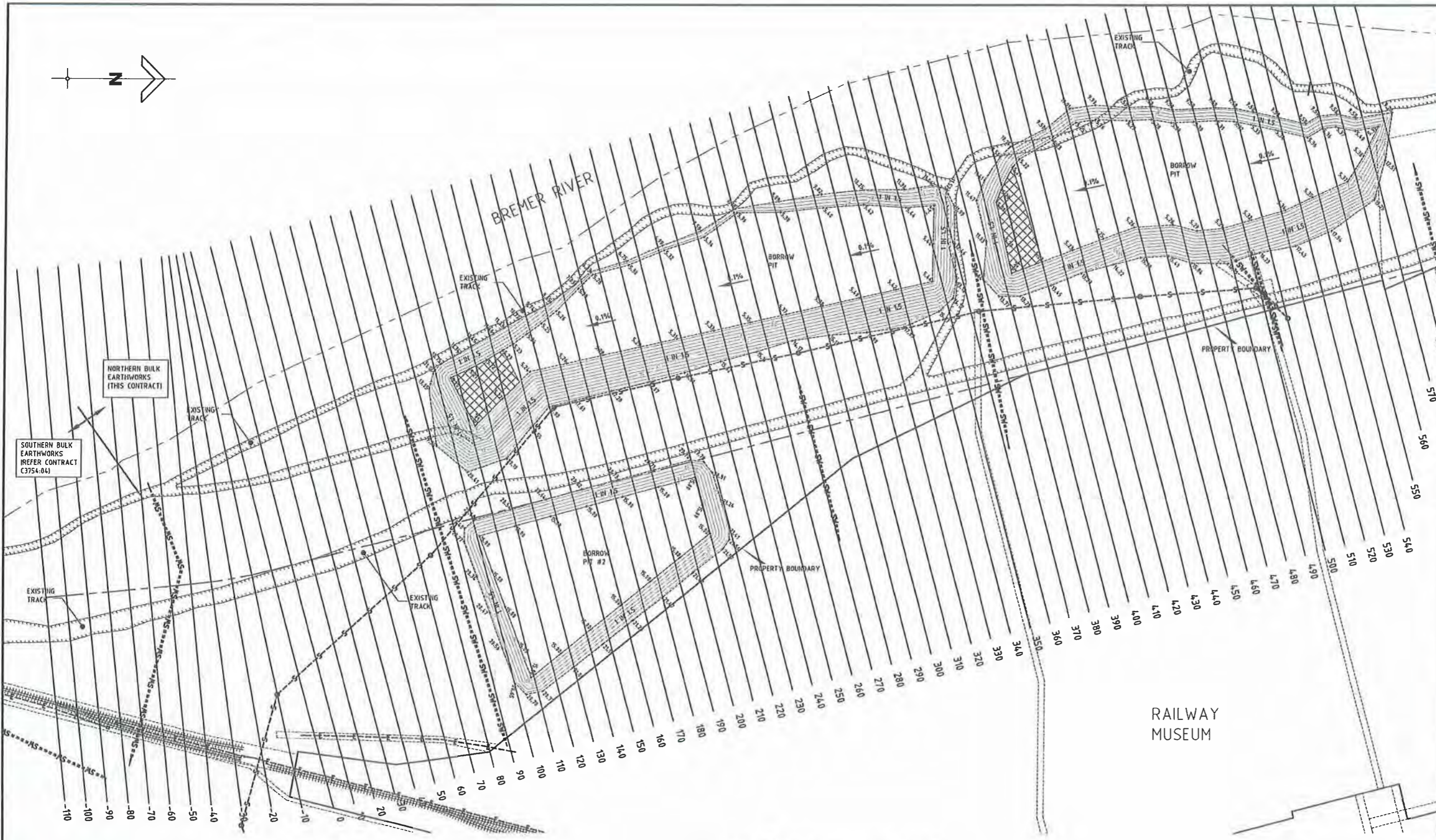
- NOTES:**
- BATTER PROFILE SUBJECT TO FINAL GEOTECHNICAL ANALYSIS
 - REFER DWG C3754:03:SK30 FOR SERVICES ALTERATION DETAILS
 - REFER DWG C3754:03:SK100 FOR EROSION AND SEDIMENT CONTROL DETAILS

PLOTTER: HP 1000 (FULL SIZE)



RIVERSIDE CENTRAL

for
LEDA DEVELOPMENTS PTY LTD



NORTHERN BULK EARTHWORKS (THIS CONTRACT)

SOUTHERN BULK EARTHWORKS REFER CONTRACT C3754-04

PLAN
SCALE 1 : 1000 (FULL SIZE) (metres)

LEGEND - EXISTING FEATURES

- EXISTING TRACK/PATH
- EXISTING RAILWAY LINE
- EXISTING ELECTRICITY (INDICATIVE LOCATION ONLY)
- EXISTING GRAVITY SEWER MAIN (INDICATIVE LOCATION ONLY)
- EXISTING UNDERGROUND STORMWATER CULVERT (INDICATIVE LOCATION ONLY)

LEGEND - BORROW PIT

- BORROW PIT CONTOUR (0.5m INTERVAL)
- BORROW PIT LEVEL AND LOCATION
- STRING LINE
- TEMPORARY SEDIMENT BASIN (MIN 500 SQ.M.)

REV.	DESCRIPTION	APPR.	DATE
F	BORROW PIT #2 ADDED		15.03.10
E	INTERIM ISSUE TO CLIENT		03.11.09
D	BORROW PITS AMENDED		18.10.09
C	BORROW PITS AMENDED		08.10.09
B	BORROW PITS AMENDED		05.09.09
A	BORROW PITS AMENDED		27.07.07

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 Email burchillvdm@vdmgroup.com.au

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PROJECT:
**RIVERSIDE CENTRAL
 NORTHERN
 BULK EARTHWORKS**

DRAWING TITLE:
**BULK
 EARTHWORKS
 BORROW
 PIT**

DEVEL. APPLIC. No.:	DATE: 23.07.07
PROJECT LEADER:	
DESIGNER:	
DRAFTSPERSON:	
CHECKED:	

SCALE: AS SHOWN	DATUM: AHD	FULL SIZE: A1
PROJECT No.: C3754:03	DRAWING No.: SK05	REVISION: F

PLOTTED: 11.08.2010 10:52:23

RIVERSIDE CENTRAL

for
LEDA DEVELOPMENTS PTY LTD

REV.	DESCRIPTION	APPR.	DATE
F	SECTIONS AMENDED		15.03.10
E	INTERIM ISSUE TO CLIENT		03.11.09
D	SECTIONS AMENDED		16.10.09
C	SECTIONS AMENDED		06.10.09
B	SECTIONS AMENDED		05.08.09
A	TOP OF STIFF CLAY ADDED AND BORROW PITS AMENDED		27.07.07



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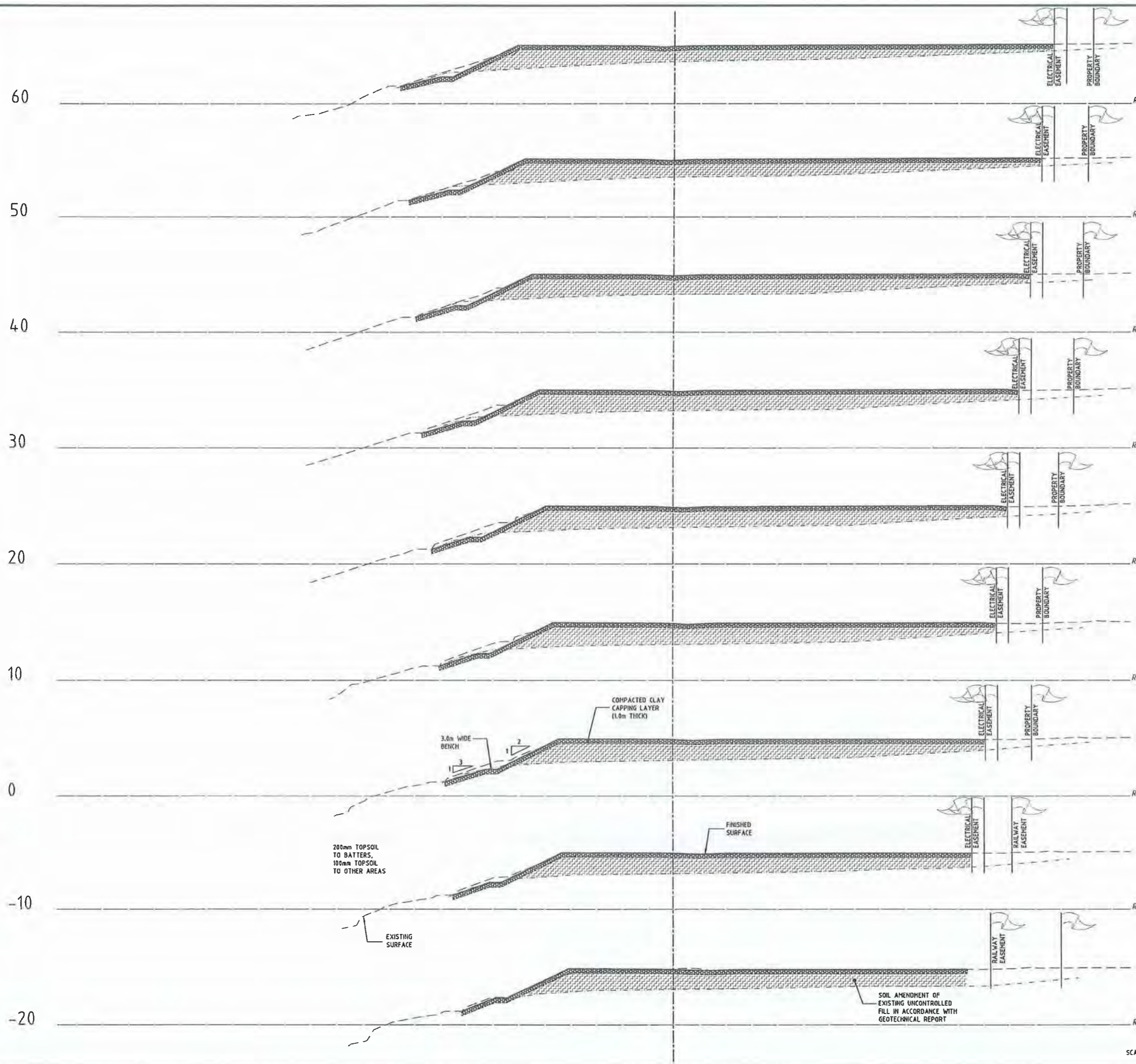
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PROJECT:
**RIVERSIDE CENTRAL
NORTHERN
BULK EARTHWORKS**

DRAWING TITLE:
**BULK
EARTHWORKS
CROSS SECTIONS
SHEET No. 2**

DEVEL. APPLIC. No.:	DATE: 23.07.07
PROJECT LEADER:	
DESIGNER:	
DRAFTSPERSON:	
CHECKED:	
APPROVED FOR AND:	

SCALE: AS SHOWN	DATUM: AHD	FULL SIZE: A1
PROJECT No.: C3754:03	DRAWING No.: SK07	REVISION: F



PLOTTER: W. 2007 2011

**RIVERSIDE
CENTRAL**

for
LEDA DEVELOPMENTS PTY LTD

REV.	DESCRIPTION	APPR.	DATE
F	SECTIONS AMENDED		15.03.10
E	INTERIM ISSUE TO CLIENT		03.11.09
D	SECTIONS AMENDED		18.10.09
C	SECTIONS AMENDED		06.10.09
B	SECTIONS AMENDED		05.08.09
A	TOP OF STIFF CLAY ADDED AND BORROW PITS AMENDED		27.07.07

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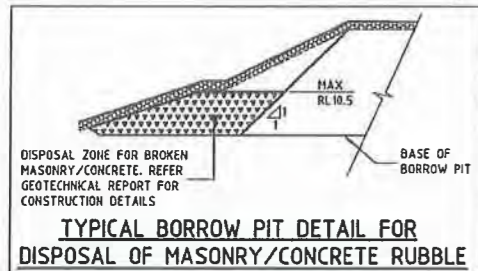
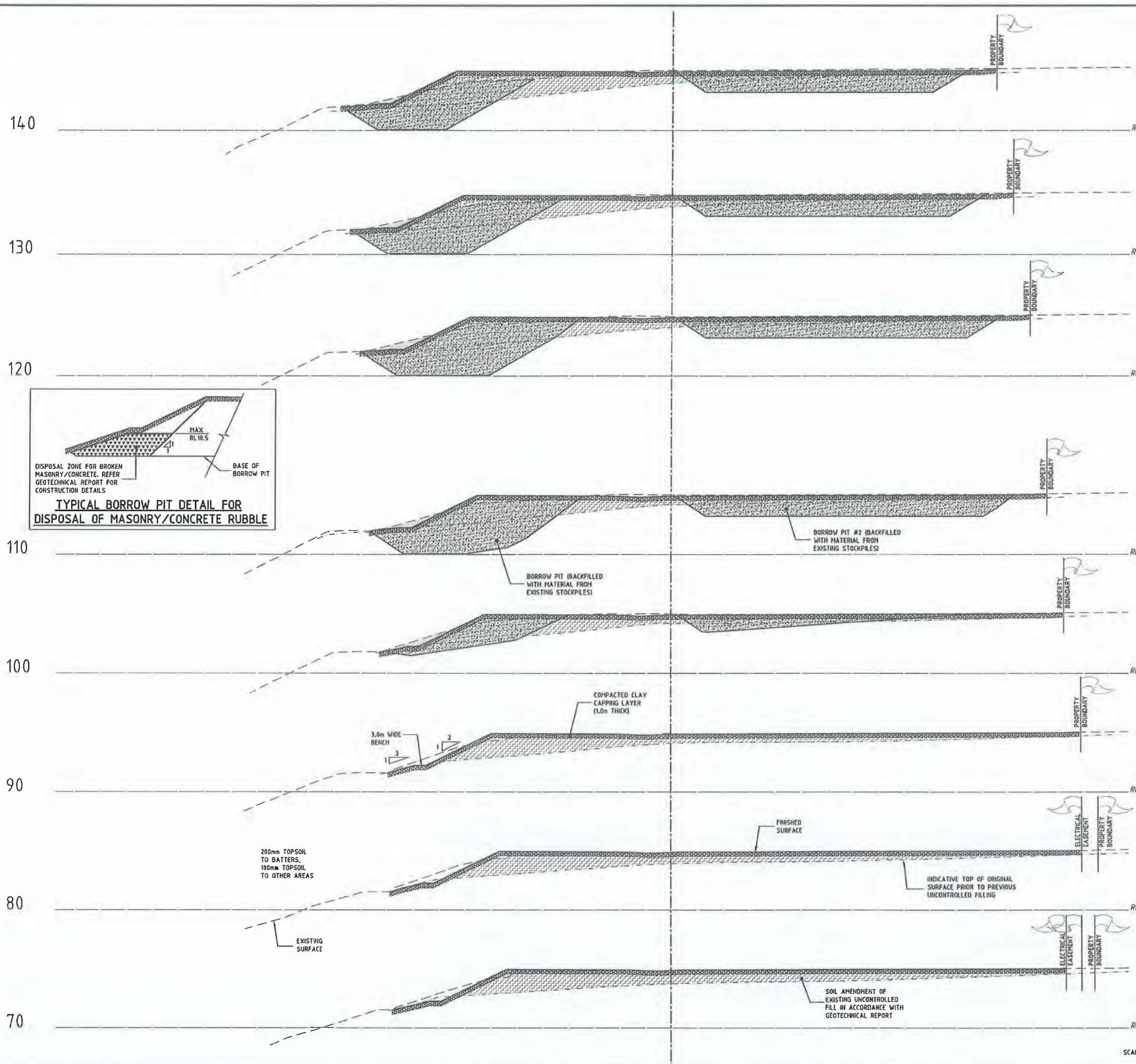
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PROJECT:
**RIVERSIDE CENTRAL
NORTHERN
BULK EARTHWORKS**

DRAWING TITLE:
**BULK
EARTHWORKS
CROSS SECTIONS
SHEET No. 3**

DEVEL. APPLIC. No.:	DATE: 23.07.07
PROJECT LEADER:	
DESIGNER:	
DRAFTSPERSON:	
CHECKED:	
APPROVED FOR AND ON BEHALF OF BIRCHILL VDM PTY LIMITED	

SCALE: AS SHOWN	DATUM: AHD	FULL SIZE: A1
PROJECT No.: C3754:03	DRAWING No.: SK08	REVISION: F



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RIVERSIDE CENTRAL

for
LEDA DEVELOPMENTS PTY LTD

REV	DESCRIPTION	APPR.	DATE
F	SECTIONS AMENDED		15.03.10
E	INTERIM ISSUE TO CLIENT		03.11.09
D	SECTIONS AMENDED		18.10.09
C	SECTIONS AMENDED		08.10.09
B	SECTIONS AMENDED		05.08.09
A	TOP OF STIFF CLAY ADDED AND BORROW PITS AMENDED		27.07.07



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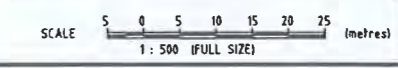
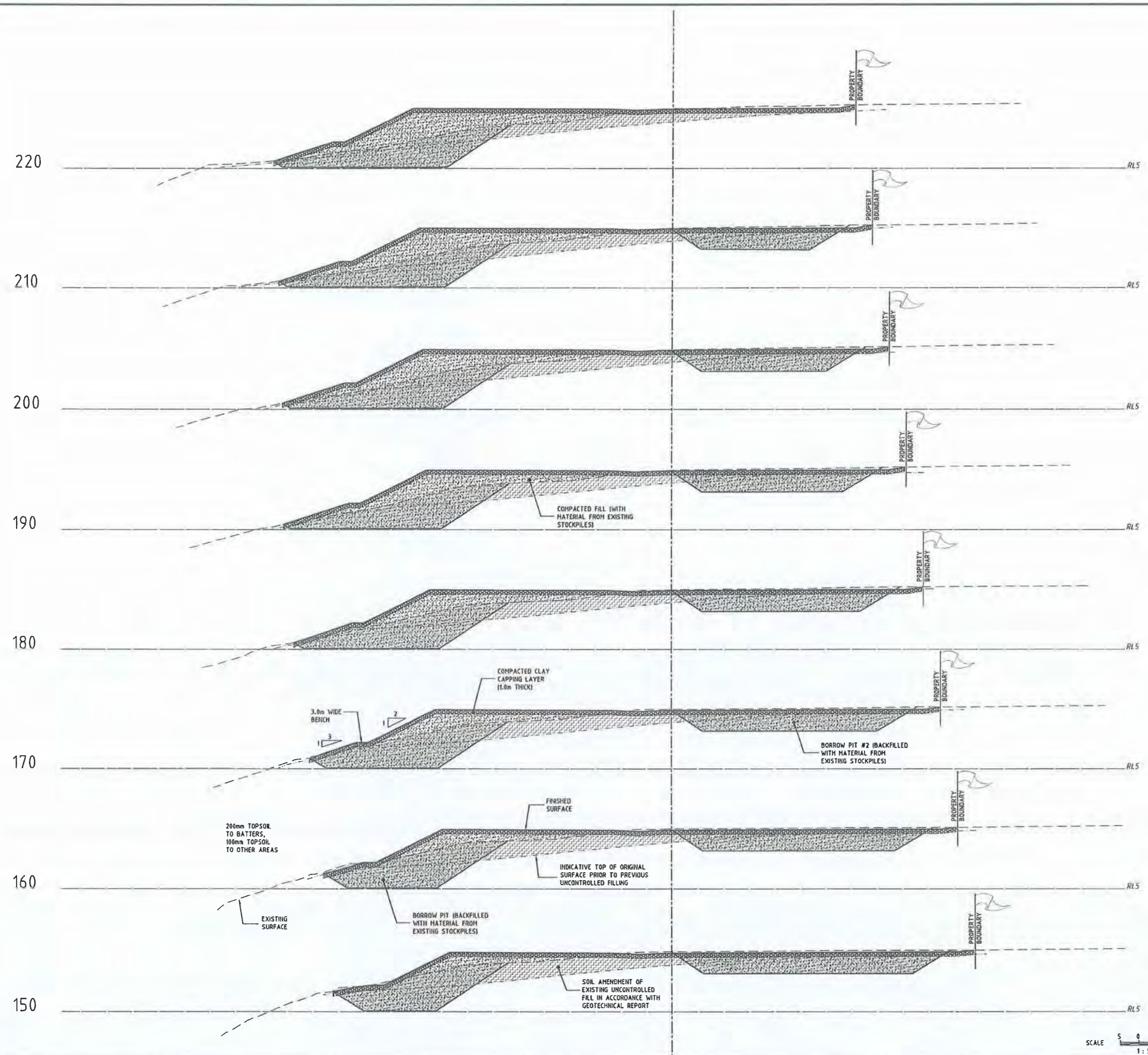
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PROJECT:
**RIVERSIDE CENTRAL
NORTHERN
BULK EARTHWORKS**

DRAWING TITLE:
**BULK
EARTHWORKS
CROSS SECTIONS
SHEET No. 4**

DEVEL. APPLIC. No.:	DATE: 23.07.07
PROJECT LEADER:	
DESIGNER:	
DRAFTSPERSON:	
CHECKED:	
APPROVED FOR AND ON BEHALF OF BURCHILL VDM PTY LIMITED	

PROJECT No.:	DRAWING No.:	REVISION:
C3754:03	SK09	F



PLOTTED: 18. Nov 2010

**RIVERSIDE
CENTRAL**

for
LEDA DEVELOPMENTS PTY LTD

REV.	DESCRIPTION	APPR.	DATE
F	SECTIONS AMENDED		15.03.10
E	INTERIM ISSUE TO CLIENT		03.11.09
D	SECTIONS AMENDED		18.10.09
C	SECTIONS AMENDED		06.10.09
B	SECTIONS AMENDED		05.08.09
A	TOP OF STIFF CLAY ADDED AND BORROW PITS AMENDED		17.07.07

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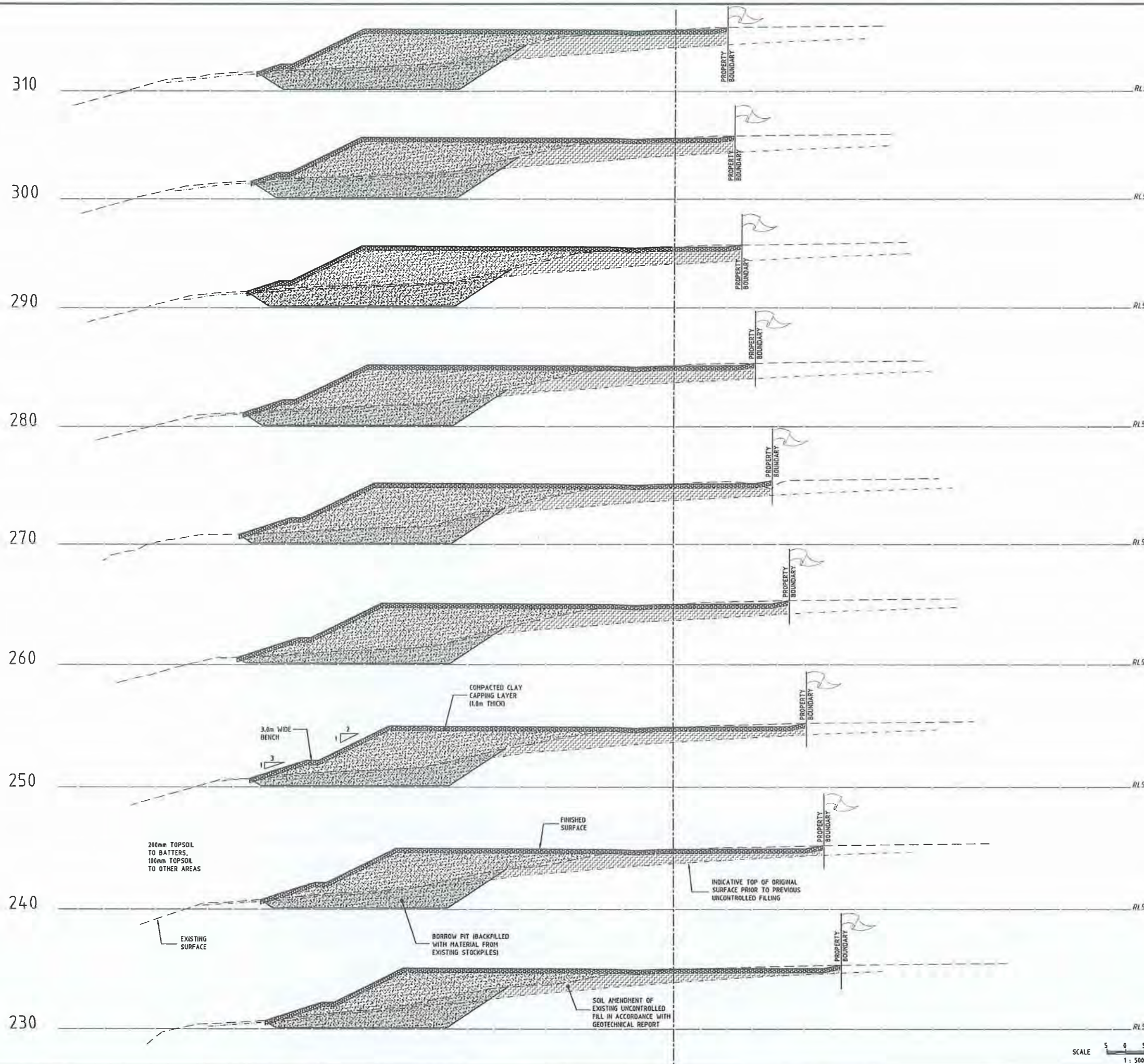
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PROJECT:
**RIVERSIDE CENTRAL
NORTHERN
BULK EARTHWORKS**

DRAWING TITLE:
**BULK
EARTHWORKS
CROSS SECTIONS
SHEET No. 5**

DEVEL APPLIC No.:	DATE: 23.07.07
PROJECT LEADER:	
DESIGNER:	
DRAFTSPERSON:	
CHECKED:	

SCALE: A3 SHOWN	DATUM: AHD	FULL SIZE: A1
PROJECT No.: C3754:03	DRAWING No.: SK10	REVISION: F



PLOTID: 10.001.2010 FILENAME: I:\PROJECTS\ACQUACON\SECTION\3754-03\50102.dwg

**RIVERSIDE
CENTRAL**

for
LEDA DEVELOPMENTS PTY LTD

REV.	DESCRIPTION	APPR.	DATE
F	SECTIONS AMENDED		15.03.10
E	INTERIM ISSUE TO CLIENT		03.11.09
D	SECTIONS AMENDED		18.10.09
C	SECTIONS AMENDED		08.10.09
B	SECTIONS AMENDED		05.08.09
A	TOP OF STIFF CLAY ADDED AND BORROW PITS AMENDED		27.07.07

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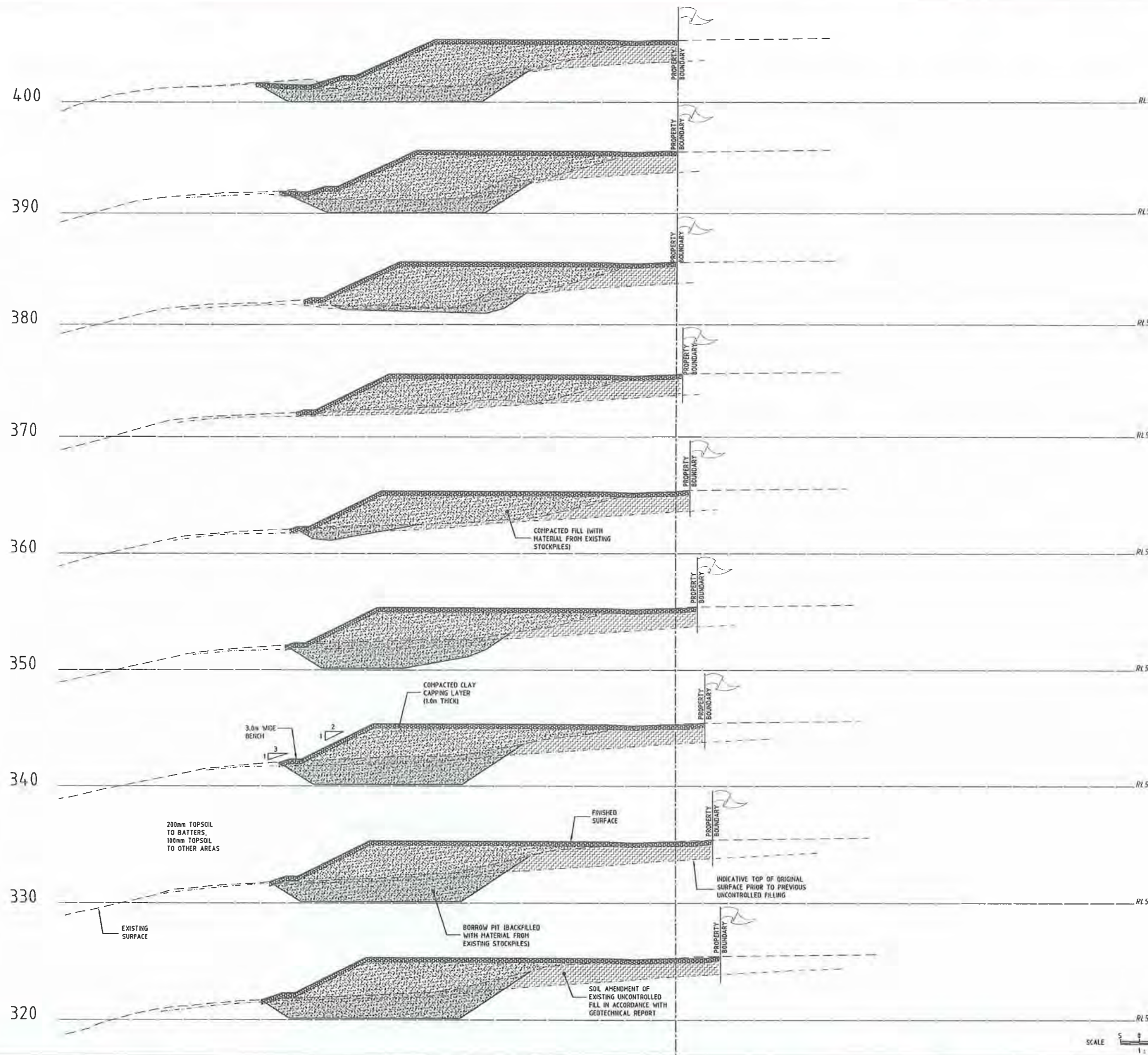
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PROJECT:
**RIVERSIDE CENTRAL
NORTHERN
BULK EARTHWORKS**

DRAWING TITLE:
**BULK
EARTHWORKS
CROSS SECTIONS
SHEET No. 6**

DEVEL APPLIC. No.:	DATE: 23.07.07
PROJECT LEADER:	
DESIGNER:	
DRAFTSPERSON:	
CHECKED:	
APPROVED FOR AND ON BEHALF OF BURCHILL VDM PTY LIMITED	

SCALE: AS SHOWN	DATUM: AHD	FULL SIZE: A1
PROJECT No.: C3754:03	DRAWING No.: SK11	REVISION: F



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**RIVERSIDE
CENTRAL**

for
LEDA DEVELOPMENTS PTY LTD

REV.	DESCRIPTION	APPR.	DATE
F	SECTIONS AMENDED		15.03.10
E	INTERIM ISSUE TO CLIENT		03.11.09
D	SECTIONS AMENDED		16.10.09
C	SECTIONS AMENDED		06.10.09
B	SECTIONS AMENDED		05.08.09
A	TOP OF STIFF CLAY ADDED AND BORROW PITS AMENDED		27.07.07



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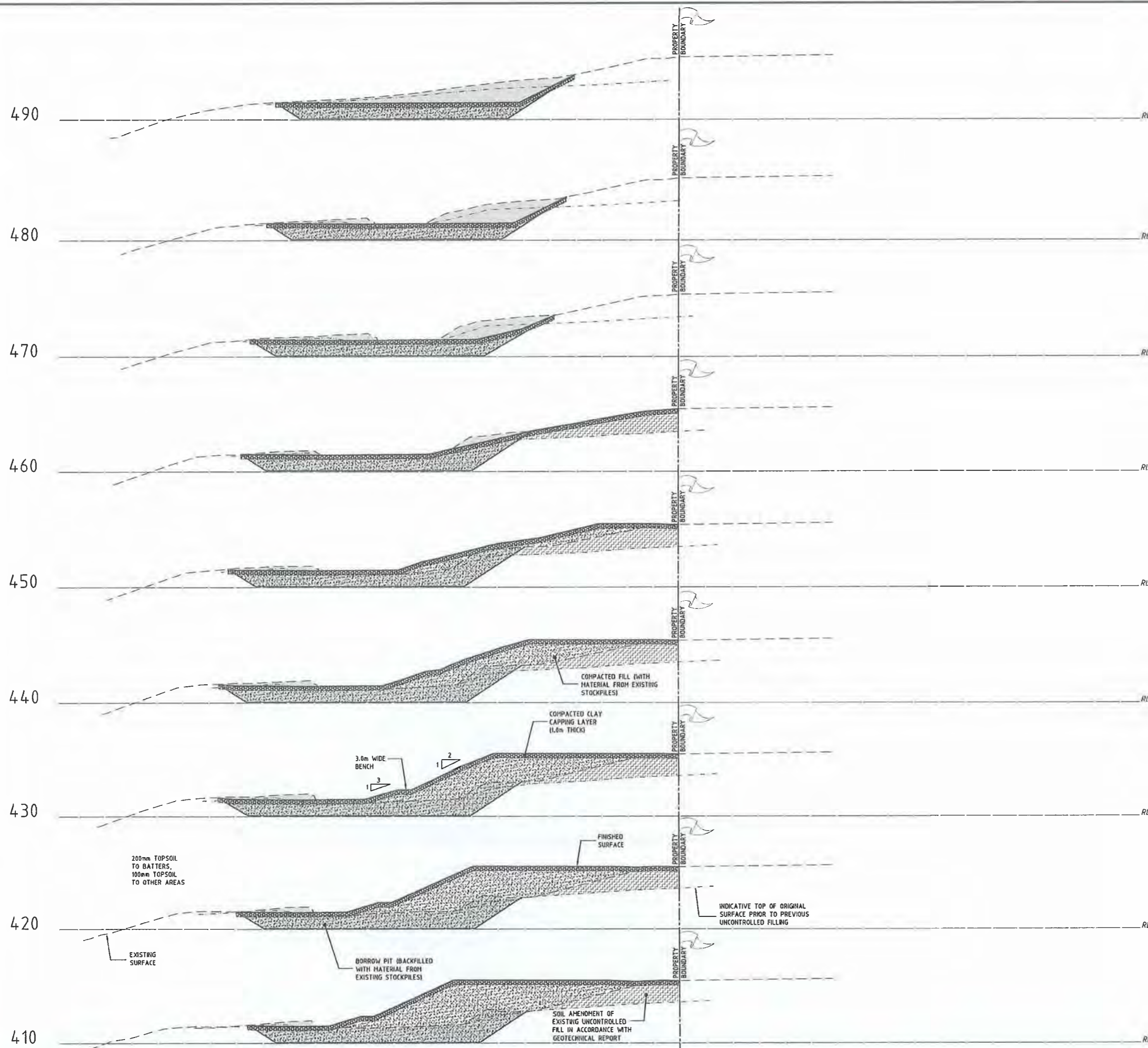
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PROJECT:
**RIVERSIDE CENTRAL
NORTHERN
BULK EARTHWORKS**

DRAWING TITLE:
**BULK
EARTHWORKS
CROSS SECTIONS
SHEET No. 7**

DEVEL. APPLIC. No.:	DATE: 23.07.07
PROJECT LEADER:	
DESIGNER:	
DRAFTSPERSON:	
CHECKED:	
APPROVED FOR AND ON BEHALF OF BURCHILL VDM PTY LIMITED	

SCALE: AS SHOWN	DATUM: AHD	FULL SIZE: A1
PROJECT No.: C3754:03	DRAWING No.: SK12	REVISION: F



PLOTTED: 11 May 2010
 PLEASANT HATCHING AND SHADING: 11 May 2010

**RIVERSIDE
CENTRAL**

for
LEDA DEVELOPMENTS PTY LTD

REV.	DESCRIPTION	APPR.	DATE
F	SECTIONS AMENDED		16.03.10
E	INTERIM ISSUE TO CLIENT		03.11.09
D	SECTIONS AMENDED		16.10.09
C	SECTIONS AMENDED		08.10.09
B	SECTIONS AMENDED		05.08.09
A	TOP OF STIFF CLAY ADDED AND BORROW PITS AMENDED		27.07.07



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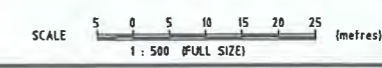
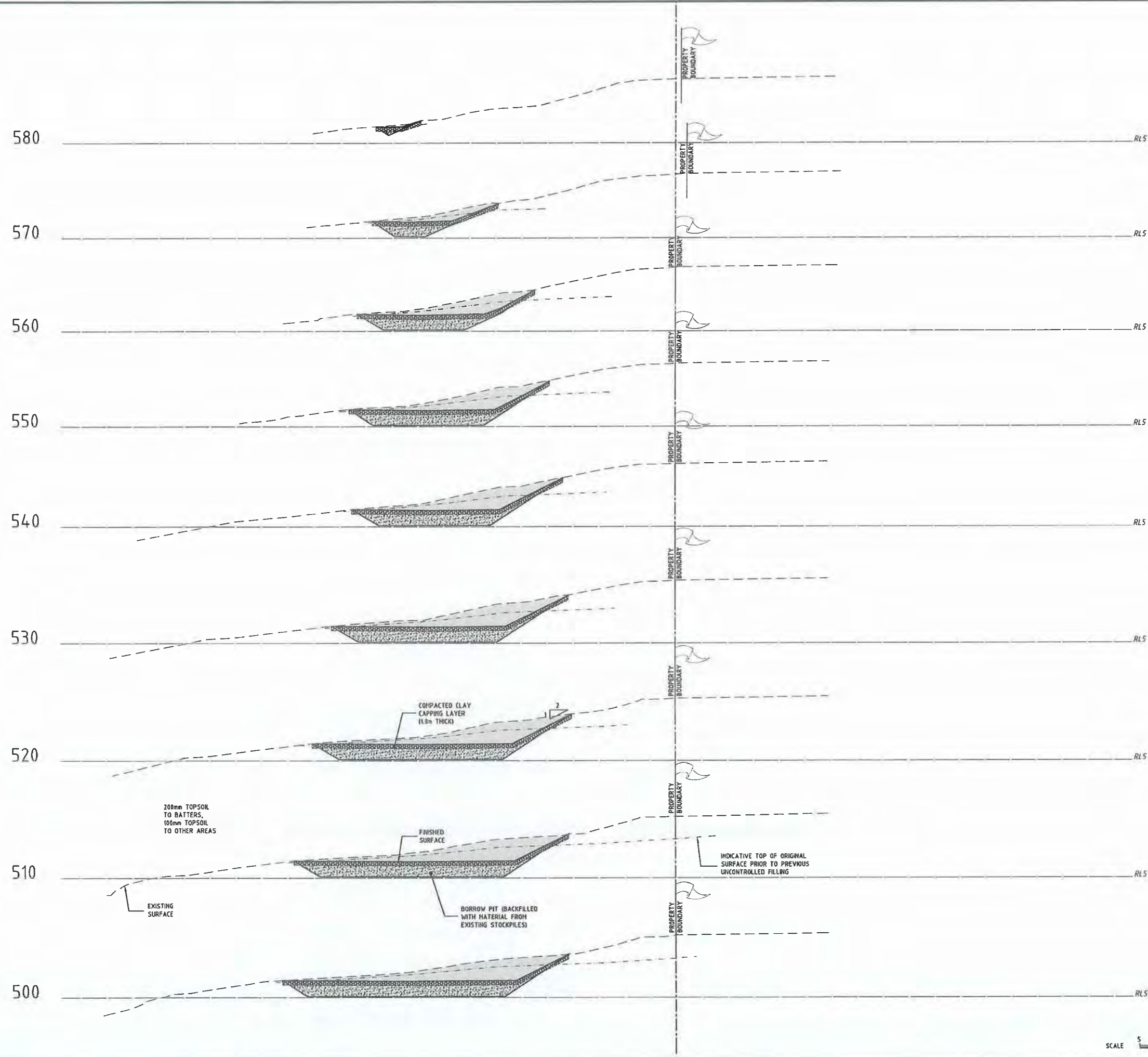
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PROJECT:
**RIVERSIDE CENTRAL
NORTHERN
BULK EARTHWORKS**

DRAWING TITLE:
**BULK
EARTHWORKS
CROSS SECTIONS
SHEET No. 8**

DEVEL. APPLIC. No.:	DATE: 23.07.07
PROJECT LEADER:	
DESIGNER:	
DRAFTSPERSON:	
CHECKED:	
APPROVED FOR AND ON BEHALF OF BURCHILL VDM PTY LIMITED	

SCALE: A3 SHOWN	DATUM: AHD	FULL SIZE: A1
PROJECT No.: C3754:03	DRAWING No.: SK13	REVISION: F

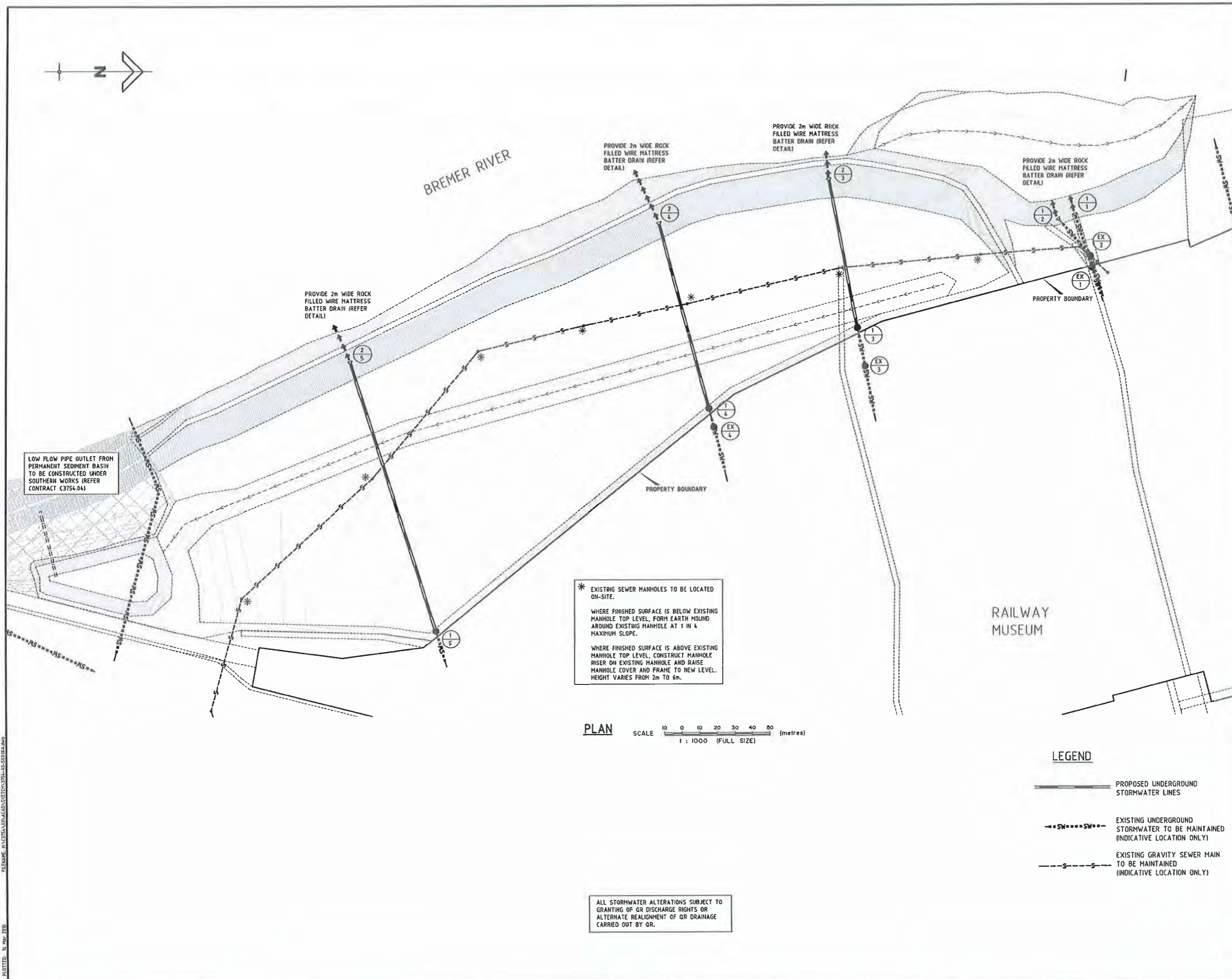


PLOT NO. 11 OF 210



RIVERSIDE CENTRAL

for
LEDA DEVELOPMENTS PTY LTD



LOW FLOW PIPE OUTLET FROM PERMANENT SEDIMENT BASIN TO BE CONSTRUCTED UNDER SOUTHERN WORKS (REFER CONTRACT C3754-04)

* EXISTING SEWER MANHOLES TO BE LOCATED ON-SITE.
WHERE FINISHED SURFACE IS BELOW EXISTING MANHOLE TOP LEVEL, FORM EARTH HOUND AROUND EXISTING MANHOLE AT 1 IN 4 MAXIMUM SLOPE.
WHERE FINISHED SURFACE IS ABOVE EXISTING MANHOLE TOP LEVEL, CONSTRUCT MANHOLE RISER ON EXISTING MANHOLE AND RAISE MANHOLE COVER AND FRAME TO NEW LEVEL. HEIGHT VARIES FROM 2m TO 6m.

PLAN SCALE 10 0 10 20 30 40 50 (metres)
1 : 1000 (FULL SIZE)

LEGEND

- PROPOSED UNDERGROUND STORMWATER LINES
- - - - - EXISTING UNDERGROUND STORMWATER TO BE MAINTAINED (INDICATIVE LOCATION ONLY)
- - - - - EXISTING GRAVITY SEWER MAIN TO BE MAINTAINED (INDICATIVE LOCATION ONLY)

ALL STORMWATER ALTERATIONS SUBJECT TO GRANTING OF OR DISCHARGE RIGHTS OR ALTERNATE REALIGNMENT OF OR DRAINAGE CARRIED OUT BY QR.

REV.	DESCRIPTION	APPR.	DATE
A	FINISHED SURFACE AMENDED		15.03.10



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PROJECT:
**RIVERSIDE CENTRAL
NORTHERN
BULK EARTHWORKS**

DRAWING TITLE:
**SERVICES
ALTERATION DETAILS
LAYOUT PLAN**

DEVEL. APPLIC. No.:	DATE: 06.10.09
PROJECT LEADER:	
DESIGNER:	
DRAFTSPERSON:	
CHECKED:	
APPROVED FOR AND ON BEHALF OF BURCHILL VDM PTY LIMITED	

SCALE: AS SHOWN	DATUM: AHD	FULL SIZE: A1
PROJECT No.: C3754:03	DRAWING No.: SK30	REVISION: A

RIVERSIDE CENTRAL

for
LEDA DEVELOPMENTS PTY LTD

REV.	DESCRIPTION	APPR.	DATE
A	FINISHED SURFACE AMENDED		15.03.10



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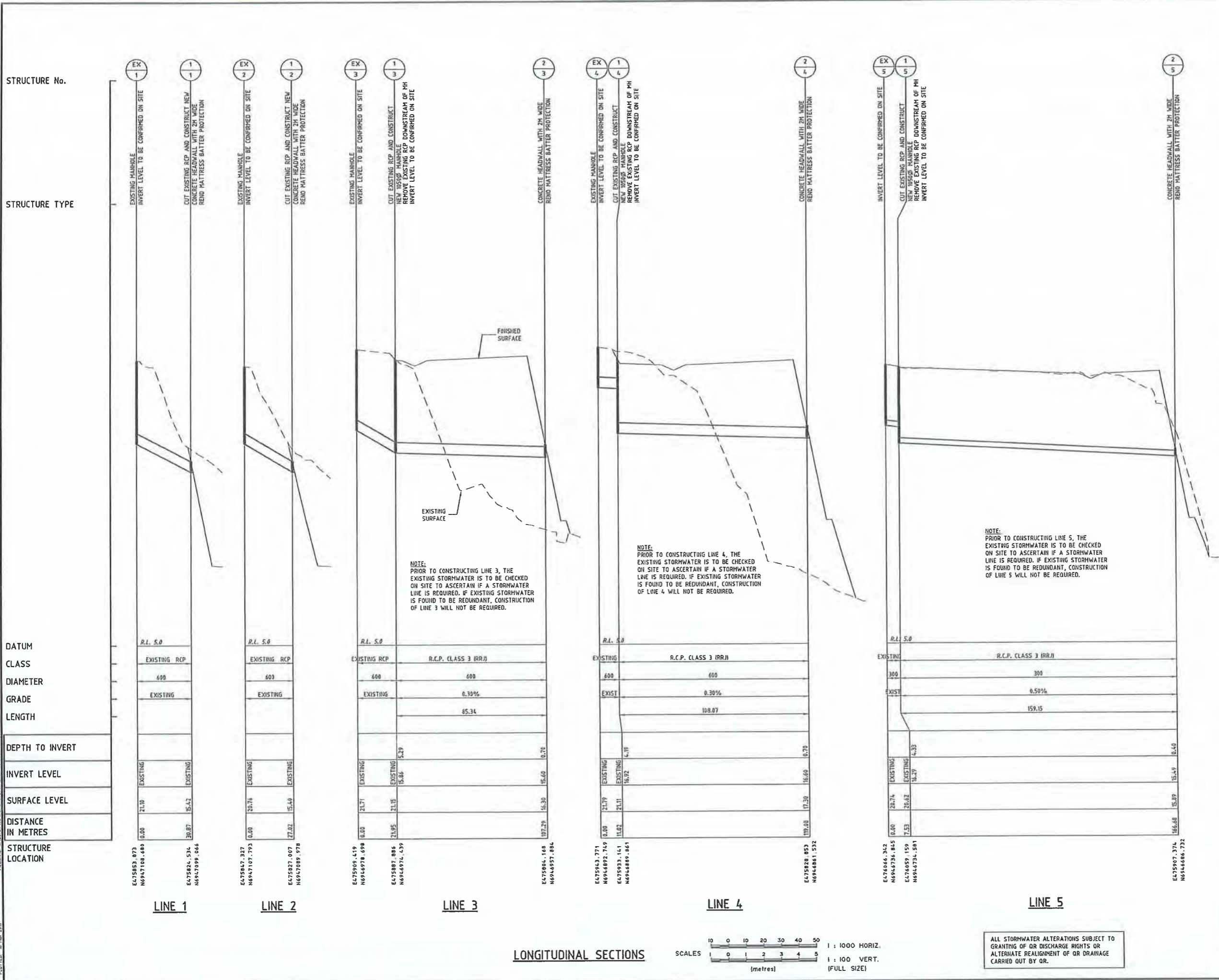
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PROJECT:
**RIVERSIDE CENTRAL
NORTHERN
BULK EARTHWORKS**

DRAWING TITLE:
**SERVICES
ALTERATION DETAILS
STORMWATER
LONGITUDINAL SECTIONS**

DEVEL. APPLIC. No.: DATE: 06.10.09
PROJECT LEADER:
DESIGNER:
DRAFTSPERSON:
CHECKED:
APPROVED FOR AND ON BEHALF OF BURCHILL VDM PTY LIMITED

SCALE: AS SHOWN DATUM: AHD FULL SIZE: A1
PROJECT No.: C3754:03 DRAWING No.: SK31 REVISION: A





CH -40
OTHER CUT = 6,450
FILL REQUIRED = 0,0
CLAY CAP REQUIRED = 3,270

CH 60
OTHER CUT = 12,170
FILL REQUIRED = 0,0
CLAY CAP REQUIRED = 15,160

CH 160
PIT 01 CLAY = 10,470
PIT 01 OTHER = 9,130
PIT 02 CLAY = 13,230
PIT 02 OTHER = 7,770
OTHER CUT = 8,620
FILL REQUIRED = 41,160
CLAY CAP REQUIRED = 17,280

CH 260
PIT 01 CLAY = 17,500
PIT 01 OTHER = 6,880
PIT 02 CLAY = 8,860
PIT 02 OTHER = 4,480
OTHER CUT = 3,900
FILL REQUIRED = 64,930
CLAY CAP REQUIRED = 15,910

CH 370
PIT 01 CLAY = 21,530
PIT 01 OTHER = 4,740
OTHER CUT = 3,010
FILL REQUIRED = 76,290
CLAY CAP REQUIRED = 12,810

CH 480
PIT 01 CLAY = 21,540
PIT 01 OTHER = 4,030
OTHER CUT = 890
FILL REQUIRED = 53,460
CLAY CAP REQUIRED = 11,770

CH 590
PIT 01 CLAY = 21,030
PIT 01 OTHER = 5,940
OTHER CUT = 470
FILL REQUIRED = 11,840
CLAY CAP REQUIRED = 5,820

G

F

E

D

C

B

A

SC

SE

SB

SD

SG

SH

SF

SK

SL

SM

SN

SO

SP

SJ

SQ OVER

SA

SD = 3,460
SL = 300
SE = 2,800
SB = 350
SA = 770
TOTAL = 7,680

10% SJ = 4,840
50% SI = 2,280
SG = 1,280
SH = 2,400
SF = 1,280
TOTAL = 12,080

SQ = 29,040
60% SJ = 29,040
20% SK = 1,340
50% SI = 2,280
TOTAL = 32,660

SL = 1,200
80% SK = 5,380
80% SJ = 14,520
TOTAL = 21,100

SN = 4,200
SM = 4,760
TOTAL = 8,960

SP = 6,400
SO = 11,520
TOTAL = 17,920

PLAN

SCALE 1 : 1000 (FULL SIZE)

LEGEND

BORROW PIT

AREA DESIGNATION (CHAINAGES REFER TO CONTROL LINE ON DRAWING C3754:03:SK04F EXTENT OF EARTHWORKS).

STOCKPILE (VOLUMES OBTAINED FROM SITE REMEDIATION REPORT).

NOTE:
ALL VOLUMES IN CUBIC METRES AND VOLUMES REFER TO EACH AREA BETWEEN THE CHAINAGES AS NOTED.

B

SK

Ipswich
Riverlink
Shopping Centre
RIVERSIDE CENTRAL
for
LEDA DEVELOPMENTS PTY LTD

REV.	DESCRIPTION	APPR.	DATE

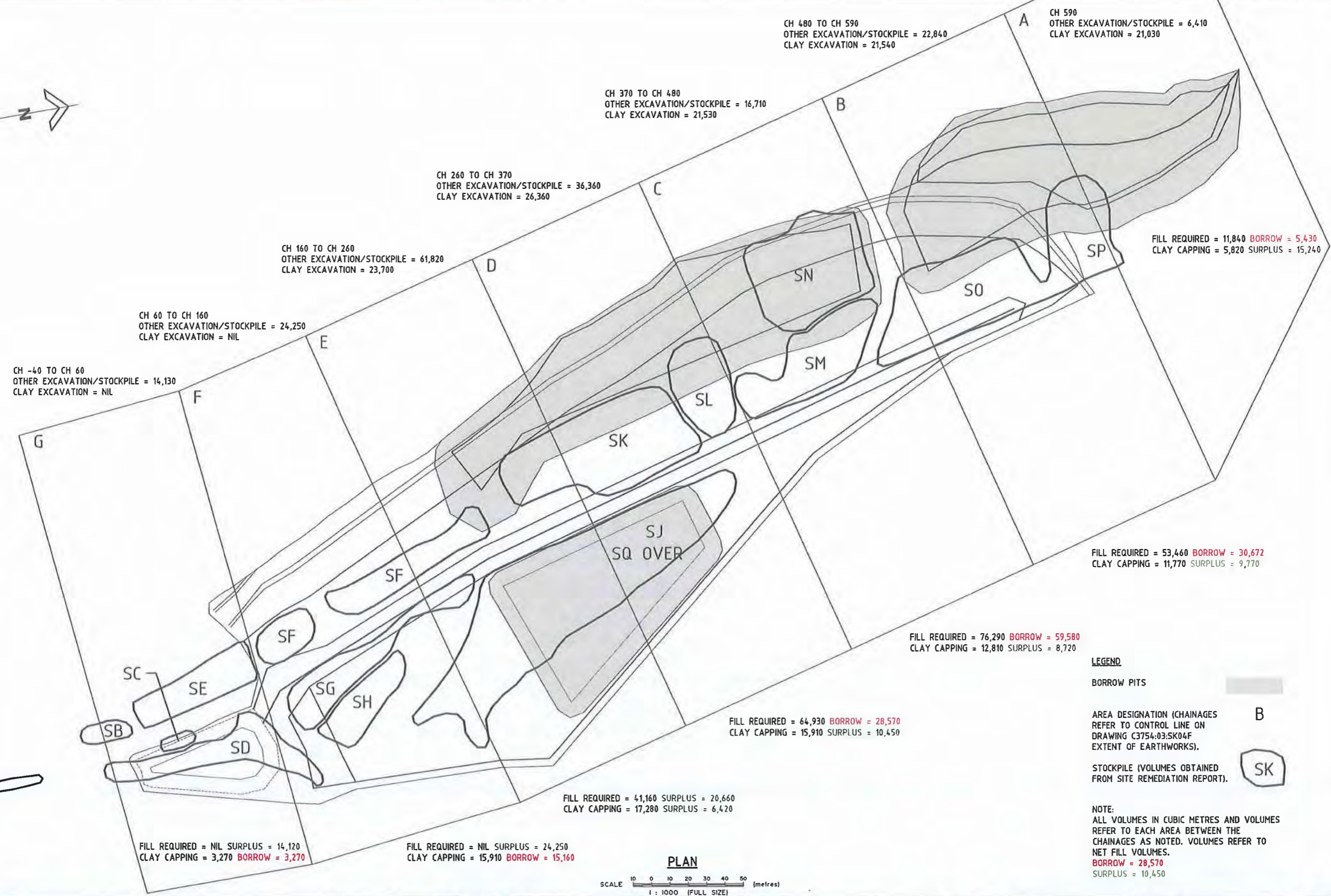
VDM CONSULTING
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PROJECT:
**RIVERSIDE CENTRAL
NORTHERN
BULK EARTHWORKS**

DRAWING TITLE:
**EARTHWORKS
VOLUMES
SUMMARY
SHEET 1**

DEVEL. APPLIC. No.:	DATE: 12.03.2010
PROJECT LEADER:	
DRAFTSPERSON:	
APPROVED FOR AND ON BEHALF OF BURCHILL VDM PTY LIMITED ACN 010 140 495	
SCALE:	DATUM: AHD FULL SIZE: A1
PROJECT No: C3754:03	DRAWING No.: SK090
	REVISION:



CH 480 TO CH 590
OTHER EXCAVATION/STOCKPILE = 22,840
CLAY EXCAVATION = 21,540

CH 590
OTHER EXCAVATION/STOCKPILE = 6,410
CLAY EXCAVATION = 21,030

CH 370 TO CH 480
OTHER EXCAVATION/STOCKPILE = 16,710
CLAY EXCAVATION = 21,530

CH 260 TO CH 370
OTHER EXCAVATION/STOCKPILE = 36,360
CLAY EXCAVATION = 26,360

CH 160 TO CH 260
OTHER EXCAVATION/STOCKPILE = 61,820
CLAY EXCAVATION = 23,700

CH 60 TO CH 160
OTHER EXCAVATION/STOCKPILE = 24,250
CLAY EXCAVATION = NIL

CH -40 TO CH 60
OTHER EXCAVATION/STOCKPILE = 14,130
CLAY EXCAVATION = NIL

FILL REQUIRED = 11,840 BORROW = 5,430
CLAY CAPPING = 5,820 SURPLUS = 15,240

FILL REQUIRED = 53,460 BORROW = 30,672
CLAY CAPPING = 11,770 SURPLUS = 9,770

FILL REQUIRED = 76,290 BORROW = 59,580
CLAY CAPPING = 12,810 SURPLUS = 8,720

FILL REQUIRED = 64,930 BORROW = 28,570
CLAY CAPPING = 15,910 SURPLUS = 10,450

FILL REQUIRED = 41,160 SURPLUS = 20,660
CLAY CAPPING = 17,280 SURPLUS = 6,420

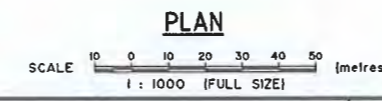
FILL REQUIRED = NIL SURPLUS = 14,120
CLAY CAPPING = 3,270 BORROW = 3,270

FILL REQUIRED = NIL SURPLUS = 24,250
CLAY CAPPING = 15,910 BORROW = 15,160

LEGEND

- BORROW PITS
- AREA DESIGNATION (CHAINAGES REFER TO CONTROL LINE ON DRAWING C3754:03:SK04F EXTENT OF EARTHWORKS).
- STOCKPILE (VOLUMES OBTAINED FROM SITE REMEDIATION REPORT).

NOTE:
ALL VOLUMES IN CUBIC METRES AND VOLUMES REFER TO EACH AREA BETWEEN THE CHAINAGES AS NOTED. VOLUMES REFER TO NET FILL VOLUMES.
BORROW = 28,570
SURPLUS = 10,450



RIVERSIDE CENTRAL
for
LEDA DEVELOPMENTS PTY LTD

REV.	DESCRIPTION	APPR.	DATE

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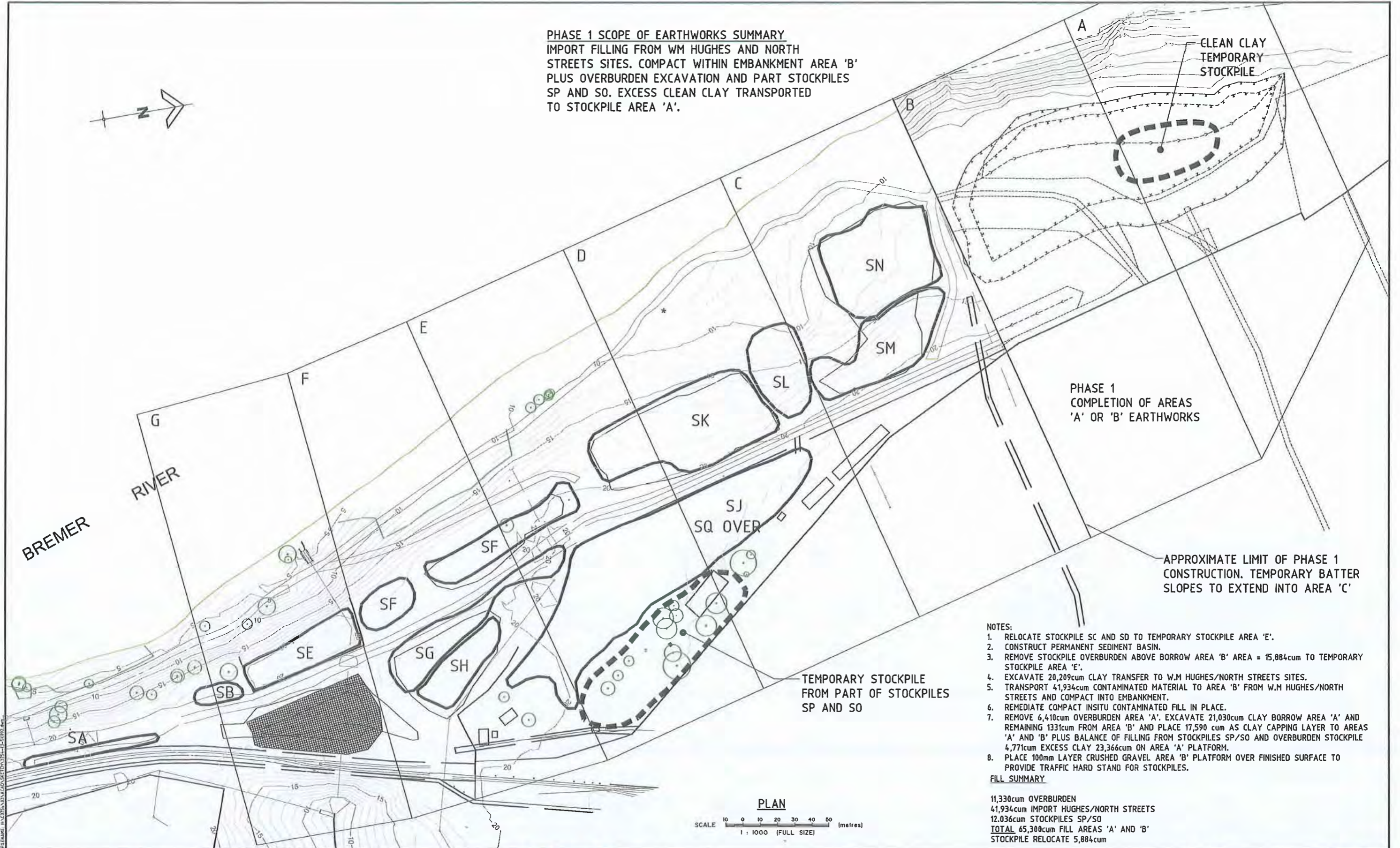
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PROJECT:
**RIVERSIDE CENTRAL
NORTHERN
BULK EARTHWORKS**

DRAWING TITLE:
**EARTHWORKS
VOLUME
MASS HAUL
SHEET 2**

DEVEL. APPLIC. No.:	DATE: 12.03.2010
PROJECT LEADER:	
DRAFTSPERSON:	
APPROVED FOR AND ON BEHALF OF BURCHILL VDM PTY LIMITED ACN 010 140 405	
SCALE:	DATUM: AHD
PROJECT No.:	FULL SIZE: A1
C3754:03	REVISION:
SK091	

PHASE 1 SCOPE OF EARTHWORKS SUMMARY
 IMPORT FILLING FROM WM HUGHES AND NORTH
 STREETS SITES. COMPACT WITHIN EMBANKMENT AREA 'B'
 PLUS OVERBURDEN EXCAVATION AND PART STOCKPILES
 SP AND SO. EXCESS CLEAN CLAY TRANSPORTED
 TO STOCKPILE AREA 'A'.



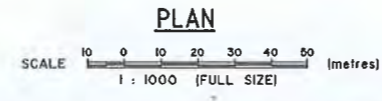
PHASE 1
 COMPLETION OF AREAS
 'A' OR 'B' EARTHWORKS

APPROXIMATE LIMIT OF PHASE 1
 CONSTRUCTION. TEMPORARY BATTER
 SLOPES TO EXTEND INTO AREA 'C'

TEMPORARY STOCKPILE
 FROM PART OF STOCKPILES
 SP AND SO

- NOTES:
1. RELOCATE STOCKPILE SC AND SD TO TEMPORARY STOCKPILE AREA 'E'.
 2. CONSTRUCT PERMANENT SEDIMENT BASIN.
 3. REMOVE STOCKPILE OVERBURDEN ABOVE BORROW AREA 'B' AREA = 15,884cum TO TEMPORARY STOCKPILE AREA 'E'.
 4. EXCAVATE 20,209cum CLAY TRANSFER TO W.M HUGHES/NORTH STREETS SITES.
 5. TRANSPORT 41,934cum CONTAMINATED MATERIAL TO AREA 'B' FROM W.M HUGHES/NORTH STREETS AND COMPACT INTO EMBANKMENT.
 6. REMEDIATE COMPACT INSITU CONTAMINATED FILL IN PLACE.
 7. REMOVE 6,410cum OVERBURDEN AREA 'A'. EXCAVATE 21,030cum CLAY BORROW AREA 'A' AND REMAINING 1331cum FROM AREA 'B' AND PLACE 17,590 cum AS CLAY CAPPING LAYER TO AREAS 'A' AND 'B' PLUS BALANCE OF FILLING FROM STOCKPILES SP/SO AND OVERBURDEN STOCKPILE 4,771cum EXCESS CLAY 23,366cum ON AREA 'A' PLATFORM.
 8. PLACE 100mm LAYER CRUSHED GRAVEL AREA 'B' PLATFORM OVER FINISHED SURFACE TO PROVIDE TRAFFIC HARD STAND FOR STOCKPILES.

FILL SUMMARY
 11,330cum OVERBURDEN
 41,934cum IMPORT HUGHES/NORTH STREETS
 12,036cum STOCKPILES SP/SO
 TOTAL 65,300cum FILL AREAS 'A' AND 'B'
 STOCKPILE RELOCATE 5,884cum



Ipswich
Riverlink
 Shopping Centre

RIVERSIDE CENTRAL
 for
 LEDA DEVELOPMENTS PTY LTD

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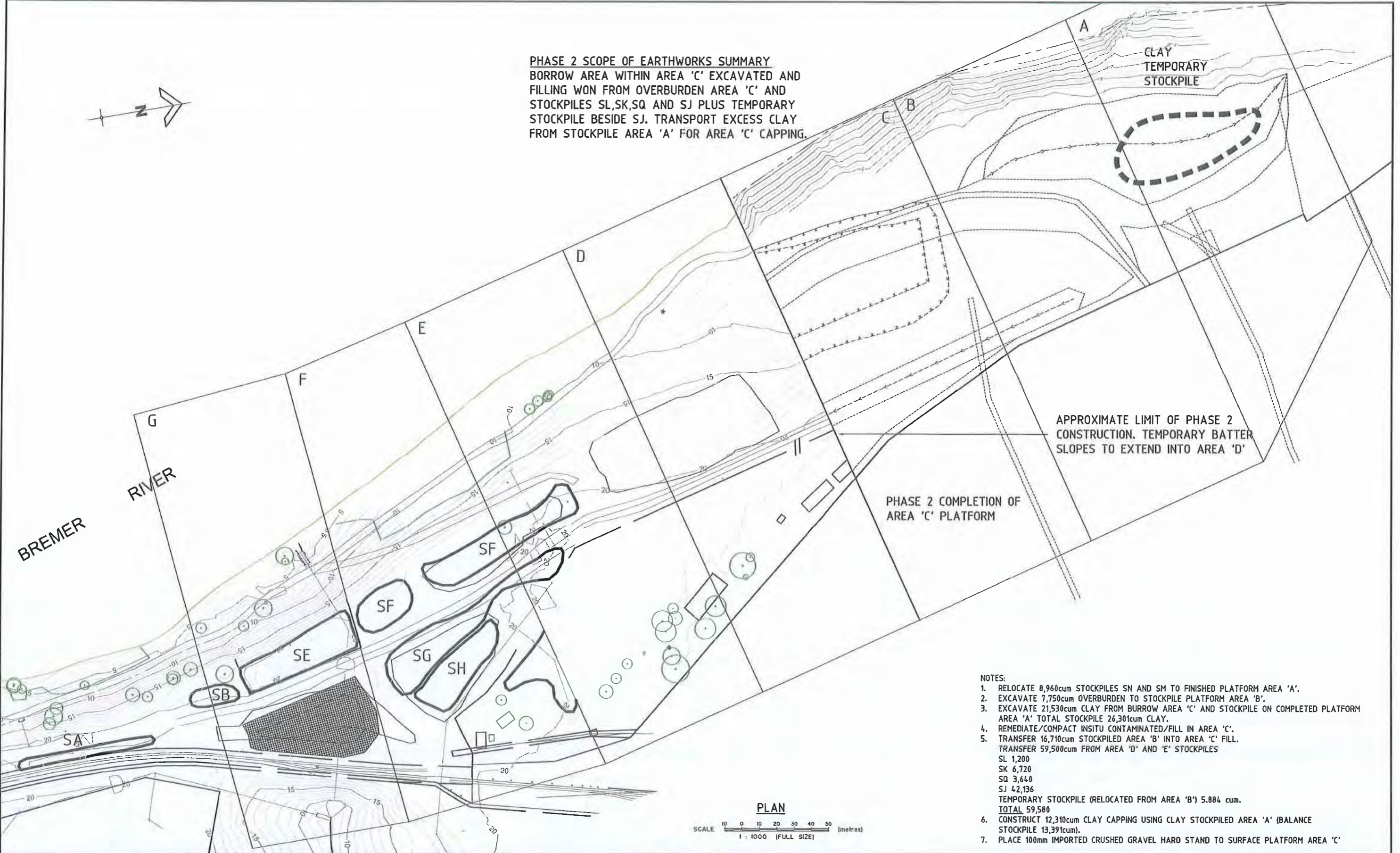
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PROJECT:
**RIVERSIDE CENTRAL
 NORTHERN
 BULK EARTHWORKS**

DRAWING TITLE:
**EARTHWORKS
 CONSTRUCTION SEQUENCE
 SHEET 1
 PHASE 1 CONSTRUCTION**

DEVEL APPLIC. No.:	DATE: 12.03.2010
PROJECT LEADER:	
DRAFTSPERSON:	
APPROVED FOR AND ON BEHALF OF BURCHILL CONSULTING ENGINEERS & PLANNERS:	
SCALE:	DATUM: AHD
PROJECT No.:	FULL SIZE: 1:A1
C3754:03	REVISION:
	SK092

PHASE 2 SCOPE OF EARTHWORKS SUMMARY
 BORROW AREA WITHIN AREA 'C' EXCAVATED AND FILLING WON FROM OVERBURDEN AREA 'C' AND STOCKPILES SL,SK,SQ AND SJ PLUS TEMPORARY STOCKPILE BESIDE SJ. TRANSPORT EXCESS CLAY FROM STOCKPILE AREA 'A' FOR AREA 'C' CAPPING.



- NOTES:
1. RELOCATE 8,960cum STOCKPILES SN AND SM TO FINISHED PLATFORM AREA 'A'.
 2. EXCAVATE 7,750cum OVERBURDEN TO STOCKPILE PLATFORM AREA 'B'.
 3. EXCAVATE 21,530cum CLAY FROM BURROW AREA 'C' AND STOCKPILE ON COMPLETED PLATFORM AREA 'A' TOTAL STOCKPILE 26,301cum CLAY.
 4. REMEDIATE/COMPACT INSITU CONTAMINATED/FILL IN AREA 'C'.
 5. TRANSFER 16,710cum STOCKPILED AREA 'B' INTO AREA 'C' FILL. TRANSFER 59,500cum FROM AREA 'D' AND 'E' STOCKPILES
 SL 1,200
 SK 6,720
 SQ 3,640
 SJ 42,136
 TEMPORARY STOCKPILE (RELOCATED FROM AREA 'B') 5.884 cum.
 TOTAL 59,580
 6. CONSTRUCT 12,310cum CLAY CAPPING USING CLAY STOCKPILED AREA 'A' (BALANCE STOCKPILE 13,391cum).
 7. PLACE 100mm IMPORTED CRUSHED GRAVEL HARD STAND TO SURFACE PLATFORM AREA 'C'

PLAN
 SCALE 10 0 10 20 30 40 50 (metres)
 1 : 1000 (FULL SIZE)

Ipswich Riverlink Shopping Centre
RIVERSIDE CENTRAL
 for
 LEDA DEVELOPMENTS PTY LTD

REV.	DESCRIPTION	APPR.	DATE

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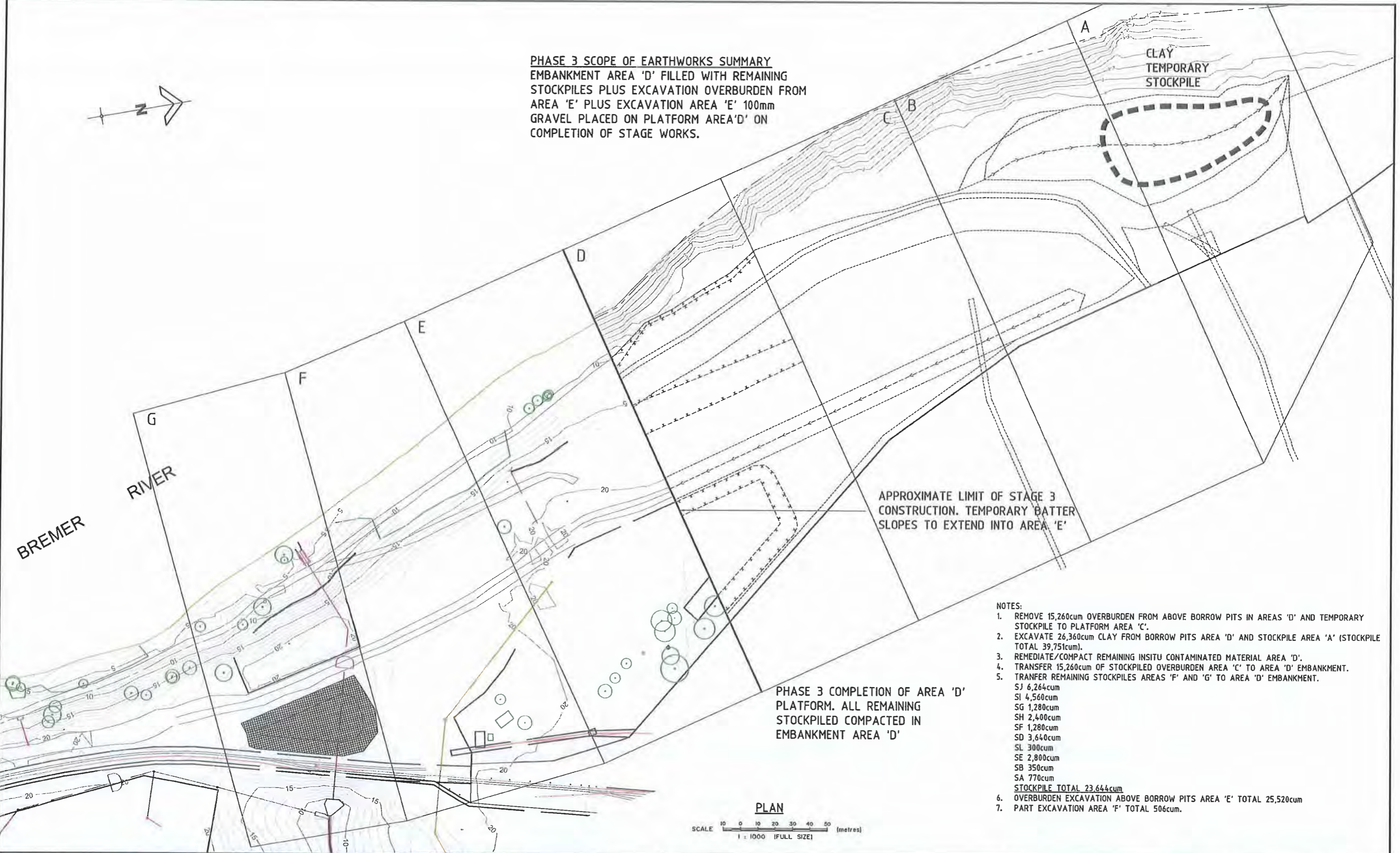
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PROJECT:
RIVERSIDE CENTRAL NORTHERN BULK EARTHWORKS

DRAWING TITLE:
EARTHWORKS CONSTRUCTION SEQUENCE SHEET 2 PHASE 2 CONSTRUCTION

DEVEL. APPLIC. No.:	DATE: 12.03.2010
PROJECT LEADER:	
DRAFTSPERSON:	
APPROVED FOR AND ON BEHALF OF BURCHILL VDM PTY LIMITED A/CN 010 149 495	
SCALE:	DATUM: AHD FULL SIZE: A1
PROJECT No.: C3754:03	DRAWING No.: SK093 REVISION:

PHASE 3 SCOPE OF EARTHWORKS SUMMARY
 EMBANKMENT AREA 'D' FILLED WITH REMAINING STOCKPILES PLUS EXCAVATION OVERBURDEN FROM AREA 'E' PLUS EXCAVATION AREA 'E' 100mm GRAVEL PLACED ON PLATFORM AREA 'D' ON COMPLETION OF STAGE WORKS.



APPROXIMATE LIMIT OF STAGE 3 CONSTRUCTION. TEMPORARY BATTER SLOPES TO EXTEND INTO AREA 'E'

PHASE 3 COMPLETION OF AREA 'D' PLATFORM. ALL REMAINING STOCKPILED COMPACTED IN EMBANKMENT AREA 'D'

- NOTES:**
- REMOVE 15,260cum OVERBURDEN FROM ABOVE BORROW PITS IN AREAS 'D' AND TEMPORARY STOCKPILE TO PLATFORM AREA 'C'.
 - EXCAVATE 26,360cum CLAY FROM BORROW PITS AREA 'D' AND STOCKPILE AREA 'A' (STOCKPILE TOTAL 39,751cum).
 - REMEDiate/COMPACT REMAINING INSITU CONTAMINATED MATERIAL AREA 'D'.
 - TRANSFER 15,260cum OF STOCKPILED OVERBURDEN AREA 'C' TO AREA 'D' EMBANKMENT.
 - TRANSFER REMAINING STOCKPILES AREAS 'F' AND 'G' TO AREA 'D' EMBANKMENT.
 SJ 6,264cum
 SI 4,560cum
 SG 1,280cum
 SH 2,400cum
 SF 1,280cum
 SD 3,640cum
 SL 300cum
 SE 2,800cum
 SB 350cum
 SA 770cum
STOCKPILE TOTAL 23,644cum
 - OVERBURDEN EXCAVATION ABOVE BORROW PITS AREA 'E' TOTAL 25,520cum
 - PART EXCAVATION AREA 'F' TOTAL 506cum.



RIVERSIDE CENTRAL
for
LEDA DEVELOPMENTS PTY LTD

REV.	DESCRIPTION	APPR.	DATE

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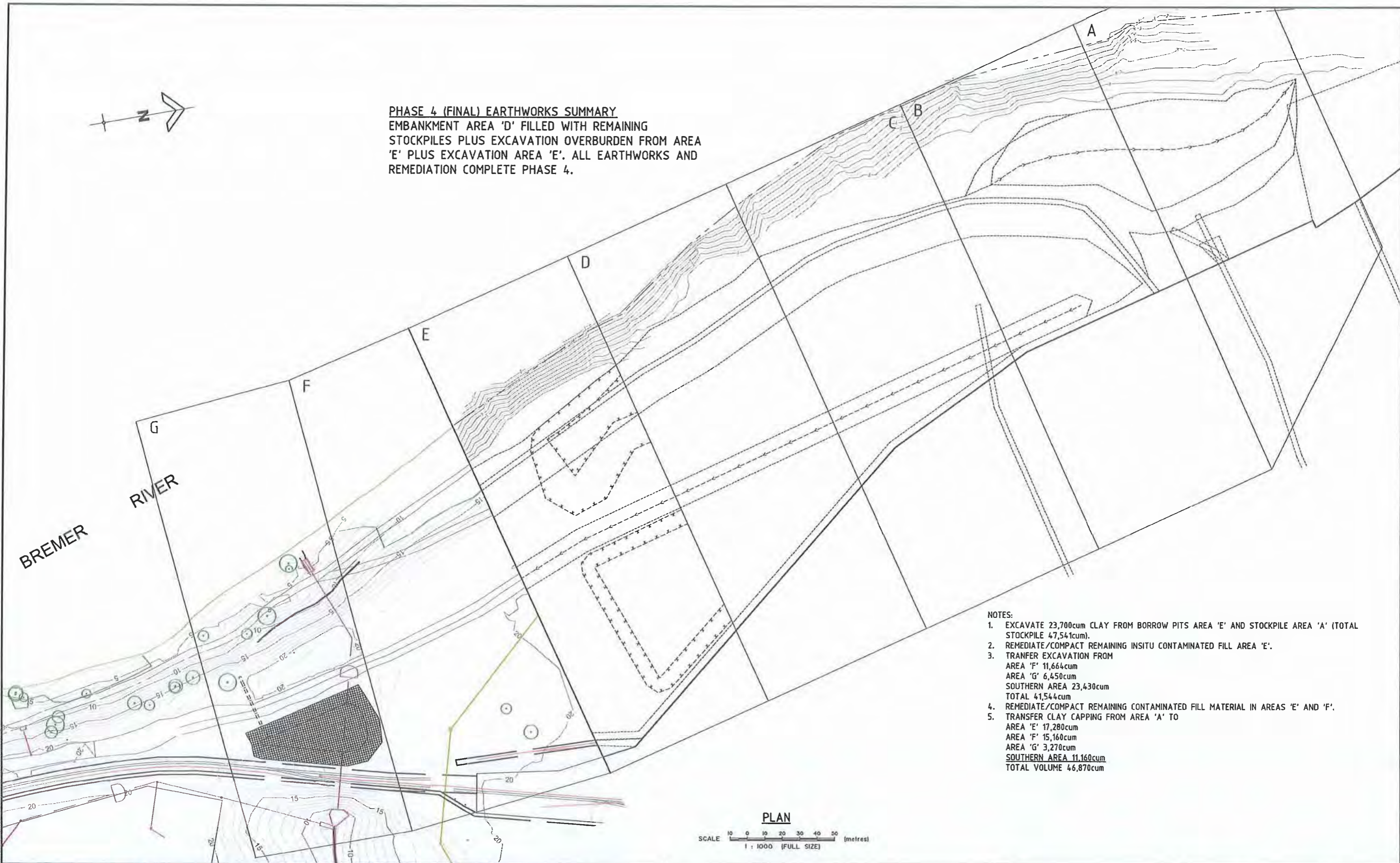
PROJECT:
 RIVERSIDE CENTRAL
 NORTHERN
 BULK EARTHWORKS

DRAWING TITLE:
 EARTHWORKS
 CONSTRUCTION SEQUENCE
 SHEET 3
 PHASE 3 CONSTRUCTION

DEVEL. APPLIC. No.:	DATE:	12.03.2010
PROJECT LEADER:		
DRAFTSPERSON:		
APPROVED FOR AND SUBMITTED BY:		
SCALE:	DATUM:	AHD FULL SIZE: A1
PROJECT No.:	DRAWING No.:	REVISION:
C3754:03	SK094	



PHASE 4 (FINAL) EARTHWORKS SUMMARY
 EMBANKMENT AREA 'D' FILLED WITH REMAINING STOCKPILES PLUS EXCAVATION OVERBURDEN FROM AREA 'E' PLUS EXCAVATION AREA 'E'. ALL EARTHWORKS AND REMEDIATION COMPLETE PHASE 4.



- NOTES:**
- EXCAVATE 23,700cum CLAY FROM BORROW PITS AREA 'E' AND STOCKPILE AREA 'A' (TOTAL STOCKPILE 47,541cum).
 - REMIATE/COMPACT REMAINING INSITU CONTAMINATED FILL AREA 'E'.
 - TRANSFER EXCAVATION FROM
 AREA 'F' 11,664cum
 AREA 'G' 6,450cum
 SOUTHERN AREA 23,430cum
 TOTAL 41,544cum
 - REMIATE/COMPACT REMAINING CONTAMINATED FILL MATERIAL IN AREAS 'E' AND 'F'.
 - TRANSFER CLAY CAPPING FROM AREA 'A' TO
 AREA 'E' 17,280cum
 AREA 'F' 15,160cum
 AREA 'G' 3,270cum
 SOUTHERN AREA 11,160cum
 TOTAL VOLUME 46,870cum

PLAN
 SCALE 1 : 1000 (FULL SIZE) (metres)

Ipswich Riverlink Shopping Centre
RIVERSIDE CENTRAL
 for
 LEDA DEVELOPMENTS PTY LTD

REV.	DESCRIPTION	APPR.	DATE

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PROJECT:
 RIVERSIDE CENTRAL
 NORTHERN
 BULK EARTHWORKS

DRAWING TITLE:
 EARTHWORKS
 CONSTRUCTION SEQUENCE
 SHEET 4
 PHASE 4 COMPLETION OF
 CONSTRUCTION

DEVEL APPLIC No.:	DATE: 12.03.2010
PROJECT LEADER:	
DRAFTSPERSON:	
PROJECT No.:	DRAWING No.:
C3754:03	SK095
REVISION:	

RIVERSIDE CENTRAL

for

LEDA DEVELOPMENTS PTY LTD

REV.	DESCRIPTION	APPR.	DATE
A	REVISED E.B.C		15.03.10

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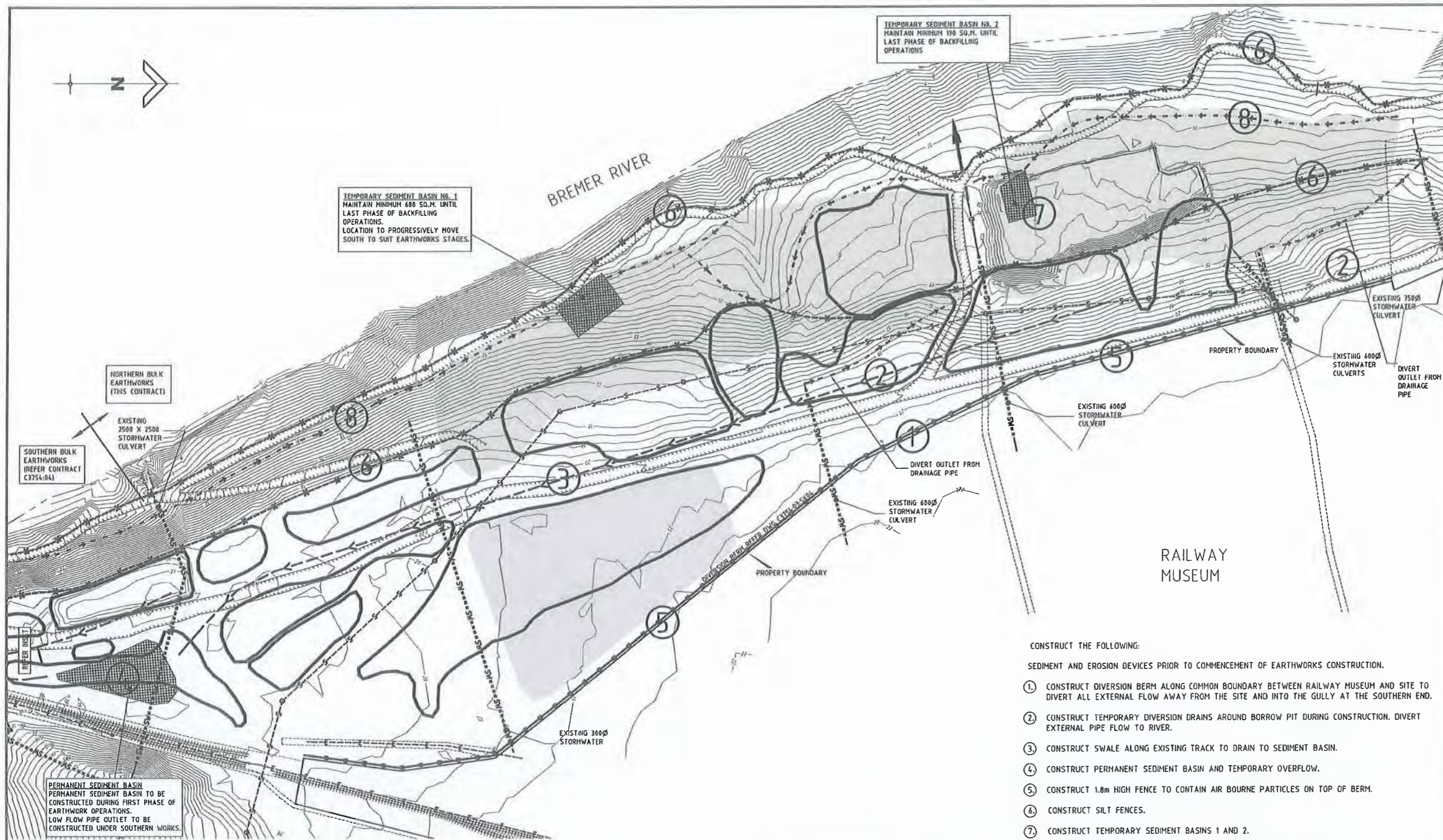
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PROJECT:
**RIVERSIDE CENTRAL
NORTHERN
BULK EARTHWORKS**

DRAWING TITLE:
**EROSION AND SEDIMENT
CONTROL SHEET 1
PRE DEVELOPMENT**

DEVEL APPLIC No.:	DATE: 08.10.09
PROJECT LEADER:	
DESIGNER:	
DRAFTSPERSON:	
CHECKED:	

SCALE: AS SHOWN	DATUM: AHD	FULL SIZE: A1
PROJECT No.: C3754:03	DRAWING No.: SK100	REVISION: A



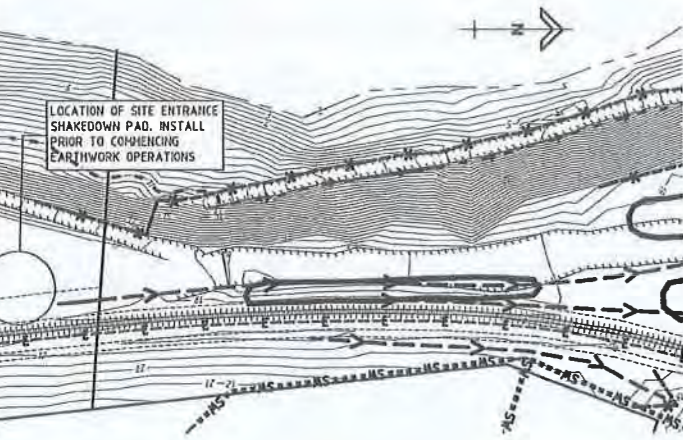
NORTHERN BULK EARTHWORKS (THIS CONTRACT)
EXISTING 2500 X 2500 STORMWATER CULVERT
SOUTHERN BULK EARTHWORKS (REFER CONTRACT C3754:04)

TEMPORARY SEDIMENT BASIN NO. 1
MAINTAIN MINIMUM 600 SQ.M. UNTIL LAST PHASE OF BACKFILLING OPERATIONS.
LOCATION TO PROGRESSIVELY MOVE SOUTH TO SUIT EARTHWORKS STAGES.

TEMPORARY SEDIMENT BASIN NO. 2
MAINTAIN MINIMUM 100 SQ.M. UNTIL LAST PHASE OF BACKFILLING OPERATIONS

PERMANENT SEDIMENT BASIN
PERMANENT SEDIMENT BASIN TO BE CONSTRUCTED DURING FIRST PHASE OF EARTHWORK OPERATIONS.
LOW FLOW PIPE OUTLET TO BE CONSTRUCTED UNDER SOUTHERN WORKS.

LOCATION OF SITE ENTRANCE SHAKEDOWN PAD. INSTALL PRIOR TO COMMENCING EARTHWORK OPERATIONS



INSET

PLAN SCALE 10 0 10 20 30 40 50 (metres)
1 : 1000 (FULL SIZE)

LEGEND - EXISTING FEATURES

- 0.5m — EXISTING SURFACE CONTOUR (0.5m INTERVAL)
- — — EXISTING TRACK/PATH
- ||||| EXISTING RAILWAY LINE
- - - - - EXISTING ELECTRICITY (INDICATIVE LOCATION ONLY)
- - - - - EXISTING GRAVITY SEWER MAIN (INDICATIVE LOCATION ONLY)
- - - - - EXISTING UNDERGROUND STORMWATER CULVERT (INDICATIVE LOCATION ONLY)
- 0 — EXISTING OPEN DRAIN
- ◡ EXISTING STOCKPILE OF UNSUITABLE MATERIAL (INDICATIVE ONLY)

LEGEND - PROPOSED WORKS

- * — * — SILT FENCE. INSTALL PRIOR TO COMMENCING EARTHWORK OPERATIONS
- < — — PERMANENT SWALE DRAIN
- ◡ EXTENT OF BORROW PITS
- ◡ SEDIMENT BASIN
- ← - - - ← CONSTRUCT 600mm DEEP DIVERSION DRAIN ALONG RL11.0m CONTOUR (TO DISCHARGE INTO TEMPORARY SEDIMENT BASIN NO. 1) PRIOR TO COMMENCING STOCKPILE REMOVAL OPERATIONS
- * — * — DUST CONTROL FENCE

- CONSTRUCT THE FOLLOWING:
SEDIMENT AND EROSION DEVICES PRIOR TO COMMENCEMENT OF EARTHWORKS CONSTRUCTION.
1. CONSTRUCT DIVERSION BERM ALONG COMMON BOUNDARY BETWEEN RAILWAY MUSEUM AND SITE TO DIVERT ALL EXTERNAL FLOW AWAY FROM THE SITE AND INTO THE GULLY AT THE SOUTHERN END.
 2. CONSTRUCT TEMPORARY DIVERSION DRAINS AROUND BORROW PIT DURING CONSTRUCTION. DIVERT EXTERNAL PIPE FLOW TO RIVER.
 3. CONSTRUCT SWALE ALONG EXISTING TRACK TO DRAIN TO SEDIMENT BASIN.
 4. CONSTRUCT PERMANENT SEDIMENT BASIN AND TEMPORARY OVERFLOW.
 5. CONSTRUCT 1.8m HIGH FENCE TO CONTAIN AIR BOURNE PARTICLES ON TOP OF BERM.
 6. CONSTRUCT SILT FENCES.
 7. CONSTRUCT TEMPORARY SEDIMENT BASINS 1 AND 2.
 8. CONSTRUCT TEMPORARY DIVERSION DRAINS TO SEDIMENT BASINS 1 AND 2.

- NOTES:**
1. REFER DWG C3754:03:SK20 FOR SERVICES ALTERATION DETAILS
 2. REFER DRAWING C3754:03:SK101 FOR TECHNICAL NOTES AND DETAILS
 3. ALL WORK TO BE PERFORMED IN PRECONSTRUCTION

for
LEDA DEVELOPMENTS PTY LTD

REV.	DESCRIPTION	APPR.	DATE
A	REVISED ESC		15.03.16

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PROJECT:
RIVERSIDE CENTRAL NORTHERN BULK EARTHWORKS

DRAWING TITLE:
EROSION AND SEDIMENT CONTROL SHEET 2

TECHNICAL NOTES AND DETAILS

DEVEL. APPROV. No.:	DATE: 09.10.09
PROJECT LEADER:	
DESIGNER:	
DRAFTSPERSON:	
CHECKED:	
APPROVED FOR AND ON BEHALF OF BURCHILL VDM PTY LIMITED	
SCALE: AS SHOWN	DATUM: AHD
PROJECT No: C3754:03	DRAWING No: SK101
	REVISION: A

GENERAL NOTES:

- THIS DRAWING HAS BEEN PREPARED AS A GUIDE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO MANAGE SITE SEDIMENT AND EROSION CONTROL MEASURES AND DURING THE CONSTRUCTION PERIOD REINSTALL ADDITIONAL MEASURES WHERE SCOUR OR SEDIMENT TRANSPORT IS LIKELY TO OCCUR.
- DELAY CLEARING, GRUBBING AND TOPSOIL STRIPPING UNTIL NECESSARY.
- EARTHWORK OPERATIONS CAN COMMENCE ONLY AFTER SILT FENCE IS IN PLACE.
- MANAGE SITE ENTRY/EXIT POINT TO ENSURE SEDIMENT IS NOT TRACKED OFF SITE.
- SHAKEDOWN AREA:** PROVIDES FOR CONSTRUCTION, SERVICE AND STAFF VEHICLES ENTERING PUBLIC ROADS. CONTRACTOR SHALL LOCATE TO SUIT SITE ACTIVITIES. CONSTRUCTED AS 250mm THICK LAYER OF COARSE (150mm - 200mm) RIVER GRAVEL OVER A SINGLE LAYER OF HIGH STRENGTH GEOTEXTILE (15m x 5m).
- ARRANGE FOR EROSION CONTROL MEASURES TO BE INSTALLED AS CLOSE AS POSSIBLE TO THE SOURCE OF EROSION.
- ENSURE STOCKPILES ARE NOT ERODED BY WIND AND STORMWATER RUN-OFF AND ARE PROVIDED WITH A SILT FENCE AROUND THE LOW SIDE.
- ERECT SILT FENCES WHERE SHOWN ON THE DRAWINGS, GENERALLY ALONG THE LOW SIDE OF THE CONSTRUCTION SITE. AS AN ALTERNATIVE TO BURYING THE SILT FENCE LOWER EDGE, THE CONTRACTOR MAY ELECT TO PLACE 200mm OF THE FABRIC ON THE GROUND UP-SLOPE OF THE FENCE AND COVER WITH 100mm 12M LAYER OF AGGREGATE.
- TO PREVENT EROSION, TOPSOIL AND GRASS IMMEDIATELY AFTER COMPLETION OF BULK EARTHWORKS TO FINISHED PROFILES.
- SWEEP EXTERNAL ROADS WHERE SEDIMENT HAS BEEN DROPPED FROM CONSTRUCTION VEHICLES. DO NOT WASH SILT INTO THE STORMWATER SYSTEM.
- ALL SEDIMENT AND EROSION CONTROL STRUCTURES SHALL BE REGULARLY MAINTAINED AND INSPECTED FOR EFFECTIVENESS.
- REFER LANDSCAPE ARCHITECTS PLAN FOR BATTER TREATMENT DETAILS
- ALL WORK IS TO BE IN ACCORDANCE WITH THE I.C.E.A. NOVEMBER 2008 'BEST PRACTICE EROSION AND SEDIMENT CONTROL' MANUAL

DEWATERING NOTES:

- ALL SEDIMENT BASINS, BORROW PITS AND EXCAVATIONS ARE TO BE DE-WATERED BY APPROVED PUMPED OUTLET SYSTEMS. THE INTAKE PIPES MUST BE HOUSED IN AN APPROPRIATE FLOW CONTROL CHAMBER TO PREVENT RE-SUSPENSION OF THE SETTLED SEDIMENT (SUCH AS FLOATING RAFT OR PERFORATED DILET PIPE).
- DISCHARGE WATER QUALITY STANDARD.
 TOTAL SUSPENDED SOLIDS (TSS) CONCENTRATION NOT TO EXCEED 50 MILLIGRAMS PER LITRE
 WATER pH BETWEEN 6.5 AND 8.5
- ALL WATERS CAPTURED SHALL BE TREATED WITH AN APPROVED FLOCCULATING AGENT TO ACHIEVE THE SPECIFIED WATER QUALITY BEFORE THE WATER IS DISCHARGED.
- THE OUTFLOW FROM PUMPED OUTLET SYSTEM MUST NOT CAUSE EROSION OR ADVERSELY AFFECT THE DOWNSTREAM ENVIRONMENT.

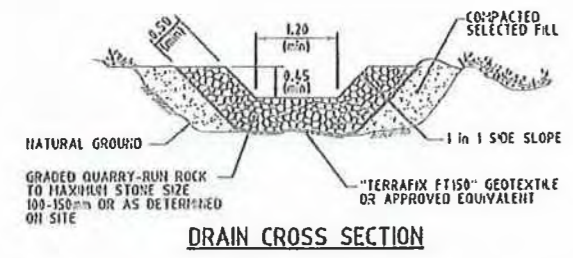
RISK MANAGEMENT PLAN:

PRIOR TO COMMENCEMENT OF CONSTRUCTION THE CONTRACTOR SHALL PROVIDE A RISK MANAGEMENT PLAN TO OUTLINE PROCEDURES TO MANAGE THE RISK ASSOCIATED WITH CONTAMINATED SOIL EXPOSED DURING FLOOD EVENTS. THE MANAGEMENT PLAN SHALL INCLUDE:

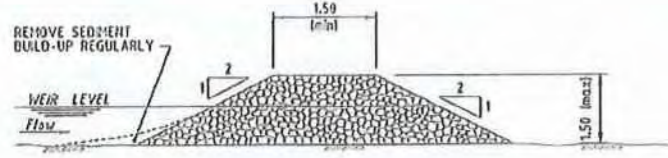
- STOCKPILING CLAY CAPPING FOR EMERGENCY USE
- INSTALLING CLAY CAPPING CONTINUOUSLY AS CONSTRUCTION OF THE EMBANKMENT PROCEEDS
- CLAY CAPPING OF REMAINING EXPOSED CONTAMINATED SURFACES SUBJECT TO REMEDIATION PRIOR TO THE FLOOD EVENT
- PROCEDURES IN PLACE FOR TRACKING FLOOD WARNING AND RAINFALL BROADCASTS FOR THE BREMER RIVER
- DETAILED CONSTRUCTION PROGRAM OUTLINING THE ACTIVITIES RELATIVE TO SPECIFIC MONTHS OF THE YEAR.

AIR BOURNE PARTICLES:

AIR BOURNE PARTICLES HAVE BEEN ADDRESSED BY A PROCESS THAT INVOLVES CONTINUOUS USE OF WATERING EQUIPMENT TO DAMPEN THE SURFACE PREVENTING AIR BOURNE MATERIALS PLUS THE CESSATION OF SITE WORKS ALTOGETHER WHEN WIND VELOCITY REACH A LEVEL SUCH THAT AIR BOURNE MATERIAL IS TRANSPORTED OUTSIDE THE BOUNDARIES OF THE SITE. THE SEDIMENT AND EROSION STAGING PLANS ALSO INCLUDES THE USE OF A 1.8 METRE HIGH HESSIAN FENCE ALONG THE COMMON BOUNDARY WITH THE QUEENSLAND RAILWAYS EASEMENT AND PROPERTY. REFER EHP FOR DUST MONITORING PROCEDURES.

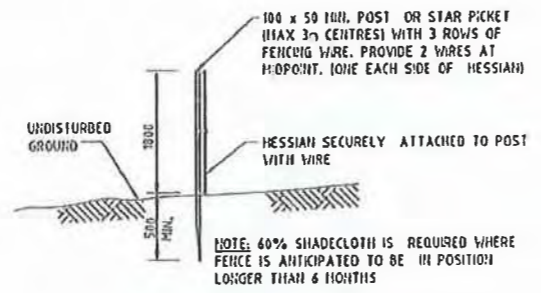


DRAIN CROSS SECTION



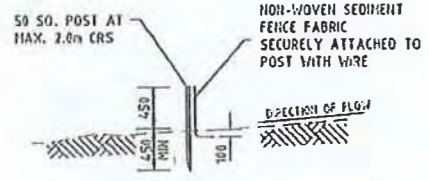
DRAIN LONGITUDINAL SECTION

ROCK FILTER DAM
 SCALE 1:50

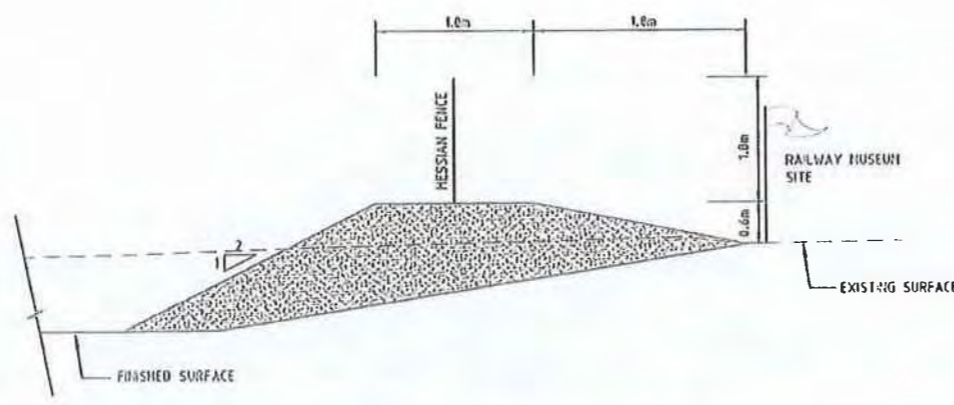


DUST CONTROL FENCE
 N.T.S.

NOTE: 60% SHADECLOTH IS REQUIRED WHERE FENCE IS ANTICIPATED TO BE IN POSITION LONGER THAN 6 MONTHS



SILT FENCE



EARTH BERM AND HESSIAN ALONG COMMON PROPERTY BOUNDARY WITH RAILWAY MUSEUM
 SCALE 1:50

SEDIMENT POND CALCULATION:

A PERMANENT SEDIMENT BASIN IS SHOWN AT THE NORTHERN ENDS OF THE SOUTHERN PORTION OF THE STAGE 2 AREA THAT IS CENTRALLY LOCATED AND SERVICES BOTH THE SOUTHERN AND NORTHERN AREAS. TWO TEMPORARY SEDIMENT BASINS ARE ALSO REQUIRED DURING EARTHWORK OPERATIONS. REFER BEST PRACTICE EROSION AND SEDIMENT CONTROL APPENDIX B SEDIMENT BASIN DESIGN AND OPERATION.

PERMANENT SEDIMENT BASIN

THE TOTAL PLATFORM FILL AREA IS 5.9 ha
 SIZING CRITERIA IS FOR BASIN DISCHARGING TO SENSITIVE RECEIVING WATERS

R 50AY 85% = 34.4mm
 C FOR LOAMY CLAY = 0.44
 SETTLING VOLUME = 10 R C A = 934 cu.m.

ADOPT BASIN WITH 1000 sq.m. BASE AND 1 in 4 SIDES.
 BOTTOM 0.6m = STORAGE ZONE = 711 cu.m.
 TOP 0.4m = SETTLING ZONE = 956 cu.m.

TEMPORARY SEDIMENT BASIN #1

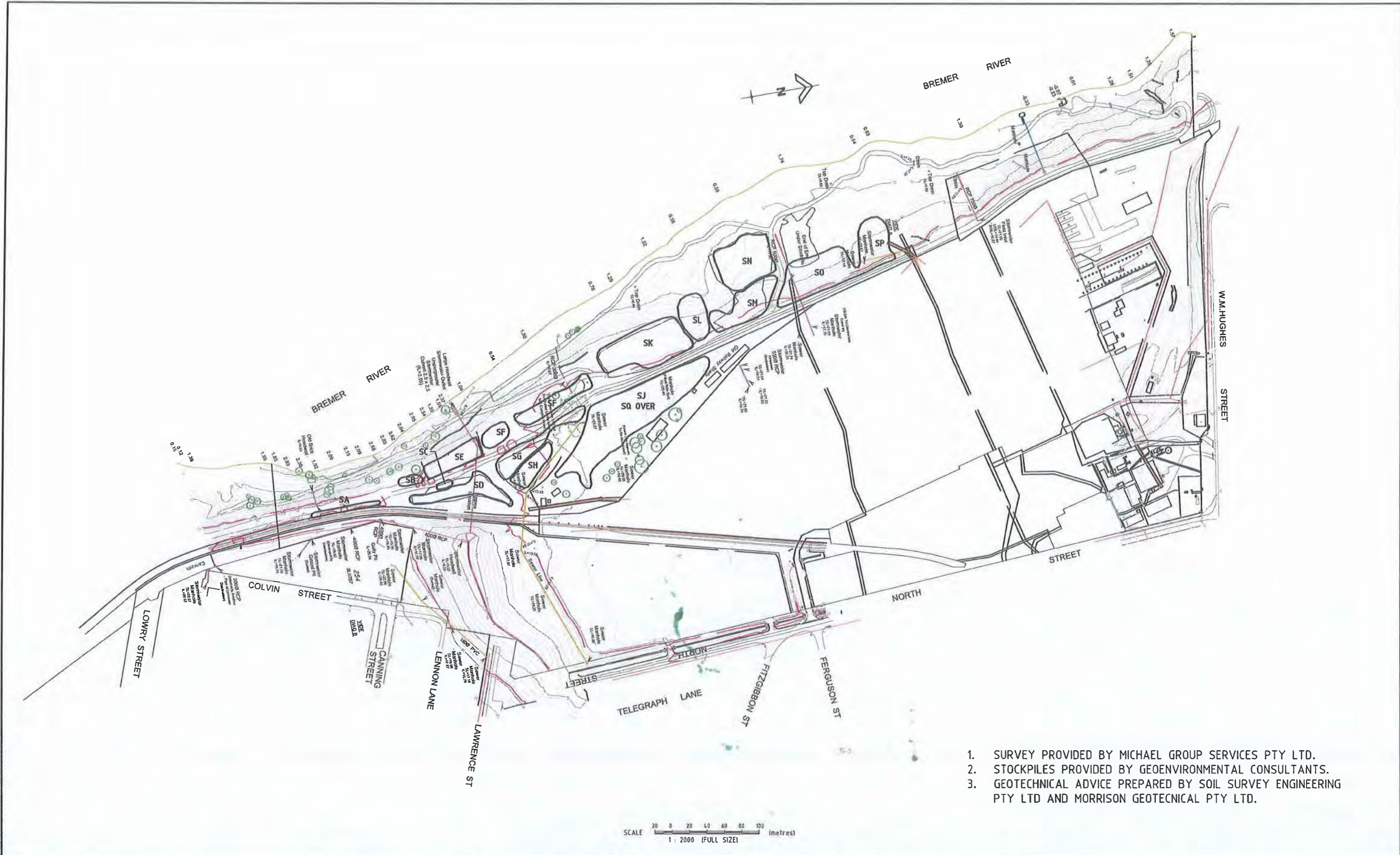
MAXIMUM CATCHMENT AREA IS 4.3 ha
 SIZING CRITERIA IS FOR BASIN DISCHARGING TO SENSITIVE RECEIVING WATERS

R 50AY 85% = 34.4mm
 C FOR LOAMY CLAY = 0.44
 SETTLING VOLUME = 10 R C A = 680 cu.m.

TEMPORARY SEDIMENT BASIN #2

MAXIMUM CATCHMENT AREA IS 1.2 ha
 SIZING CRITERIA IS FOR BASIN DISCHARGING TO SENSITIVE RECEIVING WATERS

R 50AY 85% = 34.4mm
 C FOR LOAMY CLAY = 0.44
 SETTLING VOLUME = 10 R C A = 190 cu.m.



1. SURVEY PROVIDED BY MICHAEL GROUP SERVICES PTY LTD.
2. STOCKPILES PROVIDED BY GEOENVIRONMENTAL CONSULTANTS.
3. GEOTECHNICAL ADVICE PREPARED BY SOIL SURVEY ENGINEERING PTY LTD AND MORRISON GEOTECHNICAL PTY LTD.

SCALE 20 0 20 40 60 80 100 (metres)
1 : 2000 (FULL SIZE)

RIVERSIDE CENTRAL
for
LEDA DEVELOPMENTS PTY LTD

REV.	DESCRIPTION	APPR.	DATE

VDM CONSULTING
BURCHILL
Consulting Engineers & Planners
Level 8, Australia Fair Office Tower
42 Marine Parade, Southport QLD 4215
PO Box 3768, Australia Fair, Southport QLD 4215
Phone +61 7 5509 6400
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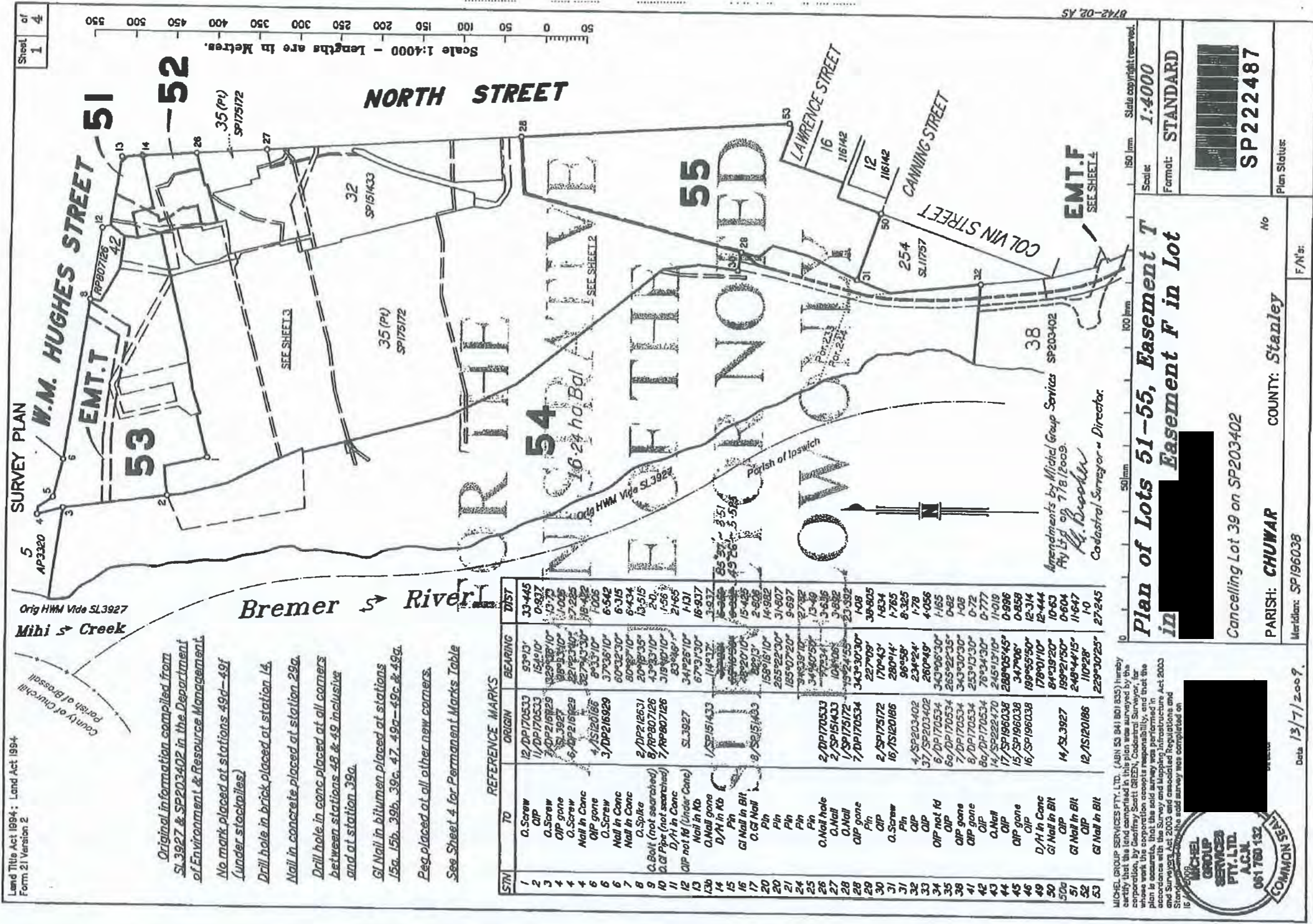
PROJECT:
**RIVERSIDE CENTRAL
NORTHERN
BULK EARTHWORKS**

DRAWING TITLE:
**SURVEY PLAN
WITH STOCKPILES
OVLAIN**

DEVEL. APPLIC. No.:	DATE: 16.03.2010
PROJECT LEADER:	
DRAFTSPERSON:	
APPROVED FOR AND ON BEHALF OF BURCHILL VDM PTY LIMITED AIN 010 140 495	
SCALE:	DATUM: AHD
PROJECT No.:	FULL SIZE: A1
C3754:03	REVISION:
DRAWING No.:	
SK400	

PLOTFILE: J:\PROJECTS\ASAP\GEO\DRAWING\SK400.DWG

SP222487 V0 REGISTERED Recorded Date 18/08/2009 10:44 Page 1 of 5 Not To Scale



Land Title Act 1994; Land Act 1994
Form 21 Variation 2

Orig HWM Vide SL3927
Mihi Creek

County of Churchill
Parish of Brissall

- Original information compiled from SL3927 & SP203402 in the Department of Environment & Resource Management.
- No mark placed at stations 49d-49f (under stockpiles).
- Drill hole in brick placed at station 14.
- Nail in concrete placed at station 29a.
- Drill hole in conc placed at all corners between stations 48 & 49 inclusive and at station 39a.
- GI Nail in bitumen placed at stations 15a, 15b, 39b, 39c, 47, 49a-49c & 49g.
- Peg placed at all other new corners.
- See Sheet 4 for Permanent Marks Table

STN	TO	ORIGIN	BEARING	DIST
1	O.Screw	12/DP170533	53°13'	33.445
2	O.Pipe	11/DP170533	154°10'	0.937
3	O.Screw	7/DP216929	128°28'10"	13.70
4	O.Pipe	5/DP216929	128°33'10"	1.005
4	O.Screw	5/DP216929	22°23'30"	7.255
4	Nail in Conc	5/DP216929	32°23'30"	16.432
6	O.Pipe	4/AS120186	8°33'10"	1.005
6	O.Screw	3/DP216929	37°35'10"	6.542
7	Nail in Conc	6/DP216929	60°32'30"	6.315
8	Nail in Conc	8/DP216929	80°27'10"	6.434
9	O.Spike	2/DP216929	20°18'35"	13.515
10	O.Bolt (not searched)	8/RP807126	43°23'10"	2.0
10	O.Pipe (not searched)	7/RP807126	31°18'10"	1.56
11	D/H in Conc	SL3927	83°48'10"	21.65
12	O.Pipe not Rd (Under Conc)	SL3927	34°25'10"	1.031
13	Nail in Kb	1/DP151433	67°31'30"	16.937
13b	O.Nail gone	1/DP151433	114°12'	3.937
14	D/H in Kb	1/DP151433	114°12'	16.937
15	Pin	1/DP151433	114°12'	16.937
16	GI Nail in Bit	1/DP151433	114°12'	16.937
17	O.GI Nail	1/DP151433	114°12'	16.937
20	Pin	1/DP151433	114°12'	16.937
21	Pin	1/DP151433	114°12'	16.937
22	Pin	1/DP151433	114°12'	16.937
24	Pin	1/DP151433	114°12'	16.937
25	Pin	1/DP151433	114°12'	16.937
26	O.Nail hole	2/DP170533	77°34'	1.349
27	O.Nail	2/SP151433	108°08'	3.636
28	O.Pipe	1/SP15172	108°08'	3.832
28	O.Pipe	7/DP170534	108°08'	23.392
29	Pin	34°30'30"	148	
30	O.Pipe	22°28'	38.605	
31	O.Screw	170°43'	1.834	
31	Pin	280°14'	1.765	
32	O.Pipe	96°58'	8.325	
33	O.Pipe	234°24'	1.78	
34	O.Pipe not Rd	280°49'	4.056	
35	O.Pipe	343°06'30"	1.65	
38	O.Pipe	265°22'35"	0.82	
41	O.Pipe	343°03'30"	1.08	
42	O.Pipe	253°13'30"	0.72	
43	O.Nail	86/DP170534	76°34'30"	0.777
44	O.Pipe	14/SP222470	245°13'10"	11.019
45	O.Pipe	17/SP196038	389°05'45"	0.966
46	O.Pipe	34°20'6"	0.859	
49	D/H in Conc	199°55'50"	12.314	
50a	GI Nail in Bit	178°01'10"	12.444	
51	O.Pipe	84°29'20"	10.63	
52	GI Nail in Bit	199°21'50"	0.604	
53	GI Nail in Bit	249°44'15"	11.647	
		110°28'	1.0	
		229°30'25"	27.245	

NOT TO SCALE

Riverside Central
for
LEDA DEVELOPMENTS PTY LTD

REV.	DESCRIPTION	APPR.	DATE

VDM CONSULTING
BURCHILL
Consulting Engineers & Planners
Level 8, Australia Fair Office Tower
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Phone +61 7 5509 6400
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PROJECT:
RIVERSIDE CENTRAL
NORTHERN
BULK EARTHWORKS

DRAWING TITLE:
SP222487

DEVL APPLIC. No.:	DATE:	18.03.2010
PROJECT LEADER:	[Redacted]	
DRAFTSPERSON:	[Redacted]	
APPROVED FOR AND:	[Redacted]	
SCALE:	DATUM:	AND FULL SIZE: A1
PROJECT No.:	DRAWING No.:	REVISION:
C3754:03	SK500	

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Scale: 1:4000
Format: STANDARD
Plan Status: SP222487

Plan of Lots 51-55, Easement T
in [Redacted] Easement F in Lot
Cancelling Lot 39 on SP203402

PARISH: CHUWAR COUNTY: Stanley
Meridian: SP196038
F/N's: No
Date: 13/7/2009

MICHEL GROUP SERVICES PTY. LTD. (ABN 53 841 801 553) hereby certify that the land comprised in this plan was surveyed by this firm in accordance with the Survey Act 2003 and that the plan is accurate, that the survey was performed in accordance with the Survey and Mapping Infrastructure Act 2003 and Surveyors Act 2003 and associated Regulations and Standards and that the said survey was completed on 15/07/2009.



8742-02.A5