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**WATER MANAGEMENT
(Incl. GROUNDWATER ASSESSMENT)

AND

EROSION AND SEDIMENT CONTROL PLAN**

**Lot 32 DP 635271 and Lot 22 DP 833317
Macarthur Road, Elderslie**

Prepared for:

M Collins and Sons (Holdings) Pty Ltd

**Job reference: 201279
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4	25/07/2011	□ Report finalised.
5	19/12/2011	Report revised. Revisions as follows: • Site water balance section updated. • Updated groundwater assessment section. • Terminal sedimentation pond sizing adjusted to match Maximum Harvestable Right Dam Capacity (MHRDC), as outlined in Water Balance section.
6	16/02/2012	Revisions as follows: • Various typographical changes • Updated groundwater assessment section Various changes to Figure and Table numbering.
7	20/04/2012	Various typographic revisions Revisions to Figures 2, 3, 4, and 8.
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	14/7/2016	Submitted to DPE (Tertius Greyling, Chase Dingle, Lauren Evans) Howard Reed Director General for Approval

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11	April /2017	Section 4 (Water Balance) revised to include potential direct and indirect additional transfers and losses as described in Section 4.6 and 4.7, and summarised in 4.10.

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Abbreviations

AWS	Automatic Weather Station
BOM	Bureau of Meteorology
DA	Development Application
DGRs	Director General Requirements
DP&E	NSW Department of Planning and Environment
DPI Water	NSW Department of Primary Industries – Office of Water
MOD3 EA	Modification 3 Environmental Assessment
ECP	Erosion Control Protocol
EMR	Environmental Management Representative
ESCP	Erosion and Sediment Control Plan
DPE	Department of Planning and Environment
DPIW	Department of Primary Industries Water
MHRDC	Maximum Harvestable Right Dam Capacity

NorBE	Neutral or Beneficial Effect
PET	Potential Evapo-transpiration
SQMR	Stormwater Quality Modelling Report
SREP 20	State Regional Environmental Plan 20 – Hawkesbury Nepean River
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
VENM/ENM	Virgin Excavated Natural Material / Excavated Natural Material
WA (1912)	Water Act (NSW) 1912
WA (2000)	Water Act (NSW) 2000
WM & ESCP	Water Management (inc groundwater) and Erosion and Sediment Control Plan
WSPs	Water Sharing Plans
WASPGMRGS	WSP's for the Greater Metropolitan Region Groundwater Sources (WASPGMRGS)
WSPGMRURWS	WSP's for the Greater Metropolitan Region Unregulated River Water Sources

1. INTRODUCTION

M Collins and Sons (Holdings) Pty Ltd (MCS) owns and operates the Spring Farm Quarry located at Lot 22 DP833317 at Spring Farm, in the Camden Local Government Area (LGA). Development consent (DA 75/256) for the extraction and processing of sand and soil was originally granted by the Minister for Planning in 1988 and the consent was modified in 1998 to extend the quarry's life. The quarry is a major source of products for the Sydney region and comprises part of the regionally significant resource identified in the Sydney Regional Environmental Plan No 9 (Extractive Industry).

On the 22 May 2009 MCS was granted a further Section 96(2) Modification for the Continuation of Operations by the Department of Planning for extraction within an 8 hectare portion of the subject site and for the continued processing of extracted materials onsite. That approval was to allow operations to continue for a further 10 year period until 2019.

On the 25th October 2012 MCS Pty Ltd was granted a further modification under Section 75W of the Environmental Planning and Assessment Act (1979) (NSW) to extend sand and soil extraction activities onto an adjacent portion of land within Lot 32 DP 635271. The extension of extraction activities consist of the following features:

- Extraction of sand and soil within a 6.8 hectare (approximate) portion of land within Lot 32 DP 635271.
- Dry screening of sand and soil within the quarry floor on Lot 22 DP833317;
- Active extraction within Lot 32 DP635271 on one (1) hectare portion of land at a time and concurrent rehabilitation works within an additional 1 hectare portion of land.
- On Lot 22 DP833317 permission exists to open and work five hectares at one time;
- Extraction and rehabilitation works are proposed to occur in concert over an 8 year period from commencement of extraction (completion in 2019); and
- Rehabilitation maintenance activities are proposed to occur over an additional 2 year period.

Harvest Scientific Services Pty Ltd (HSS) were engaged by MCS to review and update the Water Management and Erosion and Sediment Control Plan (WM & ESCP) following the Modification 3 Approval specific requirements are as follows;

- Site Water Balance;
- Erosion and Sediment Control Plan;
- Groundwater Monitoring Program; and, □ Flood Emergency Procedures Plan.

2. RELEVANT LEGISLATION

The two key pieces of legislation for the management of water in NSW are the *Water Management Act 2000* and the *Water Act 1912*. Both of these pieces of legislations are administered in NSW by the NSW Department of Industries (DPIW).

2.1. Water Management Act 2000 (WMA 2000)

After an extensive period of public consultation, the *Water Management Act 2000* was passed by the NSW Parliament in December 2000, establishing a complete new statutory framework for managing water in NSW.

The *Water Management Act 2000* is based on the concept of ecologically sustainable development which requires that development today that will not threaten the ability of future generations to meet their needs. The NSW Office of Water (NSW Government, 2012a) states that the Act recognises that:

- the fundamental health of our rivers and groundwater systems and associated wetlands, floodplains, estuaries has to be protected
- the management of water must be integrated with other natural resources such as vegetation, soils and land
- to be properly effective, water management must be a shared responsibility between the government and the community
- water management decisions must involve consideration of environmental, social, economic, cultural and heritage aspects
- social and economic benefits to the state will result from the sustainable and efficient use of water

The objectives of the Water Management Act 2000 (WMA 2000), as stated by the Act, are to *'provide for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations and, in particular:*

- *to apply the principles of ecologically sustainable development, and*
- *to protect, enhance and restore water sources, their associated ecosystems, ecological processes and biological diversity and their water quality, and*
- *to recognise and foster the significant social and economic benefits to the State that result from the sustainable and efficient use of water, including:*
- *benefits to the environment, and*
- *benefits to urban communities, agriculture, fisheries, industry and recreation, and*
- *benefits to culture and heritage, and*
- *benefits to the Aboriginal people in relation to their spiritual, social, customary and economic use of land and water,*
- *to recognise the role of the community, as a partner with government, in resolving issues relating to the management of water sources,*
- *to provide for the orderly, efficient and equitable sharing of water from water sources,*
- *to integrate the management of water sources with the management of other aspects of the environment, including the land, its soil, its native vegetation and its native fauna,*
- *to encourage the sharing of responsibility for the sustainable and efficient use of water between the Government and water users,*
- *to encourage best practice in the management and use of water.'* The principles as set out

in s5 of the WMA (2000) are as follows:

(2) Generally:

- (a) water sources, floodplain and dependent ecosystems (including groundwater and wetlands) should be protected and restored and, where possible, land should not be degraded, and*
- (b) habitats, animals and plants that benefit from water or are potentially affected by managed activities should be protected and (in the case of habitats) restored, and*
- (c) the water quality of all water sources should be protected and, wherever possible, enhanced, and*
- (d) the cumulative impacts of water management licences and approvals and other activities on water sources and their dependent ecosystems, should be considered and minimised, and*
- (e) geographical and other features of indigenous significance should be protected, and*
- (f) geographical and other features of major cultural, heritage or spiritual significance should be protected, and*
- (g) the social and economic benefits to the community should be maximised, and*
- (h) the principles of adaptive management should be applied, which should be responsive to monitoring and improvements in understanding of ecological water requirements.*

(3) In relation to water sharing:

- (a) sharing of water from a water source must protect the water source and its dependent ecosystems, and*
- (b) sharing of water from a water source must protect basic landholder rights, and*
- (c) sharing or extraction of water under any other right must not prejudice the principles set out in paragraphs (a) and (b).*

(4) In relation to water use:

- (a) water use should avoid or minimise land degradation, including soil erosion, compaction, geomorphic instability, contamination, acidity, waterlogging, decline of native vegetation or, where appropriate, salinity and, where possible, land should be rehabilitated, and*
- (b) water use should be consistent with the maintenance of productivity of land in the long term and should maximise the social and economic benefits to the community, and (c) the impacts of water use on other water users should be avoided or minimised.*

(5) In relation to drainage management:

- (a) drainage activities should avoid or minimise land degradation, including soil erosion, compaction, geomorphic instability, contamination, acidity, waterlogging, decline of native vegetation or, where appropriate, salinity and, where possible, land should be rehabilitated, and*
- (b) the impacts of drainage activities on other water users should be avoided or minimised.*

(6) In relation to floodplain management:

- (a) floodplain management must avoid or minimise land degradation, including soil erosion, compaction, geomorphic instability, contamination, acidity, waterlogging, decline of native vegetation or, where appropriate, salinity and, where possible, land must be rehabilitated, and*
- (b) the impacts of flood works on other water users should be avoided or minimised, and*

- (c) *the existing and future risk to human life and property arising from occupation of floodplains must be minimised.*

(7) *In relation to controlled activities:*

- (a) *the carrying out of controlled activities must avoid or minimise land degradation, including soil erosion, compaction, geomorphic instability, contamination, acidity, waterlogging, decline of native vegetation or, where appropriate, salinity and, where possible, land must be rehabilitated, and*
- (b) *the impacts of the carrying out of controlled activities on other water users must be avoided or minimised.*

(8) *In relation to aquifer interference activities:*

- (a) *the carrying out of aquifer interference activities must avoid or minimise land degradation, including soil erosion, compaction, geomorphic instability, contamination, acidity, waterlogging, decline of native vegetation or, where appropriate, salinity and, where possible, land must be rehabilitated, and*
- (b) *the impacts of the carrying out of aquifer interference activities on other water users must be avoided or minimised.*

Because of the major changes required by the legislation, the Act has been progressively implemented. Since 1 July 2004 the new licensing and approvals system has been in effect in those areas of NSW covered by operational water sharing plans – these areas cover most of the State's major regulated river systems and therefore the largest areas of water extraction. As water sharing plans are finalised and commenced for the rest of the state, the licensing provisions of the Act are introduced extending the benefits for the environment of defined environmental rules and for licence holders of perpetual water licences and greater opportunities for water trading. Since the legislation was passed in 2000, some amendments have been necessary to better implement the new arrangements and also give effect to the National Water Initiative signed on 25 June 2004, including creation of perpetual or open-ended water licences. The Act was also amended in 2008 to strengthen compliance and enforcement powers in response to water theft. The latest copy of the Water Management Act (NSW Government, 2012b) is available from the NSW government legislation site.

2.1.1. Water sharing plans the Greater Metropolitan Region Groundwater Sources (WASPGMRGS)

[and the Greater Metropolitan Region Unregulated River Water Sources \(WSPGMRURWS\)](#)

The *Water Management Act 2000* was driven by the need for NSW to secure a sustainable basis for water management for several reasons:

- NSW was at the limits of its available water resources – new licences for commercial purposes could no longer be issued across most of NSW and a limit had been placed on the total volume of water that can be extracted across the inland of NSW under the Murray–Darling Basin Cap
- The decline in the health of our rivers, groundwater, floodplains and estuaries was being seen through increasing water quality problems, loss of species, wetland decline and habitat loss.

As a result the *Water Management Act 2000* recognises the need to allocate and provide water for the environmental health of our rivers and groundwater systems, while also providing licence holders with more secure access to water and greater opportunities to trade water through the separation of water

licences from land. The main tool the Act provides for managing the State's water resources are water sharing plans. These are used to set out the rules for the sharing of water in a particular water source between water users and the environment and rules for the trading of water in a particular water source.

On 01 July 2011, the Water Sharing Plans (WSP's) for the Greater Metropolitan Region Groundwater Sources (WASPGMRGS) and the Greater Metropolitan Region Unregulated River Water Sources (WSPGMRURWS) commenced, giving effect to the licensing provisions of the Water Management Act 2000 (NSW) (WMA, 2000) in the plan area.

2.2. Water Act 1912 (WA 1912) NSW

The *Water Act 1912* came into force at the turn of the last century and represented a different era in water management in NSW. This Act has been progressively phased out and replaced by the *Water Management Act 2000*, but some provisions are still in force (NSW Government, 2012b).

A copy of the *Water Act 1912* is available from the NSW's Government legislation website (NSW Government, 2012c).

3. SITE CHARACTERISTICS AND CONSTRAINTS

3.1. Site location

MCS owns and operate the Spring Farm sand and soil quarry located at Lot 22 (DP833317) and Lot 32 (DP653271) at Spring Farm, in the Camden Local Government Area (LGA). These operations are accessed via Macarthur Road, Spring Farm. (Figures 1 and 2).

The final landform and extraction and rehabilitation staging are depicted on Figures 3 and 4 respectively.



Figure 1. Location of Sand and Soil Extraction and Processing Operations

3.2. Drainage patterns

Surface water run-off within the extraction area predominantly drains to the west directly into the Nepean River. A minor portion of the subject land drains to the east toward a Dry River Anabran, which in turn drains into the Nepean River.

3.3. Slope

The slope of the existing land surface within the major portion of the extraction area is gently undulating and generally slopes within the range of 0 to 5 per cent.

Active extraction cells will have a slight slope on the quarry floor of approximately 1 to 2 per cent and working batters of approximately 30 per cent (i.e. 1V: 3H). Vegetation cover will vary subject to the stage of rehabilitation.

Post extraction, the landform in all open paddock areas is to be relatively flat, with a gentle slope of 1 to 5 per cent draining generally toward the south-west.

3.4. Soil landscape group

Based on the 1:100,000 Soil Landscapes of the Wollongong to Port Hacking map sheet (Hazelton and Tille, 1990), the area where extraction is proposed belongs to the 'Theresa Park' Soil Landscape group.

Hazelton and Tille (1990) describe the Theresa Park Soil Landscape Group as a fluvial Soil Landscape Group occurring on floodplains with levees, meander scrolls and terraces with local relief up to 60m. Slopes are generally less than 5 per cent, except on edges of terraces where some slopes may exceed 10 per cent. Red earths and red podzolic soils occur on terraces and minimal prairie soils on current floodplain. Alluvial bedding is sometimes evident with alluvial soils. In drainage lines solodic soils occur. These soils are highly variable and include poorly structured orange to red silty loams, brown loams and sandy loams.

Figure 2
Existing site layout

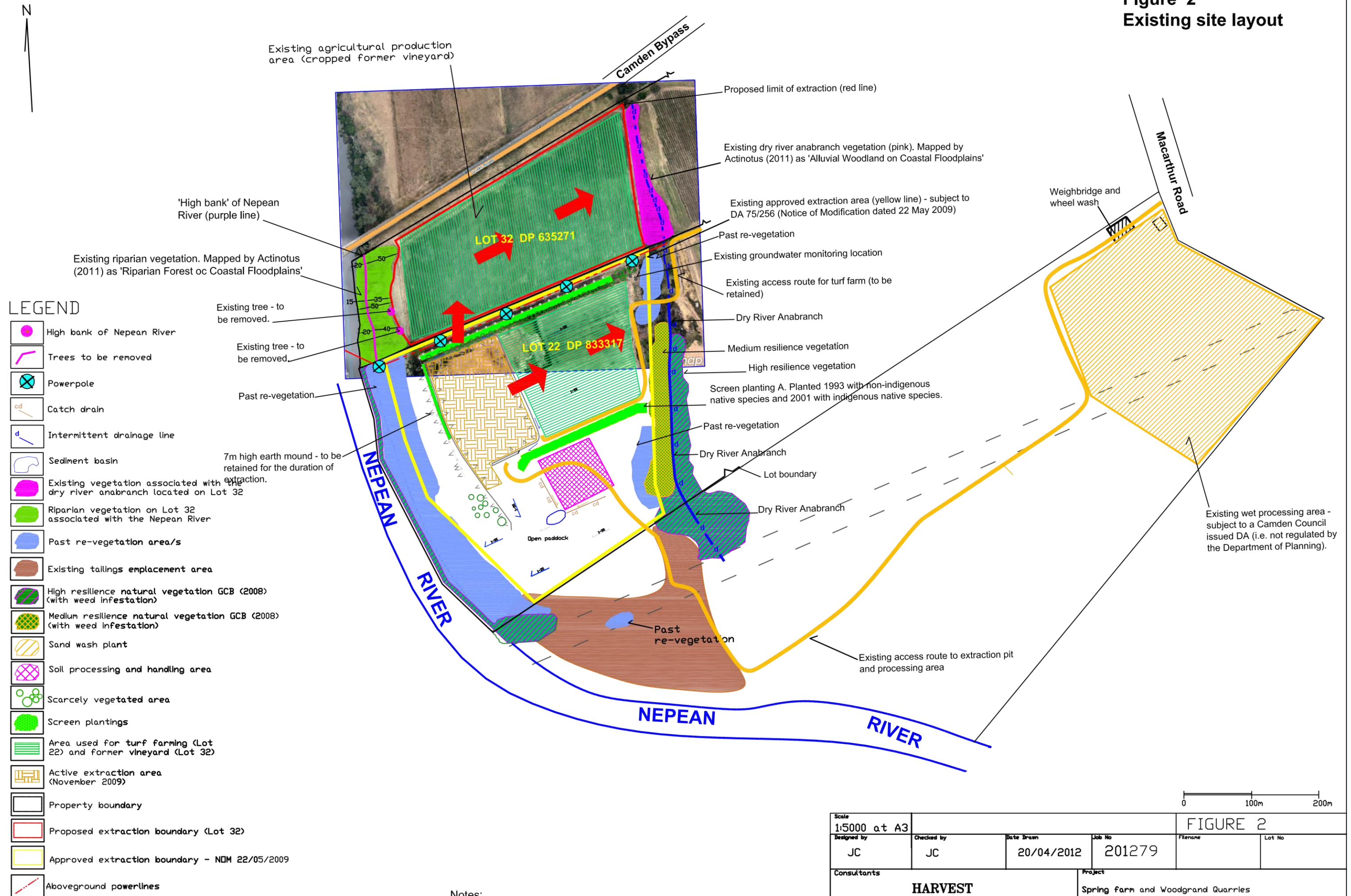
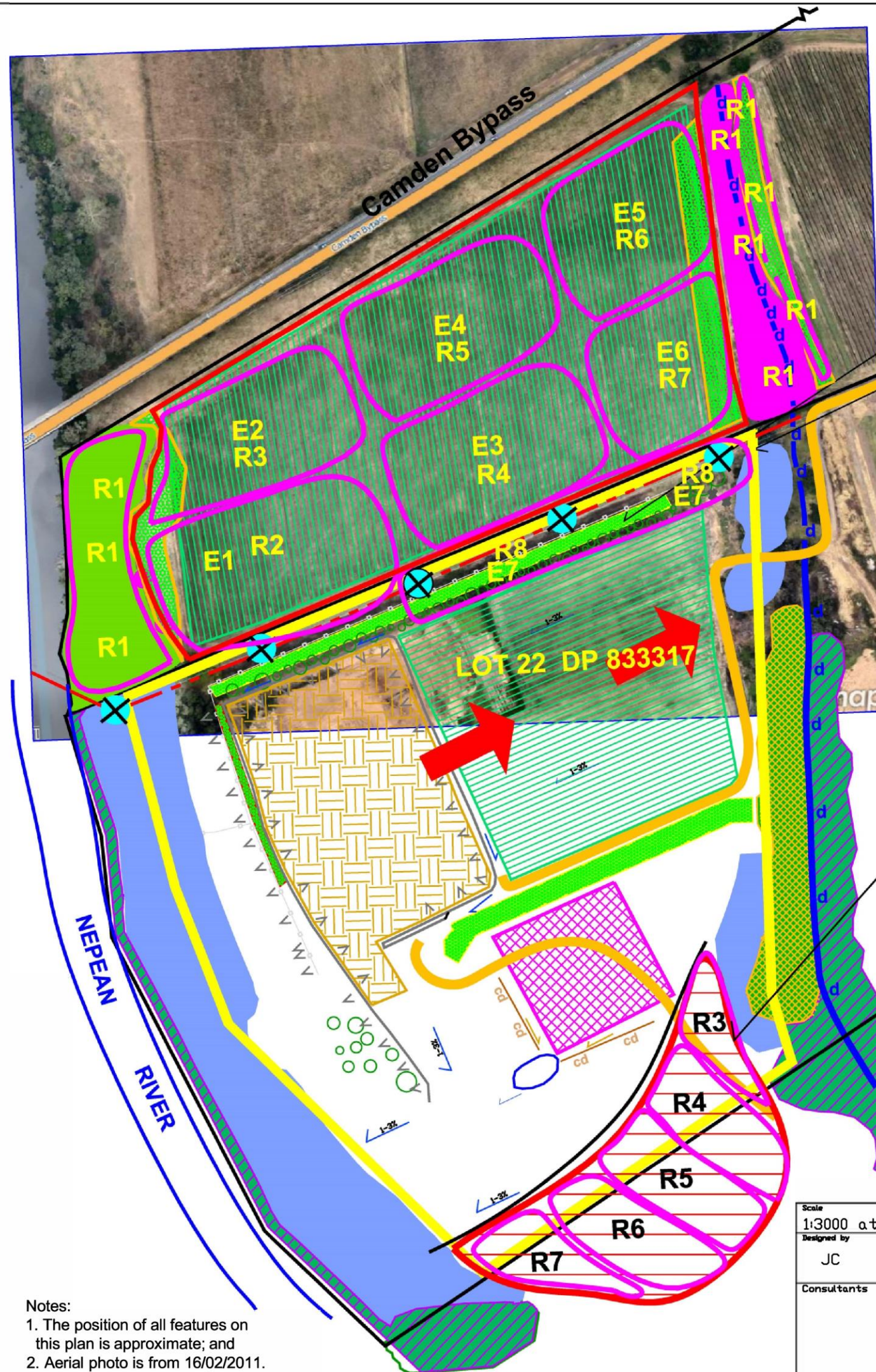


Figure 4
Extraction and
rehabilitation staging plan



LEGEND

- Staging boundary
- Trees to be removed
- Powerpole
- Catch drain
- Intermittent drainage line
- Sediment basin
- Existing vegetation associated with the dry river anabranch located on Lot 32
- Riparian vegetation on Lot 32 associated with the Nepean River
- Past re-vegetation area/s
- High resilience natural vegetation GCB (2008) (with weed infestation)
- Medium resilience natural vegetation GCB (2008) (with weed infestation)
- Sand wash plant
- Soil processing and handling area
- Scarcely vegetated area
- Screen plantings
- Area used for turf farming (Lot 22) and former vineyard (Lot 32)
- Active extraction area (November 2009)
- Existing internal fence-line
- Property boundary
- Proposed extraction boundary (Lot 32)
- Approved extraction boundary - NDM 22/05/2009
- Aboveground powerlines
- Proposed progressive direction of extraction
- Tailsings emplacement area

Notes:

1. The position of all features on this plan is approximate; and
2. Aerial photo is from 16/02/2011.

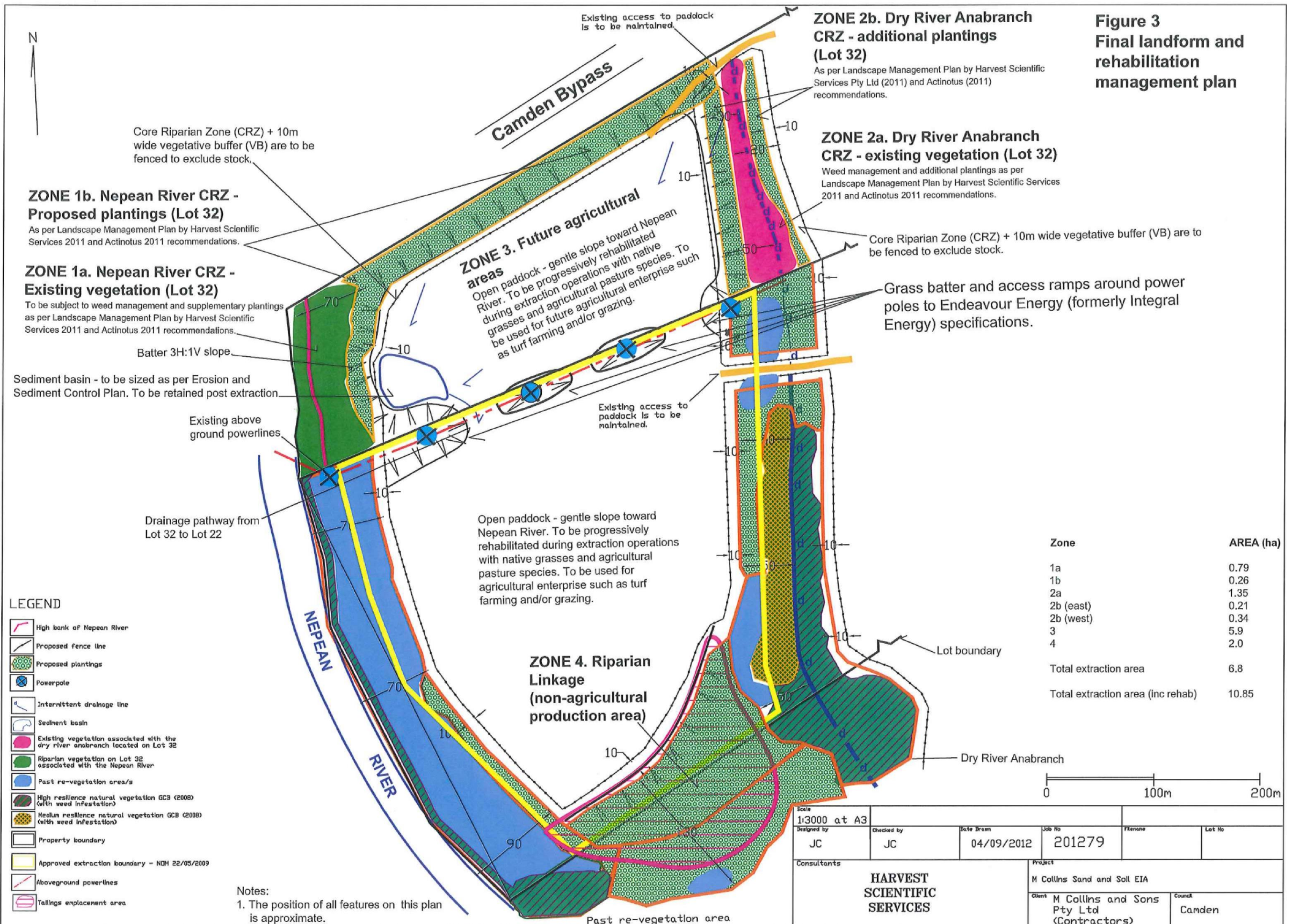
YEAR	REHABILITATION CELLS	EXTRACTION CELLS
2015	R1	E1
2016	R2	E2
2017	R3	E3
2017	R4	E4
2018	R5	E5
2018	R6	E6
2019	R7	E7 (extraction complete)
2019	R8 (rehabilitation complete)	
2020	Maintenance R6 and R7	
2021	Maintenance R7	

Tailsings emplacement area. To include:
- a VENM earth/clay access ramp/wall.
- staged placement in the direction from cell R3 to cell R7.

Dry River Anabranch

Scale 1:3000 at A3		FIGURE 4	
Designed by JC	Checked by JC	Date Drawn 27/03/2017	Job No 201279
Consultants HARVEST SCIENTIFIC SERVICES		Project M Collins Sand and Soil EIA	
		Client M Collins and Sons Pty Ltd (Contractors)	Council Camden

Figure 3
Final landform and
rehabilitation
management plan



Hazelton and Tille (1990) define the main limitations of the 'Teresa Park' Soil Landscape Group to include localised flooding, seasonal water-logging and very high soil erosion hazard for concentrated flows.

4. WATER BALANCE

4.1. Water sharing plans the Greater Metropolitan Region Groundwater Sources (WASPGMRGS)

and the Greater Metropolitan Region Unregulated River Water Sources (WSPGMRURWS)

On 01 July 2011, the Water Sharing Plans (WSP's) for the Greater Metropolitan Region Groundwater Sources (WASPGMRGS) and the Greater Metropolitan Region Unregulated River Water Sources (WSPGMRURWS) commenced, giving effect to the licensing provisions of the Water Management Act 2000 (NSW) (WMA, 2000) in the plan area.

The subject land falls within Sydney Basin Central Groundwater Source, for the WASPGMRGS, and the Camden Weir Management Zone and Mid Nepean River Catchment Management Zone, for the WSPGMRURWS.

Guidance information on the proposed controls within each of these management zones is appended as Appendix 2.

4.2. Maximum Harvestable Right Dam Capacity (MHRDC) and proposed sedimentation terminal

pond

Harvestable rights orders under Section 54 of the WMA give a landholder the right to collect a proportion of runoff from their property and store it in one or more dams up to a certain size, known as the Maximum Harvestable Right Dam Capacity (MHRDC). The MHRDC is based on the total continuous area of land ownership and accounts for variable rainfall in different regions of NSW. In Central and Eastern Divisions of NSW, landholders may capture and use **up to 10% of the average regional rainwater runoff on their land** by means of a dam(s) having not more than the total capacity calculated in accordance with Schedule 1 of the orders, providing such structures are located on minor streams only (i.e. first and second order streams). Water take in excess of the maximum harvestable right requires licencing from the NSW Department of Industries – Office of Water (DPI Water), **except** where an exemption applies (see further below).

Based on the MHRDC calculator located on the DPI Water website (as assessed for the MOD3 EA), Lot 32 has a MHRDC of 0.075 ML/ha, which equates to 1.32 ML for the approximate 17.7 hectare lot size. This applies to any dams where an exemption does **not** apply (see notes further below in relation to sediment dams).

The terminal pond (Figure 3 & Figure 8) is to be limited to the MHRDC size of 1.32 ML as the dam is intended to remain in the final landform following rehabilitation (ie will no longer be a pollution control sediment dam). As the terminal sedimentation pond is less than the MHRDC a Water Access Licence (WAL) is not required for this structure. This feature is to be retained post extraction as a sediment trap for the postextraction agricultural production areas.

Water is available from the terminal sedimentation pond for dust suppression purposes if required during the life of the extraction proposal and irrigation purposes post-extraction.

Clause 36 of the Water Management (General) Regulation 2011 (the Regulation) provides **exemptions** for both construction and use of certain classes of water storage structures as set out in Schedule 1 of the Regulation, which notably includes the following in Schedule 1(3):

- *“Dams solely for the capture, containment and recirculation of drainage and/or effluent, consistent with the best management practice or required by a public authority (other than Landcom or the Superannuation Administration Corporation or any of their subsidiaries) to prevent the contamination of a water source, that are located on a minor stream.”*

These exemption provisions are applicable to temporary sediment basins constructed during the life of the project to control runoff and prevent water pollution in accordance with recognised design guidelines.

Subsequently, temporary sediment dams designed for the site as described in Section 6 of this WM & ESCP are considered exempt from the MHRDC. Sediment ponds are employed in disturbance/processing and rehabilitation areas as required in accordance with Section 6 of this document.

4.3. Sources and security of water supply

An annual total of 390.3 ML is available for site operations from sources including river water from the Nepean River, bore water and surface water from the proposed terminal sedimentation pond. A breakdown of the various water sources is outlined in **Table 1**. Given the vast majority of sources are **not** from harvesting surface rainfall runoff (as detailed further below), an indicative annual average approach to the water balance is provided and considered sufficient. This approach is also supported by a significant general water surplus position (refer section 4.10) provided primarily by the significant licenced water sources available as detailed below.

Table 1. Summary of available water sources and volumes.

Source	WAL WMA 2000	WMA 2000 Approval	Available Volume (ML)	Notes
Nepean River	10AL117216	10WA117217	41	River pump
	10AL117214	10CA117215	230	River pump
Groundwater	10AL117186	10CA117187	20	Bore pump (Lot 22 DP 833317)
	10AL109570	10CA109571	98	Bore pump (Lot 1 DP 587631)
Onsite sediment basins	Exempt.	Exempt.	1.3* (see notes)	1.3ML Terminal Pond Based on Lot 32 MHRDC. 13.5ML of <i>MHRDC-exempt</i> temporary sediment basins (0.588ML/ha of disturbance, up to 22.8ha max for lot22/32). Further discussion provided in text below.
Total			390.3	

The total available volume of water from the Nepean River is 271 ML per annum which is sourced from two existing licences under the Water Act 2000 (NSW) (WA, 2000). The Water Access Licences (WAL's) are administered by the NSW Department of Primary Industries Water (DPIW) under the WMA (2000).

The total available volume of water from groundwater sources is 118 ML per annum sourced from two existing licences under the Water Act 2000 (NSW) (WA, 2000). The Water Access Licences (WAL's) are administered by the NSW Department of Primary Industries Water (DPIW) under the WMA (2000).

Approximately 1.3ML of surface water from the onsite terminal sedimentation pond will also be available to supplement site water needs if required. As this volume is less than the Maximum Harvestable Right (MHR) for the site, a Water Access Licence is not required to utilise this water.

Temporary Sediment Dams (Pollution control dams):

Section 6 provides details for additional sediment dams (MHRDC exempt) temporarily required during the project life to protect runoff water quality. Sediment basins are progressively installed as extraction 'cells' progress across the site (refer **Figure 8**) and are sized to relevant disturbance areas as per Section 6. Within Lot 32, 6.8 Ha of extraction is approved of the total 17.7Ha. Within Lot 22, 16 Ha is approved of the total 37.36Ha. Therefore a maximum area of 22.8ha is approved for extraction within lots 22 and 32 which if conservatively assessed in total would require a combined volume of up to 13.5ML in sediment dams capacity across the site. Sediment dams exist for temporary water quality treatment during the project and are **not** relied upon as principle water sources at this site (opportunistic use only if required and available – refer evaporation effects in Section 4.7.1). The dams are supplied from local runoff only, and are not supplied by any transfers from other permanent supply sources (licenced extraction bores/river). Given the above and the already ample surplus position of the water balance in Section 4.10, detailed estimations of annual potential sediment dam water supply (and loss) was not considered necessary, and as such are not specifically listed in Table 1. Current sediment dam capacity and disturbance areas reporting to them for progressive extraction within Lots 22 and 32 are reported annually in the AEMR/Annual Review.

4.4. Site water use

MCS Pty Ltd currently utilise an annual total of 271 ML and a breakdown of the various water uses is outlined in **Table 2**. Industrial extraction uses include the water required by the sand wash-plant and for dust suppression purposes. Environmental uses include water utilised for establishment of re-vegetated areas. Agricultural use water is currently utilised by turf farming operations.

Table 2. Summary of annual water uses and volumes.

Aspect	Available Volume (ML/annum)
Industrial (extraction) usage	139
Environmental and rehabilitation usage	16
Agriculture	116*
Total	271

** Included for completeness for all approved activities to permissible extent. It is noted that (as at April 2017), whilst still approved, agricultural activities are not currently undertaken. Subsequently, 116ML of potential water source is not currently employed, effectively providing further conservative redundancy to the site water balance.*

The annual average usage is not anticipated to change as part of the extraction as the scale of the overall operation is not proposed to change. Water currently utilised on the existing MCS Pty Ltd site for a specific purpose (such as rehabilitation establishment) will be diverted to the adjacent site when it is no longer needed (such as when rehabilitation works are complete).

Given that a total of 390.3 ML per annum of water is available (**Table 1**) and the annual requirement is 271 ML (**Table 2**), ample water sources are therefore available for the operations.

4.5. Water management, storage and access

Water is pumped directly from the Nepean River with two centrifugal pumps directly to the relevant area for use. Water from groundwater bores will be pumped directly to the relevant area if required for use via a standard bore pump that is to be installed on each bore.

Water may also be pumped from sediment basins if required with a fire-fighter pump and recycled onsite site on an as needed basis, such as for dust suppression purposes. Typically water is transported in a water cart but may be pumped locally via sprinklers.

4.6. Direct offsite water transfers

Water is not pumped or piped offsite. The site does not have a Licenced Discharge Point (no formal river discharges) as all waters within design event criteria are retained onsite (refer Section 6 for details on multiple-level onsite retention measures (including flood bunding) in addition to sediment basins). This is consistent with approved EA commitments.

4.7. Indirect water transfers and losses

4.7.1. Evaporation Losses from Dams

Evaporation losses are primarily applicable to surface water storages. The vast majority of available water sources for the site are provided by licenced extraction from the river or licenced groundwater extraction bores (as detailed in Section 4.3) As such, the only surface water storages on Lots 32 and 22 relate to sediment dams and the terminal pond which will remain in the final landform.

Daily evaporation statistics from the nearest Bureau of Meteorology (BOM) weather station regularly recording pan evaporation have been sourced from BOM Station #067019 at Prospect Dam (81m AHD, recorded daily since 1965). Mean monthly pan evaporation rates from over 44 years of available evaporation records at the station are provided in **Table 3** below. Table 3 also provides and compares mean rainfall records from the nearest BOM rainfall station (Camden Airport AWS Station# 68192, 74m AHD, <1.5km from the site, providing over 42 years of daily rainfall records).

Table 3: Comparison of Available Evaporation and Rainfall Data (BOM statistics as at April 2017)

	Mean Rainfall and Pan Evaporation Data (mm)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Pan Evap (mm)	167.4 (5.4)	123.2 (4.7)	120.9 (3.9)	87 (2.9)	62 (2.0)	48 (1.6)	52.7 (1.7)	77.5 (2.5)	105 (3.5)	136.4 (4.4)	150.0 (5.0)	173.6 (5.6)	1,314 (3.6)
Mean Rainfall (mm)	80.6	96.8	90.6	69.2	54.6	67.0	37.0	42.1	39.2	61.0	76.2	57.1	792.4

Median Rainfall (mm)	60.8	76.5	65.6	39.9	36.6	40.6	25.8	20.4	34.4	39.8	70.5	41.2	813.4
Dry Year Rainfall (10%ile)	19.3	20.7	25.5	10.3	5.6	7.2	7.8	4.6	7.4	9.0	13.2	18.0	502.6
Wet Year Rainfall (90%ile)	169.9	253.0	171.4	146.9	125.0	167.0	73.0	96.9	70.2	152.9	148.2	107.2	1060.3

Note: Values in italics and brackets represent daily statistics

Table 3 shows evaporation rates on average typically exceed rainfall on both a monthly and annual basis. This further illustrates the site's primary reliance on licenced water extraction directly from the river and groundwater bores rather than storing rainfall runoff (as detailed earlier in Section 4.3 and 4.4).

Subsequently, detailed calculation of evaporation losses from temporary sediment dams which are not relied upon for water supply in the water balance (refer Section 4.3) is not considered necessary. Notwithstanding this, annual average evaporation loss for the terminal pond (which will remain permanently in the final landform) are expected to significantly exceed the 1.3ML MHRDC source contribution listed in Table 1 (see Section 4.3). Accordingly annual evaporative losses from the terminal pond are applied equivalently as 1.3ML.

4.7.2. Evaporation Loses Environmental and Rehabilitation

As per Table 2 in the water supply balance, 16ML is allocated for environmental and Rehabilitation purposes on Lots 32 and 22. Dust suppression is conducted on haul roads, processing area and establishment of new plantings in rehabilitation areas. The site water cart has a 15,000 litre tank capacity; conducting a maximum four loads per day to Lots 32 and 22 or 15.84ML worst case scenario. This is within the allocated offsite water use and accordingly annual evaporation losses from environmental (dust suppression) and rehabilitation are applied equivalently at 16ML.

4.7.3. Exported Water in Saleable Product

Materials extracted from Lots 22 and 32 have no application of water other than environmental factors (rain). Water leaving site via sold material products (not applicable to consent conditions on Lot 1) variable based on climatic conditions and operational throughput, and will be estimated on recorded average material moisture content and tonnages leaving the site. Key products exported from the site containing water include sand and soil.

Materials which remain onsite (eg overburden) or which are imported and on-sold (eg VENM/ENM) are not applicable (no site water transferred offsite) and subsequently is excluded. Estimated water exported from the site in material products during 2016 operations and for maximum approved throughput scenarios is presented in **Table 4**. Conservatively *maximum* acceptable commercial product moisture limits have been applied to *all* throughput tonnages throughout the year (no change from month to month with climate).

The maximum production rates of 300,000 tonnes per annum has been assumed for sand/soil as per actual recorded portions in 2016 throughputs (i.e. approximately 2/3 sand to soil ratio).

From Table 4 it can be seen that, conservatively, up to ~20.2ML/year of water may be exported within product materials from the site.

Table 4: Estimated Water Volumes Exported in Sold Product

Saleable Product	Typical Maximum Moisture Content	Approved Operations			2016 Operations		
		Maximum Throughput	Estimated Exported Water Content		Extracted Tonnage (2016)	Estimated Exported Water Content	
Type	(%)	Tonnes/Yr	Tonnes/yr	ML/yr	Tonnes/yr	Tonnes/yr	ML/yr
Sand	5*	213,555**	10,678	10.68	66,842	3,342.1	3.34
Soil	11*	86,445*	9,509	9.51	27,056	2,976.2	2.98
Totals		300,000	20,187	20.19	93,898	6,318.3	6.32

* Product moisture content is highly variable due to climatic conditions. Typical commercial maximums have been used in Table 4 above. Recorded moisture contents will be reported in the AEMR/Annual Review and will typically be below these values and result in lower annual water loss.

** Total sand/soil approved combined throughput is 300,000 tonnes per annum (no set split for sand/soil). For table estimation purposes only, sand/soil breakdown has been apportioned as per 2016 recorded production.

4.7.4. Dam Seepage Losses

Indicative estimate of dam seepage loss (m^3/day) is determined using Darcy's Law as follows:

$$Q_s = K.A.h, \text{ where:}$$

Q_s = dam seepage (volumetric discharge)

K = dam floor hydraulic conductivity A

= dam cross sectional area h =

hydraulic head gradient

Due to the progressive nature of extraction across the site, sediment dams are typically constructed within reclaimed quarried area behind the advancing face in clay backfill material. The following conservative parameter assumptions are applied:

- hydraulic conductivity for machine shaped uncompacted clay floor, periodically exposed to drying ($K=0.009\text{m/day}$, 100x typical value for compacted clay); and
- assume sediment dam is maintained at *maximum* depth in determining average hydraulic gradient (in practice, water levels may be regularly much lower to maintain required capacity for 5 day settlement zone design requirements, or even dry depending on significant evaporation effects as detailed in Section 4.7.1 above, in which case seepage is negligible to zero).

MHRDC contributions from the Terminal Pond (which will remain in the final landform) have been listed as a source in the water balance, and accordingly seepage losses have been determined for this dam. **Table 5** shows that under the above conservative assumptions, up to approximately 3.7 ML/yr could seep from the floor of the terminal pond (when not exceeded by evaporation). As noted in Section 4.3, temporary sediment dams for water quality management are not been relied upon as a water source in the water balance. Accordingly seepage losses have not been included for these dams.

It is also noted that general surface water runoff and infiltration losses (separate to dam seepage) are already considered within runoff coefficients used to determine sediment dam storages and do not require further consideration.

Table 5: Conservative Estimate of Terminal Pond Seepage Loss

Parameter	Terminal Pond (1.3ML)
Hydraulic Conductivity (m/day)	0.009
Hydraulic gradient	1.5
Dam surface area (m ²)	1000
Estimated seepage loss (m ³ /day)	13.5
Estimated seepage loss (ML/day)	0.014
Seepage loss (ML/yr)	4.9

4.8. Reporting procedures.

Water use records for water pumped from the Nepean River and groundwater are maintained onsite and are made available to the NSW Department of Industries, as requested, as per the water licence conditions.

4.9. Measures to minimise water use by the development

Water use is to be minimised by the following measures:

- Avoid over-application of water;
- Monitoring of the application of water to minimise run-off;
- Minimise the area of exposed surfaces; and
- Apply water on an as-needed basis.

4.10. Conclusion

Details of water sources, uses and losses from the site water balance are provided in Sections 4.3-4.7. As noted within these, certain variable aspects (including product water losses) will be reported annually within the AEMR/Annual Review. **Table 6** provides a summary of the annual average water balance.

Table 6: Summary of Annual Average Water Balance

Total Sources (refer Section 4.3)	Total Usage (refer s4.4)	Direct Water Transfers (refer s4.6)	Total Indirect Transfers and Losses (refer Section 4.7)	Total Sinks (Usage, Transfer, Losses)	Net Annual Average Water Balance (Sources – Sinks)
390.3 ML/yr	271* ML/yr	Nil	42.4ML (16 +20.2+1.3+4.9)	297.4 ML max 181.4 ML min*	Significant Surplus
					(92.9 ML min, 208.9 ML max*)

* Value for all permissible activities employed at the site. 116ML allocated to agricultural use is not currently employed as at April 2017, providing further surplus redundancy to the current water balance. Refer Section 4.4 for details.

Accordingly, with regard to site water balance it is concluded that:

- Ample water is available for the operations
- Provision of the water for this facility is consistent with the objectives of the Water Management Act (2000).

5. GROUNDWATER ASSESSMENT AND MANAGEMENT

5.1. Literature review

5.1.1. Regional groundwater regime

Douglas Partners (2004) performed a groundwater assessment for the Menangle Park Urban Release area, located in the Camden South area and Harvest Scientific Services Pty Ltd (2010) performed a groundwater assessment for a proposed sand and soil extraction operation located at Menangle Park (approximately 2-3 kilometres up-stream from the project site). Both study areas were located within a similar hydro-geological setting to the project site and both studies identified two distinct groundwater settings in the local area, which may be described as follows:

- Groundwater within unconsolidated Quaternary deposits of the Nepean River flood plain; and
- Groundwater within Wianamatta Group shales.

5.1.2. Unconsolidated sediments

The extraction is located within Quaternary Alluvium sediments associated with the Nepean River (Sherwin and Holmes, 1982). Groundwater flow in these sediments is dominated by porous flow in sandy horizons (Douglas Partners, 2004) and this groundwater regime may be further categorised based upon the following two groundwater regimes:

- **Permanent sediment hosted groundwater.** This is the deeper sediment hosted groundwater regime that is directly connected to the Nepean River. This groundwater regime is bound at its base by relatively impermeable clay and shale associated with underlying bedrock. Groundwater within this regime is free flowing and cannot be drained.

This groundwater regime is not proposed to be intercepted during the extraction. This groundwater regime is protected by the provision of an appropriate buffer distance between extraction activities and the groundwater.

- **Perched sediment hosted groundwater.** This is shallower and intermittently sediment hosted groundwater. Groundwater within this regime may be derived from either accumulation above minor layers of relatively impermeable sediments and/or seepage from recent infiltration of rainwater. This groundwater regime is typically characterised minor seepage when intercepted rather than free flowing groundwater. This groundwater regime typically contains a low salinity content.

The potential for this groundwater regime to exist within the investigation area was further assessed in the form of a field assessment (refer to Section 4.2 of this report for further details) and no evidence of perched or intermittent sediment hosted groundwater was identified within the investigation area.

5.1.3. Shale landscape groundwater regime

McNally (2005) describes some general features of the hydrogeology of Western Sydney which are relevant to the site. The shale terrain of much of Western Sydney is known for saline groundwater, resulting either from the release of connate salt in shales of marine origin or from the accumulation of windblown sea salt.

This salt is concentrated by evapo-transpiration and often reaches highest concentrations in the B-horizon of residual soils.

McNally (2005) identified groundwater in the shale system to have the following general features:

- Shales are likely to have a very low intrinsic permeability and groundwater flow is likely to be dominated by fractured flow with a resultant low yield (typically < 1 L/s);
- Seasonal groundwater level changes of 1-2 m can occur in a shallow regolith aquifer or a deeper shale aquifer due to natural influences;
- Groundwater is likely to be hard saline water, with Total Dissolved Solids (TDS) typically in the range 4000–5000 mg/L, but with some cases of TDS up to 31750 mg/L have been reported; and
- The dominant ions are typically sodium and chloride and the water is generally unsuitable for livestock or irrigation.

Shales were identified to have a low intrinsic permeability and groundwater flow is likely to be dominated by fractured flow. Given that only quaternary sediments are to be extracted as part of the extraction, the deeper shale groundwater regime will not be impacted upon by the extraction.

5.1.4. Nearby groundwater bores

Based on a review of records held by the NSW DPIW, the location of the nearby groundwater bores is presented on Figure 5. Details of each bore is summarised in Table 7.

Bores GW110586 and GW110587 are the closest bores to the extraction area and both are under the control of MCS. The standing water level in GW110587 is at 10.9 metres below ground level and will not be impacted upon by the extraction activities.

GW110586 is located in alluvial sediments approximately 1 kilometre away from the extraction area and is located sufficiently far away to not be impacted upon by the extraction.

Table 7. Summary of nearby groundwater bores. Data supplied by the NSW DPIW.

Groundwater ID	Authorised purpose	Property	Standing water level (m)	Water bearing zones (m)
GW110586	Industrial – Sand and gravel, Irrigation	M Collins and Sons (Holdings) Pty Ltd	4.13	4.13 - 20.0
GW110587	Industrial – Sand and gravel, Irrigation	Spring Farm	10.90	10.90 - 24.0
GW026239	Irrigation	N/A	-	14.6 - 22.80
GW026523	Irrigation	N/A	-	17.3 - 21.20
GW108624	Domestic	Moushigian	22.0	120 - 120.25
GW026533	Irrigation / stock	N/A	-	17.3 - 21.20
GW100329	Domestic stock	Clinton	-	9.0 - 10.0 29.0 - 31.0
GW106446	Domestic	Neich	21	109 - 109.15 132 - 132.25



Figure 5. Nearby groundwater bores. Source NSW DPIW (2012).

5.1.5. Review of local groundwater regime and monitoring

M.P.A. Williams and Associated (1995) consulting geotechnical engineers prepared a detailed groundwater assessment for the adjacent soil pit located on Lot 22 DP 833317 in 1995. That assessment included a review of a separate groundwater assessment by **Johnstone Environmental Technology Pty Ltd (1995)** and historical test-pit and groundwater logs by **Longworth and McKenzies (1977)**.

With regard to groundwater conditions of the site, the assessment found the following:

- Boreholes within the extraction pit but close to the Nepean River penetrated to a depth of up to 18 metres and at this depth fine to medium grained silty sand was present. These results suggest that close to the Nepean River, Quaternary deposits occur at a depth at least equal to the present river bed levels.
- Water is held in the Anabranh by low permeability underlying clays. As a result of the clays, shallow groundwater (~6 to 7 metres below ground level at the time of that assessment) occurs in the near vicinity to the Anabranh. Seepage losses through the clays associated with the Anabranh is likely to be very low, and it is probable that the major mechanism for water loss from the Anabranh is evaporation.
- The localised water table associated with the Anabranh falls away sharply to the west of the Anabranh (i.e. toward the Nepean River) and did not influence the area containing sands and silty clays where extraction was proposed and is now currently in progress.

- In the area of extraction (i.e. the sands and silty clays in the area between the Anabran and the Nepean River), the watertable is likely to be a reflection of the river level. This is due to the likely connectivity of the Quaternary deposits with the present day river bed levels.

5.1.6. Historical groundwater monitoring

Groundwater has historically been monitored at an existing groundwater monitoring bore (GW 1 - Figure 5) on a monthly basis by Harvest Scientific Services Pty Ltd since March 2009. The groundwater bore is located immediately to the west of the Anabran and on the southern border of the area of extraction.

Groundwater monitoring results to date are summarised in **Table 8**.

Table 8. Summary of historical (since March 2009) groundwater monitoring data

Parameter	Depth to water table ¹ (m)	EC ¹ (uS/cm)	pH (4.0 – 6.5) Moderately Acidic	Salinity category ²
Minimum	10.77	359	4.30	Medium salinity (280-800 uS/cm)
Maximum	11.69	952	6.20	
Average	11.37	653	4.98	

Notes:

- 1) EC, pH and groundwater depth values presented in this table represent a summary of 85 samples collected on a monthly basis from March 2009 until April 2016
- 2) Medium salinity (280-800 uS/cm). This water can be used for irrigation purposes if moderate leaching occurs. Plants with medium salt tolerance can be grown, usually without special measures for salinity control. Sprinkler irrigation with the more-saline waters in this group may cause leaf scorch on salt sensitive crops, especially at high temperatures in the daytime and with low application rates (Based on Table 5.6 of the Australian and New Zealand Environment and Conservation Council (ANZECC) 1992 Australian Water Quality Guidelines for Fresh and Marine Waters).

Based on historical groundwater monitoring (**Table 8**), groundwater is approximately 10.77 to 11.69 metres below the natural ground surface at this location.

5.2. Groundwater assessment

The site is located immediately adjacent to the study area of M.P.A. Williams and Associates (1995) and local geological mapping indicates that the geological environment within both study areas is similar. Accordingly, a groundwater assessment was undertaken on the site to investigate the local groundwater regime in the context of the interpretation by M.P.A. Williams and Associates (1995).

5.2.1. Objectives

The objectives of the investigation were to:

- identify the likely groundwater impacts;
- provide a schematic representation of the local sediment hosted groundwater regime in the context of the extraction; and
- provide groundwater management recommendations to mitigate any potential groundwater impacts.

5.2.2. Methodology

The assessment consisted of the following:

- Testing pitting at 6 locations within the investigation area. Soil profile logs are appended as Appendix 1 and test-pit locations are depicted on Figure 6;
- Installation of 3 paired piezometers (by SMEC 2011) to a total depth of 9.5 meters along the northern boundary of the extraction area. Measurement of groundwater depth by Harvest Scientific Services Pty Ltd. These piezometers are depicted as Location 1 (BH1 and BH2), Location 2 (BH3 and BH4) and Location 3 (BH5 and BH6) on Figure 6. Profile logs are appended as Appendix 1;
- a visual inspection of the existing operational quarry pit on Lot 22 DP 833317; and
- Interpretation of the field observations in the context of the existing literature relevant to the local groundwater and geological regime.

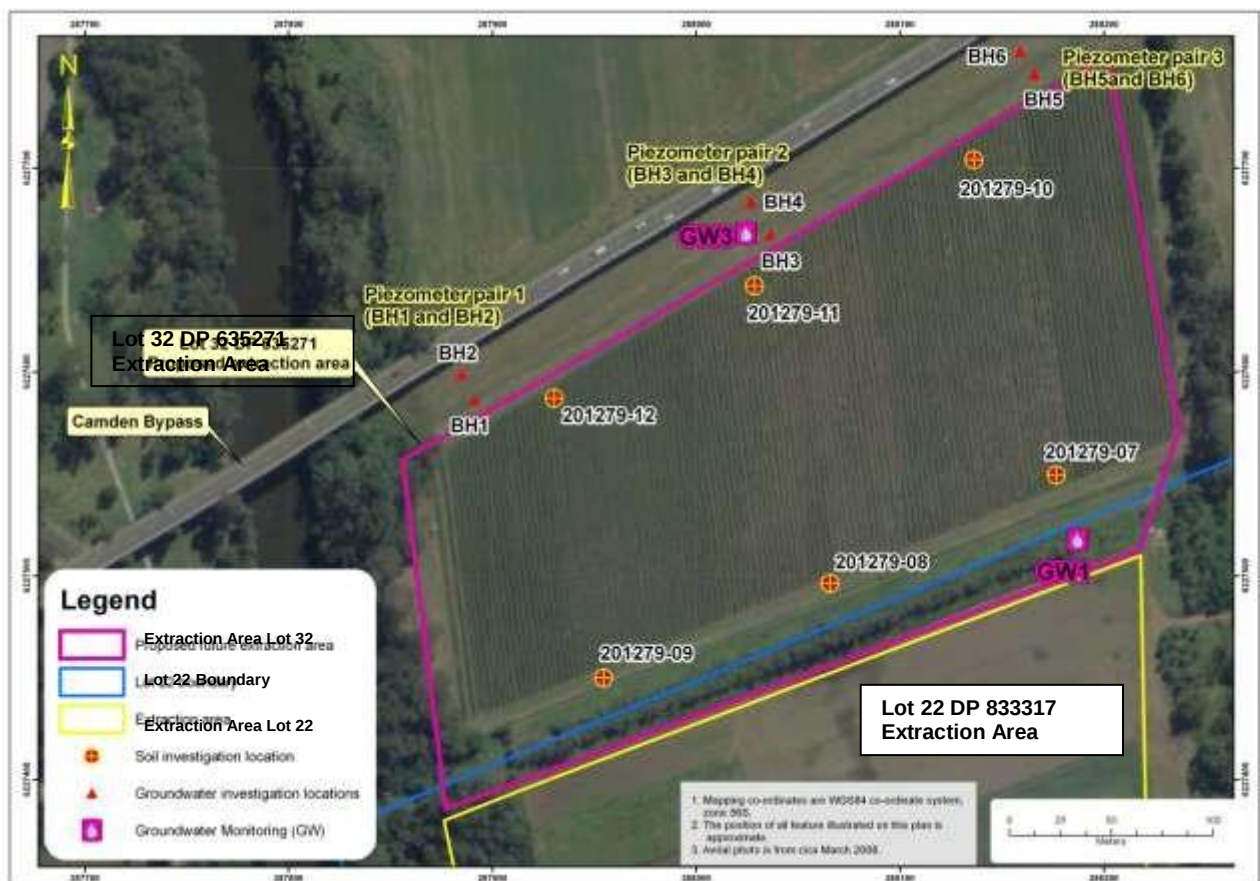


Figure 6. Groundwater investigation locations

5.2.3. Results

The assessment found the following:

Test-pitting

- Groundwater was not identified within any of the 6 soil test-pits that were excavated to approximately 5.5 to 6 metres below ground level (Appendix 1). Some moisture was noted at location 201279-10 but this moisture was not free flowing or seepage.

Piezometers BH1, BH2, BH3, BH4, BH5 and BH6 (Figure 6)

□ Groundwater depth within the 3 paired piezometers is summarised in Table 9. Measurements recorded on 23 November 2011 were after an extended period of heavy rain and no irrigation in the adjacent Lucerne paddock. At location 1 (BH1, BH2) and BH6 groundwater was greater than 9.1 metres. At locations BH3 and BH4 groundwater was at approximately 9 metres below ground level during both measurements. Groundwater levels within BH5 were at 6.7metres on 18 November 2011 and had dropped to 6.9 metres on 23 November 2011, indicating that the groundwater was draining away. The second reading on the 23 November also followed an extended period of heavy rain. The observation of groundwater draining away is inconsistent with the typical process of groundwater recharge from rain. It is also inconsistent with the observed groundwater depth in the adjacent piezometer at location BH5 being greater than 9.1m below ground level. It is considered that the likely source of the groundwater in BH6 is a leaking pipe within the Lucerne paddock and the observed drop in groundwater levels is a direct result of the irrigation pump being turned off during the extended period of heavy rain and is not a result of a natural process.

Table 9. Summary of groundwater depth at locations BH1 to BH6.

Location	Piezometer	Depth to groundwater (m)	
		18/11/2011	23/11/2011
1	BH1	>9.1	>9.1
	BH2	>9.1	>9.1
2	BH3	>9.1	~8.9
	BH4	~8.9	~8.9
3	BH5	~6.7	~6.9
	BH6	>9.1	>9.1

Visual observations in the quarry pit

- No seepage was observed within the walls of the quarry pit.
- No significant seepage has been encountered within the walls of the adjacent quarry pit during extraction operations to-date.
- The quarry floor is firm and vehicles are able to move freely within the quarry floor.

5.2.4. Summary of findings

The findings of the assessment are interpreted schematically on Figure 7. In summary, groundwater levels are inferred to be approximately 4 to 6 metres below the final landform and are therefore not considered

to pose a constraint to the extraction. This inferred buffer distance to groundwater is considered to be adequate for the protection of ground water. It is considered that:

- The extraction will not have an adverse impact on the local groundwater regime;
- Licensing/approval from the NSW Department of Primary Industries (DPI) is not required for the draining of groundwater as it is not anticipated that groundwater will be drained as part of the extraction; and
- The extraction is consistent with the objectives of the Water Management Act (2000).

5.2.5. Management Commitments

MCS has committed to the following actions with regard to groundwater controls. These are outlined as follows:

- **Maintenance of 1m vertical buffer distance.** During active extraction, a buffer distance of 1 metre is maintained between the base of the quarry floor and the permanent groundwater horizon. The purpose of the buffer is to ensure adequate protection of groundwater. This buffer is based upon accepted practice on adjacent operations.

If, during active extraction, the permanent groundwater is inadvertently intercepted (as indicated by free flowing groundwater), the quarry floor is back-filled to provide a 1 metre buffer between the operational surface and groundwater.

- **Monitoring.** Daily inspections of extraction holes and monthly site inspections are conducted to monitor and report for seepages/inflows within the quarry pit. Groundwater depth and salinity levels continue to be monitored as per the protocol outlined in Table 10 of this report.

Table 10. Summary groundwater monitoring protocol.

Aspect (Location)	Parameters measured	Method	Frequency
Groundwater (GW 1 – Figure 6)	Electrical conductivity Groundwater level (cm) below ground level (bgl). pH range of acids	Field EC meter.	Monthly
		pH	Monthly
Quarry pit floor	Water Seepage / Inflow Volume, flow seepage rate, source	Visual inspection Investigate water inflow source and irrigation main lines Investigate water main lines on adjoining property	Daily Daily, Report Monthly

The existing Water Licence for location GW1 permits both environmental monitoring and pumping for irrigation and industrial purposes. If in the event that GW1 (Figure 6) is to be utilized for irrigation purposes and industrial purposes and a bore pump is installed, groundwater monitoring should be transferred to a location as indicated by GW3. A permit issued by DPIW will be required for this

purpose. Trigger values to be used for further investigation groundwater monitoring results are outlined in Table 11.

Table 11. Trigger values for further investigation

Location	EC (uS/cm)	pH	Depth to water table (m)
Groundwater bore	> 800 uS/cm	<4.0 – >6.5	Depth < 5.83 Depth > 15.93

Notes:

- Trigger values for EC represents a change in the salinity class from 'Medium Salinity' to 'High Salinity', as defined by the Australian Water Quality Guidelines for Fresh and Marine Waters;
- Trigger values for depth to groundwater represent a nominal 5m variation; and
- It is noted that if the trigger values are achieved then causal factors will be investigated, it does not necessarily mean that the quarry operation has had a negative impact as the variation may be a natural occurrence or caused by other factors.
- Trigger values for pH represents a change from acidic to neutral to basic.

Investigations will be implemented for all exceedance outside of the trigger ranges of potential adverse groundwater impacts including;

- Review of existing results for possible factors or gradual changes,
- Review of site practices and weather conditions for possible impact,
- Request results from neighbouring local Nepean River bore and conduct tests from additional site bore GW3 (Figure 6) / Bore Pump Lot 1 (GW 110586 –Figure 5),
- Additional external monitoring frequency,
- Ongoing monitoring as per management plan for pattern,
- External consultants engaged if required,
- Review of existing trigger values and management plan if required.

6. EROSION AND SEDIMENT CONTROL PLAN (ESCP)

6.1. Erosion and sediment control guidelines

This ESCP has also been prepared with reference to the following documents:

- Managing Urban Stormwater, Soils and Construction (the 'Blue Book'), 4th Edition. NSW Department of Housing 2004 (Landcom); and
- Managing Urban Stormwater, Soils and Construction, Volume 2E Mines and quarries. Department of Environment and Climate Change (DECC) 2008.

6.2. Objectives of this ESCP

The principle objectives of the ESCP are set out below.

- To minimise erosion and sedimentation from all active and rehabilitated areas, thereby minimising sediment ingress into surrounding surface waters;
- To ensure the segregation of 'dirty' water from 'clean' water, and maximise the retention time of 'dirty' water such that any discharge from the project site meets the relevant water-quality limits, including limits contained in relevant guidelines and any limits imposed by specific project approvals. 'Dirty' water is defined as surface runoff from disturbed catchments (e.g. active areas of disturbance, sand and soil stockpiles and rehabilitated areas (until stabilised)). 'Clean' water is defined as surface runoff from catchments that are undisturbed or relatively undisturbed by project-related activities and rehabilitated catchments;
- To minimise the volume of water discharged from the project site, however, should the discharge of water prove necessary, ensure sufficient settlement time is provided prior to discharge such that suspended sediment within the water meets the objectives of this ESCP;
- To ensure sustainable long-term surface water features are established following rehabilitation of the site, including implementation of an effective revegetation and maintenance program; and
- To monitor the effectiveness of surface water and sediment controls and to ensure all relevant surface-water quality criteria are met.

The principle design aspect of the project is the prevention of 'clean' water in surface water sheet flows entering the active disturbance area. This will be achieved through the use of perimeter bunding (earth mounds), as well as the containment of 'dirty' water in sediment control structures within the active areas of the project to minimise any uncontrolled runoff.

6.3. Potential sources of contaminated surface waters ('dirty water') during extraction

Sources of potentially contaminated water ('dirty water') are summarised in **Table 12** and the location of these features is depicted on **Figures 2, 3 and 4**. These potential contaminant sources are to be managed by the 'Erosion and Sediment Controls (ECPs) outlined in this ESCP.

Table 12. Summary of potential contaminant sources.

Source	Comments
1. Active extraction pit	Potential soil erosion and sediment losses during rain events. Assumed maximum exposed area = 5 hectare
2. Rehabilitation area/s	Potential soil erosion and sediment losses during rain events until rehabilitated.
3. Internal haul road/s	Potential sediment losses during rain events.
4. Tailings emplacement area.	Potential sediment losses during rain events until rehabilitated.
5. River bank	Potential Soil erosion during flooding and rain events.
6. Water Supply line breakage	Potential soil erosion and generation of sediment

6.4. Erosion and sediment controls – operational safeguards

The Erosion and Sediment Controls (ESCs) implemented onsite are summarised in the following sections of this report. The location of these ESC's is depicted on Figure 8.

6.4.1. ESC 1 - Perimeter bund – all extraction cells

A 'Perimeter Bund' is constructed around the active extraction cell and tailings emplacement areas, thus forming an enclosed internal catchment around these disturbed areas. These bunds are dual purpose in that they will divert clean surface run-off waters around the active extraction pits and act as a catch drain to prevent the loss of surface waters without treatment.

Construction of the perimeter bund is formed as the first activity to occur on the extraction cell and or tailings emplacement areas, and prior to any extraction or tailings emplacement taking place. The bund is constructed from topsoil stripped from the subject extraction cell.

The topsoil perimeter bund have a minimum height of 1m and base width of 4m with batter slope grades of 2H:1V. Stripped topsoil includes existing grass runners which will quickly stabilise the bund. Additional seeding with a mix of sterile grasses such as 'Wimmera Rye' and 'Japanese Millet' is to be undertaken if deemed necessary by the EMR.

6.4.2. ESC 2 - Sediment basins

Dirty surface waters from each active extraction cell and areas actively undergoing rehabilitation will be treated by a localised sediment basin. Each sediment basin is to have a volume of 588 cubic meters (500m³ sedimentation volume + 88 m³ storage volume – Table 13) for each hectare of up-slope surface water collected.

Sediment basins sizes are based on the calculations outlined Appendix 3 of this report.

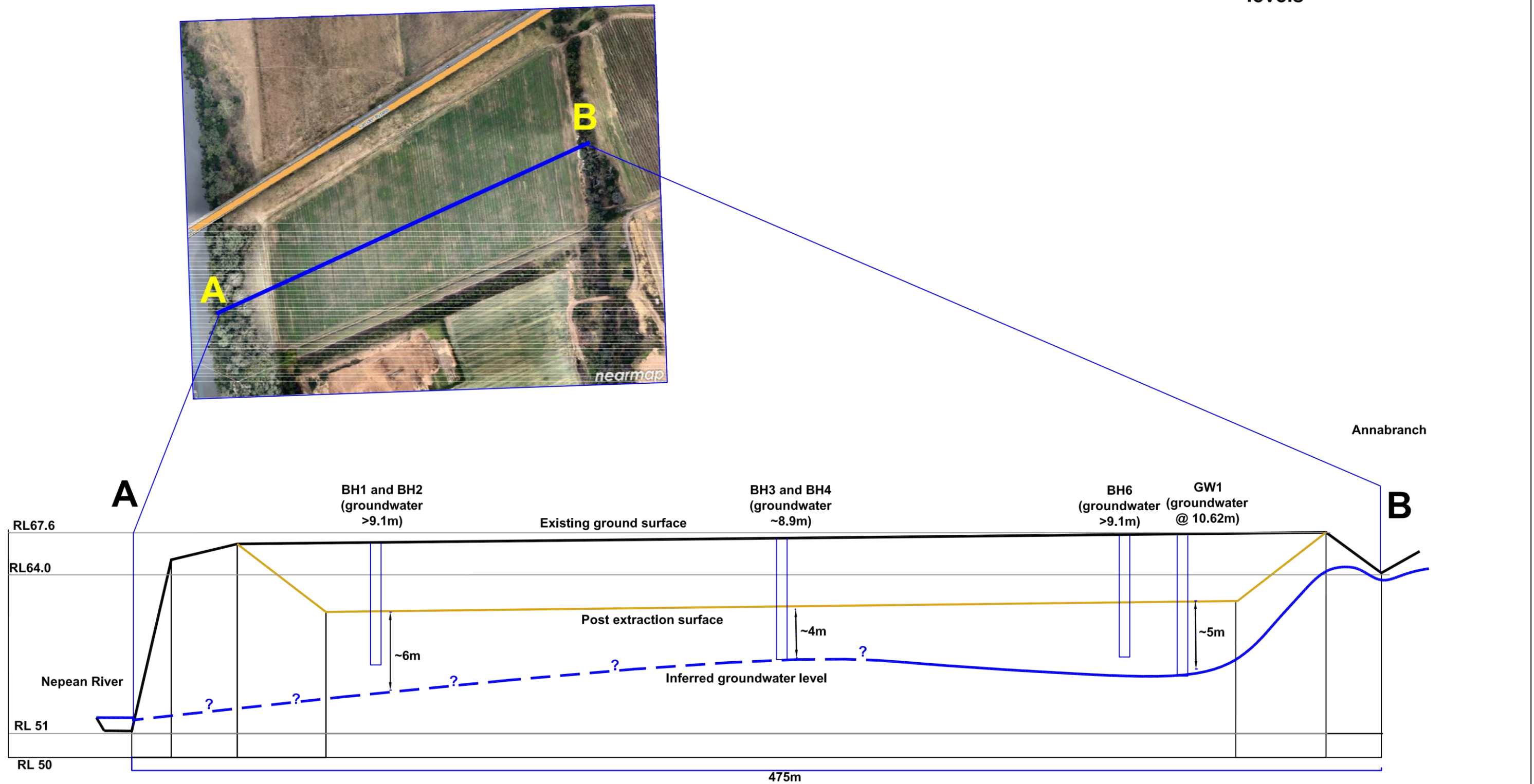
Table 13. Summary of sediment basin properties – refer to Figure 7 for location details.

Site component	Minimum sediment basin volume (m ³) per ha of disturbed land (inc. sediment storage).	Minimum sediment storage volume (m ³)	Comments
Active extraction area	500	88	To be constructed in accordance with Appendix 4 . Overflow from sediment basin is to be discharged to the ground surface via a level spreader.
Areas subject to rehabilitation.	500	88	To be constructed in accordance with Appendix 4 . Overflow from sediment basin is to be discharged to the ground surface via a level spreader.
Tailings emplacement area	500	88	Existing sediment basin is to be utilized. To be constructed in accordance with Appendix 4 . Overflow from sediment basin is to be discharged to the ground surface via a level spreader.

Sediment basins are managed subject to the following controls:

- Flocculants are added if deemed necessary by the EMR and on an as-needed basis.
- Each basin is constructed as per the blue book – see Appendix 4.
- Basins are maintained so that the minimum required storage volume is achieved within 5 days of a storm event. This is achieved by either over-sizing the basins and re-use of water onsite for irrigation and dust suppression measures.
- Sediment is removed as necessary to ensure that the minimum sediment storage volume is achieved at all times.

Figure 7
Schematic site long section
and inferred groundwater
levels



LEGEND

Notes:
 1. The position of all features on this plan is approximate;
 2. Aerial photo is from 16/02/2011:

Horizontal scale 1:1500 at A3					
Designed by JC	Checked by JC	Date Drawn 16/02/2012	Job No 201279	Filename	Lot No
Consultants HARVEST			Project M Collins Sand and Soil EIA		

ESC 1. Perimeter bund.

A 'Perimeter Bund' will be constructed around the active extraction cell and tailings emplacement areas, thus forming an enclosed internal catchment around these disturbed areas. These bunds are to be dual purpose in that they will divert clean surface run-off waters around the active extraction pits and act as a catch drain to prevent the loss of surface waters without treatment.

Construction of the perimeter bund will be formed as the first activity to occur on the extraction cell and or tailings emplacement areas, and prior to any extraction or tailings emplacement taking place. The bund will be constructed from topsoil stripped from the subject extraction cell.

The topsoil perimeter bund will have a minimum height of 1m and base width of 4m with batter slope grades of 2H:1V. Stripped topsoil will include existing grass runners which will quickly stabilise the bund. Additional seeding with a mix of sterile grasses such as 'Wimmera Rye' and 'Japanese Millet' is to be undertaken if deemed necessary by the EMR.

ESC 2. Sediment basins.

Dirty surface waters from each active extraction cell, areas actively undergoing rehabilitation and the tailings emplacement area will be treated by a localised sediment basin. Each sediment basin is to have a volume of 588 cubic meters (500m3 sedimentation volume + 88 m3 storage volume - **Table 9**) for each hectare of up-slope surface water collected.

Sediment basins are to be managed subject to the following controls:

- Flocculants may be added if deemed necessary by the EMR and on an as-needed basis.
- Each basin is to be constructed as per the blue book - see **Appendix 2**.
- Basins are to be maintained so that the minimum required storage volume is achieved within 5 days of a storm event. This may be achieved by either over-sizing the basins and re-use of water onsite for irrigation and dust suppression measures.
- Sediment is to be removed as necessary to ensure that the minimum sediment storage volume is achieved at all times.

ESC 3. Sedimentation terminal pond.

All surface water from the development site is to be collected via a sedimentation terminal pond. The volume of the sedimentation pond is to be at 1,300m3. The terminal pond is to be located at the location depicted on **Figure 3** and is to be retained at the completion of works as a long-term water quality management structure. Water from the sedimentation terminal pond is to be discharged via a 5 metre wide grassed swale.

The sedimentation terminal pond is to be managed subject to the following controls:

- Flocculants may be added if deemed necessary by the EMR and on an as-needed basis.
- The terminal pond is to be constructed as per the blue book - see **Appendix 2**.

Sediment is to be removed as necessary to ensure that the minimum sediment storage volume is achieved at all times.

LEGEND

- High bank of Nepean River
- Proposed fence line
- Proposed plantings
- Powerpole
- Catch drain
- Intermittent drainage line
- Sediment basin
- Existing vegetation associated with the dry river anabranch located on Lot 32
- Riparian vegetation on Lot 32 associated with the Nepean River
- Past re-vegetation area/s (with weed infestation)
- High resilience natural vegetation GCB (2008)
- Medium resilience natural vegetation GCB (2008) (with weed infestation)
- Sand wash plant
- Soil processing and handling area
- Scarcely vegetated area
- Screen plantings
- Area used for turf farming (Lot 22) and former vineyard (Lot 32)
- Active extraction area (November 2009)
- Existing internal fence-line
- Property boundary
- Proposed extraction boundary (Lot 32)
- Approved extraction boundary - NDM 22/05/2009
- Aboveground powerlines

Drainage pathway from Lot 32 to Lot 22

ESC 4. Grass swales

All surface water from extraction areas are to be collected via a grass swale that drains direction into sedimentation terminal pond (ESC 3).

Discharge waters from ESC 3 sedimentation terminal pond are to be discharged via a grass swale and directed around the embankment that is to host the existing electricity poles.

All surface water from the tailings emplacement areas are to be collected via a grass swale and diverted to the associated sediment basin (ESC 2).

ESC 2. Sediment basins (SB).

Dirty surface waters from each active extraction cell, areas actively undergoing rehabilitation and the tailings emplacement area will be treated by a localised sediment basin. Each sediment basin is to have a volume of 588 cubic meters (500m3 sedimentation volume + 88 m3 storage volume - **Table 9**) for each hectare of up-slope surface water collected.

This existing sediment basin is to be managed as per the WM and ESCP dated 10/02/2010 for the existing facility.

Figure 8
Erosion and sediment control plan

ESC 5. Sequence of works.

Extraction is to be subject to the following controls:

- Before any work commences ensure plans are on hand and all equipment and materials likely to be required are available for use;
- Install sediment fencing where there is a risk of soil loss;
- Construct **ESC 3 Sedimentation Terminal Pond** at the first stage of construction. As extraction progresses, divert all surface water from the entire extraction area to **ESC 3** via constructed grassed swales (**ESC 4**).
- Construct sediment basins for the subject cell and perimeter bunds for the subject cell prior to extraction of the cell. Divert internal runoff to the sediment basin via construction of earth bunds;
- Ensure slopes of embankments (batters) are stable to prevent collapse of banks during operations; and
- Areas containing planted vegetation and grasses (such as bunds) are to be watered regularly and monitored until an effective cover has been properly established.

Tailings emplacement is to be subject to the following controls:

- Before any work commences ensure plans are on hand and all equipment and materials likely to be required are available for use;
- Install sediment fencing where there is a risk of soil loss;
- Construct **ESC 2 Sediment basin** at the first stage of construction. As tailings placement progresses, divert all surface water from the new emplacement area via a constructed grassed swale/s (**ESC 4**).
- Construct sediment basins for the subject cell and perimeter bunds for the subject cell prior to tailings emplacement with the cell. Divert internal runoff to the sediment basin via construction of earth bunds;
- Ensure slopes of embankments (batters) are stabilised; and

Areas containing planted vegetation and grasses (such as bunds) are to be watered regularly and monitored until an effective cover has been properly established.

ESC 6. Other controls

Details of the various controls required are outlined below.

- Sediment fencing will be installed at locations down-slope of disturbed areas where there is a risk of sediment losses;
- Install straw bale filters in areas of concentrated flows (i.e. within grassed swales).
- Access for contractor vehicles and equipment during construction of basins and bunds is to be restricted to a defined path;
- Vehicles will exit the site via a wheel wash; and

Grass Filter strips (preferably at least 5 metres wide) of retained vegetation are to be maintained where possible on the down-slope side sediment basins, bund construction activities and roads.

ESC 7. Site monitoring and maintenance

The Environmental Management Representative (EMR) or nominated person is expected to inspect the site each work day, paying particular attention to:

- Ensuring that bunds and basins are operating effectively (i.e. no breaching), and carry out any necessary repairs;
- Removal of trapped sediment from sediment basins, sediment fences, bunds and other structures. Remove sediment from basins when their capacity is reduced by 30% and spread this sediment over rehabilitating areas (upslope of basin). Flocculant can be used on basins if required, apply gypsum evenly over water surface at a rate of 0.32kg/cubic metre of water; and
- Any remedial works carried out on sedimentation control structures and any diminished sediment retention basin capacity will be noted by the EMR in the site diary.

Scale 1:3000 at A3						
Designed by JC	Checked by JC	Date Drawn 20/04/2012	Job No 201279	Filename	Lot No	
Consultants HARVEST			Project M. Callan Sand and Soil EIA			

6.4.3. ESC 3 – Sedimentation terminal pond

All surface water from the development site is collected via a sedimentation terminal pond. The volume of the sedimentation pond is at least 1,300m³. The terminal pond is located at the location depicted on **Figure 8** and is retained at the completion of works as a long-term water quality management structure. Water from the sedimentation terminal pond is discharged via a 5 metre wide grassed swale.

The sedimentation terminal pond is managed subject to the following controls:

- Flocculants are added if deemed necessary by the EMR and on an as-needed basis.
- The terminal pond is constructed as per the blue book – see **Appendix 4**.
- The terminal pond is maintained so that the minimum required storage volume is achieved within 5 days of a storm event. This is achieved by either over-sizing the pond or re-use of water onsite for irrigation and dust suppression measures.
- Sediment is removed as necessary to ensure that the minimum sediment storage volume is achieved at all times.

6.4.4. ESC 4 – Grassed swales

All surface water from the development site is collected via a grass swale that drains direction into sedimentation terminal pond (**ESC 3**).

Discharge waters from **ESC 3** sedimentation terminal pond are discharged via a grass swale and directed around the embankment that is to host the existing electricity poles.

6.4.5. ESC 5 – Sequence of works

Extraction is subject to the following controls:

- Before any work commences plans are on hand and all equipment and materials likely to be required are available for use;
- Install sediment fencing where there is a risk of soil loss;
- Construct **ESC 3 Sedimentation Terminal Pond** at the first stage of construction. As extraction progresses, divert all surface water from the entire extraction area to ESC 3 via constructed grassed swales (ESC 4).
- Construct sediment basins for the subject cell and perimeter bunds for the subject cell prior to extraction of the cell. Divert internal runoff to the sediment basin via construction of earth bunds;
- Ensure slopes of embankments (batters) are stable to prevent collapse of banks during operations; and
- Areas containing planted vegetation and grasses (such as bunds) are to be watered regularly and monitored until an effective cover has been properly established.

6.4.6. ESC 6 - Other specific measures to be adopted for the extraction operation

Details of the various controls required are outlined below.

- Design capacity of basins will not be compromised by storage of any operational water on Lot 22 and Lot 32
- Sediment fencing will be installed at locations down-slope of disturbed areas where there is a risk of sediment losses;
- Install straw bale filters in areas of concentrated flows (i.e. within grassed swales).
- Access for contractor vehicles and equipment during construction of basins and bunds is to be restricted to a defined path;

- Vehicles will exit the site via a wheel wash; and
- Grass Filter strips (preferably at least 5 metres wide) of retained vegetation are to be maintained where possible on the down-slope side sediment basins, bund construction activities and roads.

6.4.7. ESC 7 - Site monitoring and maintenance

The Environmental Management Representative (EMR) or nominated person is expected to inspect the site each work day, paying particular attention to:

- Ensuring that bunds and basins are operating effectively (i.e. no breaching), and carry out any necessary repairs;
- Removal of trapped sediment from sediment basins, sediment fences, bunds and other structures. Remove sediment from basins when their capacity is reduced by 30% and spread this sediment over rehabilitating areas (upslope of basin). Flocculant can be used on basins if required, apply gypsum evenly over water surface at a rate of 0.32kg/cubic metre of water; and
- Any remedial works carried out on sedimentation control structures and any diminished sediment retention basin capacity will be noted by the EMR in the site diary.

6.5. Erosion and sediment control conclusion

Providing that the controls outlined in this ESCP are implemented, it is concluded that potential surface water impacts associated with this extraction are consistent with the objectives of the Water Management Act (2000) (NSW).

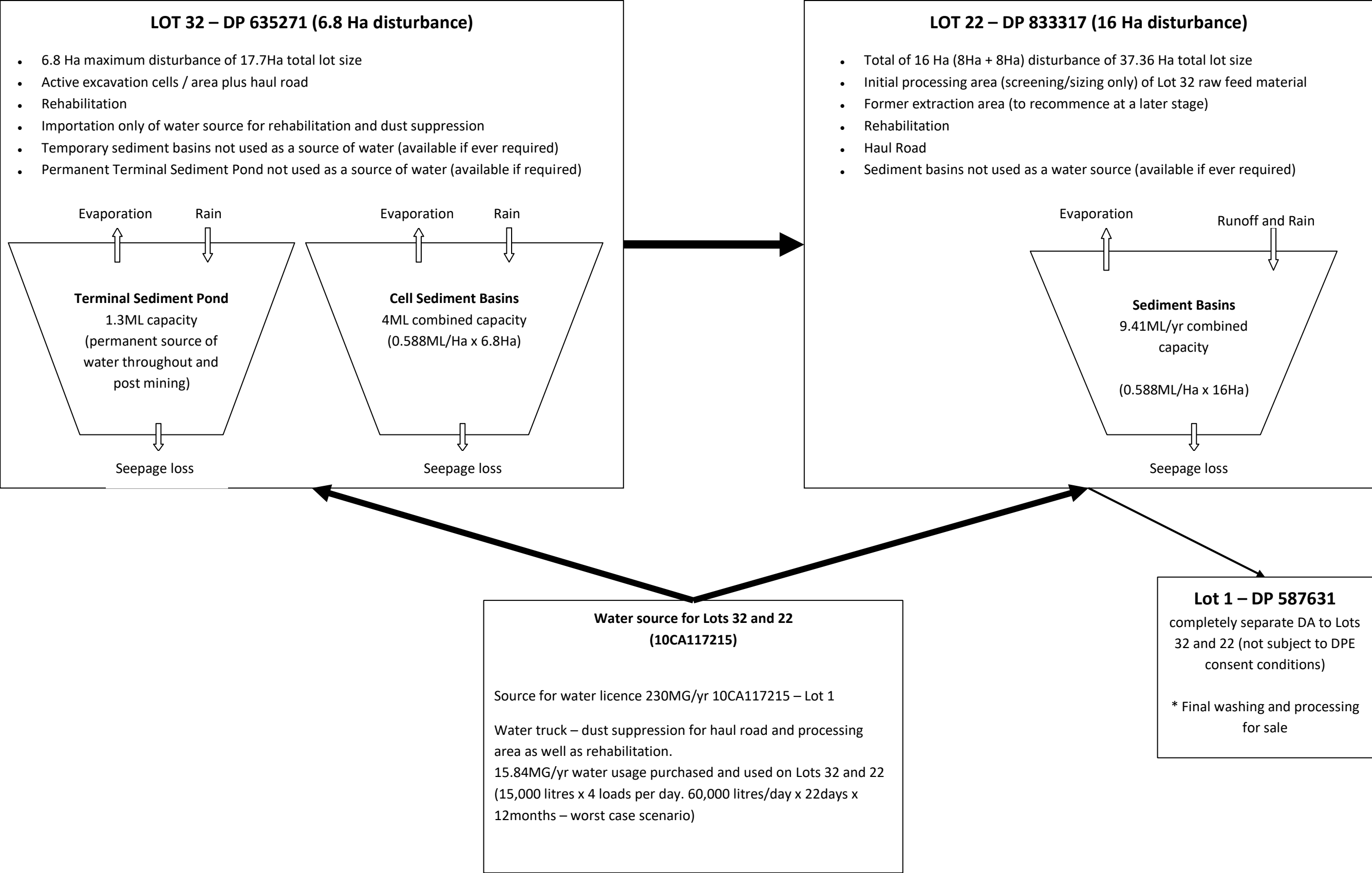
7. FLOOD EMERGENCY PROCEDURES PLAN

The site and stockpiling areas are subject to the procedures outlined in this section for a major flood event. The trigger for a major flood event will either be a flood warning for the local area published on the Bureau of Meteorology Webpage, a flood warning on the local radio or a flood warning issued by Camden Council or the local Emergency Services. A precautionary approach is adopted such as conducting Emergency drills and monitoring the Menangle river gauge and visually for river flow during predicted rain periods.

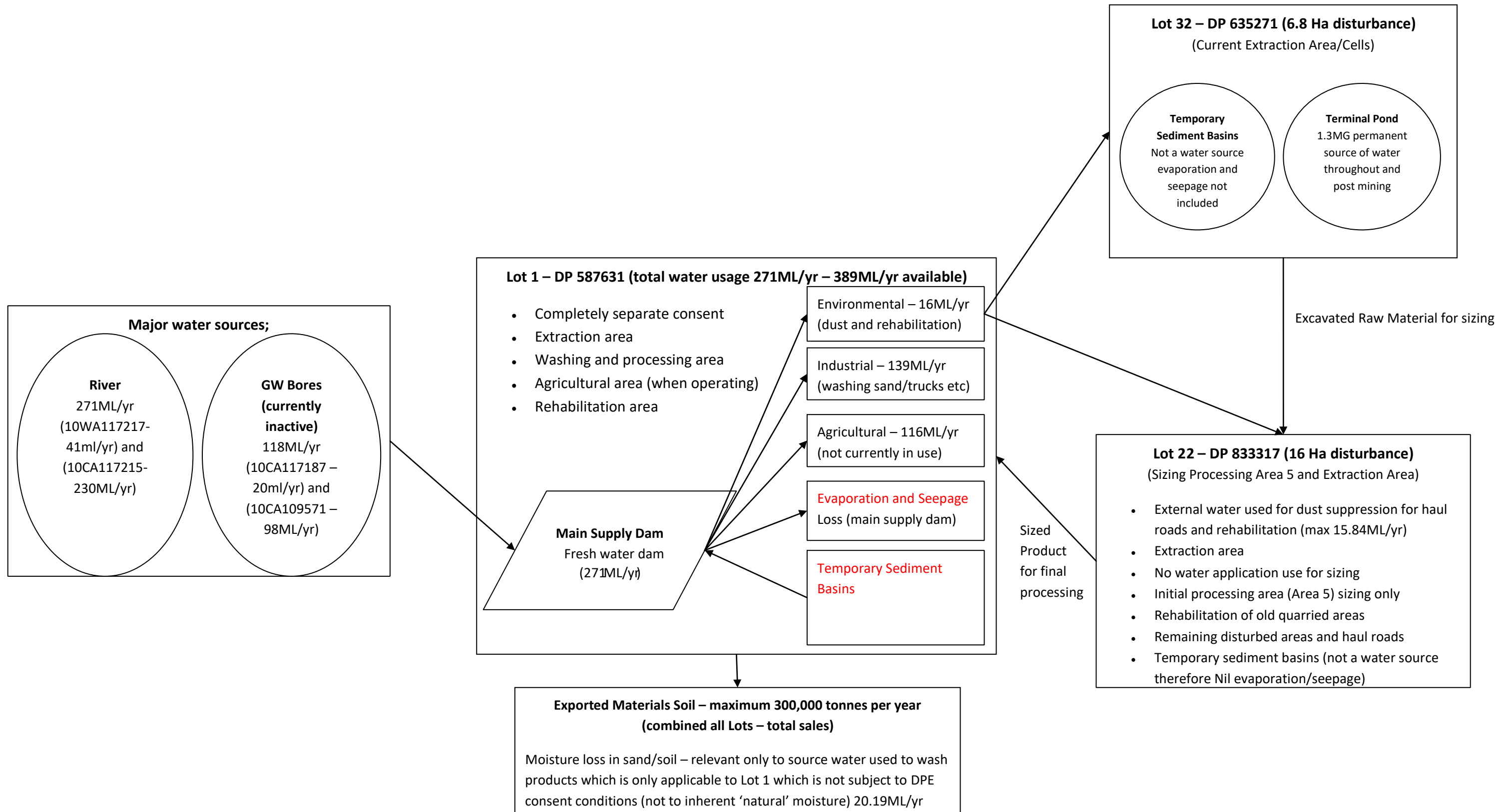
In the event of a flood warning the flood procedures will be as follows:

- Monitor Menangle river gauge;
- Continually monitor for river flow and levels visually;
- Cease all extraction and processing operations;
- Isolate all relevant electricity supply;
- Check bore cap is sealed to prevent water entry;
- Ensure all tools are available for equipment relocation (loaders, tow slings, etc);
- Be aware of time available to evacuate before flood waters cut off access areas;
- Relocate portable fuels, oils to eliminate pollution incident;
- Gather all loose items and conduct housekeeping;
- Disconnect pump suction and discharge lines to eliminate being washed away;
- Re-locate all portable machinery (including electric pumps, heavy and light equipment and machinery) to above the 1 in 100 flood contour;
- Providing that there is sufficient time to do so and it is safe, manually drain all oils and fuels from any non-mobile equipment remaining within portions of the site affected by flood; and
- Continually monitor flood levels and warnings for higher than expected levels of flooding.

WESCP – Figure 9



Site Water balance - Figure 10



After a flood event the following procedures will occur:

- Continue to monitor Menangle river gauge;
- Continue to monitor for river flow and levels visually;
- EMR is to check the integrity of all erosion and sediment control devices and ensure that any repairs are undertaken as soon as practical;
- EMR is to check the integrity of roadways, fences, bores and ensure repairs are undertaken as soon as practical;
- Conduct general housekeeping to ensure any debris or rubbish washed onto site is removed;
- As soon as practical drain/pump water from any permanent equipment affected by flood waters and then service equipment, as appropriate;
- Ensure equipment affected by flood water is fit for purpose prior to reinstallation and use; and
- Before commencement of operations;
 - Wait for flood waters to seep away or pump flood waters from the extraction pits and processing areas; and
 - Remove sediment from sediment basins to ensure that the minimum required storage capacity is available.

8. LIMITATIONS TO THIS REPORT

This report has been prepared subject to a number of limitations. These include:

- The application of conditions of approval or impacts of unanticipated future events could modify the outcomes described in this document. In particular, the occurrence of earthquakes of any magnitude, extreme rainfall events or the effects of climate change have not been considered but should they occur, may have an impact on the site. The client agrees that such events are possible but nevertheless accepts the risk that they pose;
- The findings contained in this report are the result of discrete/specific methodologies used in accordance with normal practices and standards. To the best of our knowledge, they represent a reasonable interpretation of the general condition of the site in question. Under no circumstances, however, can it be considered that these findings represent the actual state of the site/sites at all points;
- In preparing this report, Harvest Scientific Services Pty Ltd has relied upon certain verbal information and documentation provided by the client and/or third parties. Harvest Scientific Services did not attempt to independently verify the accuracy or completeness of that information. To the extent that the conclusions and recommendations in this report are based in whole or in part on such information, they are contingent on its validity. Harvest Scientific Services assume no responsibility for any consequences arising from any information or condition that was concealed, withheld, misrepresented, or otherwise not fully disclosed or available to Harvest Scientific Services Pty Ltd; and
- This report is not to be relied upon for any purpose other than that defined in it.

Prepared by:

Mart Rampe BSc (Applied Geology)
Principal Consultant

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APPENDIX 1

Soil profile logs

WATER MANAGEMENT (INC GROUNDWATER) AND EROSION AND SEDIMENT CONTROL PLAN

Appendix 2

Guidance information on Sydney Basin Central Groundwater Source, for the WSPGMRGS, and the Camden Weir Management Zone and Mid Nepean River Catchment Management Zone, for the WSPGMRURWS

APPENDIX 3

Sediment basins were sized according to the methodology outlined in Sections I4 & I5 of the guidelines entitled 'Managing Urban Stormwater, Soils and Construction' (the 'Blue Book'), 3rd Edition as produced by the NSW Department of Housing¹².

The site constraints which have been utilised in sediment basin sizing calculations are outlined in Table 1.

Table 1: Site soil constraints and values

Constraint and/or Characteristic	Value and/or rating for sediment basin calculations
Area disturbed	1ha
Rainfall erosivity value	2500
Soil erodibility factor	0.039
Slope gradient (%)	Maximum of 30
Calculated soil loss (tonnes/ha/yr)	674.31
Soil Texture Group	Type F ²
Soil Hydrologic Group	Group D ³
Runoff coefficient (Cv)	0.69 (as required by the NSW EPA)
Site Area (ha)	Per 1 hectare disturbed
R (90 th ile 5-day rainfall event (mm))	48.7

Based upon the above calculations the minimum required sediment basin size is **504m³** for each 1 ha of disturbed land.

The sediment basin is to have a minimum sediment storage volume of **87m³** per hectare of disturbed land.

APPENDIX 4

¹ NSW Department of Housing (1998) *Managing Urban Stormwater - Soils and Construction*. NSW Department of Housing, Liverpool.

² It is noted that the predominant soil category present is 'Type C' (i.e. coarse), particularly along the bank of the Nepean River, but some Type F soils may be present, particularly at the base of the extraction cells. The sediment basin has therefore been sized based on 'Type F' soils as a conservative measure.

³ It is noted that the predominant hydraulic category of onsite soils is 'Group A', particularly along the portion of land adjacent to the Nepean River, but some 'Group D' material may be present, particularly on the base of the extraction cells. The sediment basin has therefore been sized based on a 'Group D' hydraulic group as a conservative measure.

General guidance for soil & water management devices from the 'Blue Book'

APPENDIX 5

Evidence of Consultation with Governing Authorities

APPENDIX 1

Soil profile logs

SOIL PROFILE LOG: 201279-07													
Project		Salinity Assessment					Method of Investigation			Trench (excavation)			
Job Number		201279					Aspect						
Location		Lot 32 DP 635721 Macarthur Road, ELDESLIE					Slope						
Land Use		Lucerne Paddock					Topography			Floodplain			
Geology		Quaternary Alluvium					Soil Landscape Unit			Theresa Park			
ASC Classification		Stratic Rudosol					External Drainage			Poor			
Depth (m)	Graph	Horizon	Boundary	Munsell Colour	Colour Class	Texture	Coarse Fraction	Structure	Fabric	CaCO ₃	pH	Drainage	Comments
0 to 1 (approx)		A1 ₁		10YR 2/2	Very Dark Brown	Fine sandy loam	-	Weak	Rough	-	N/A	Excellent	Deep humic topsoil.
1 to 3.5 (approx)		A1 ₂	Gradual	10YR 4/3	Brown	Loamy sand (fine)	-	Apedal	Single	-	N/A	Excellent	Horizon ighter than horizon above and below.
3.5 to 5.5 (approx)		A1 ₃	Gradual	10YR 3/3	Dark Brown	Loamy sand (fine)	-	Apedal	Single	-	N/A	Excellent	Very fine sand. Alluvial bedding evident.

ASC: Australian Soil Classification N/A : Not assessed Notes: 1. Uniform profile.	
Author	JC
Date Logged	3/05/2011

SOIL PROFILE LOG: 201279-08													
Project		Salinity Assessment					Method of Investigation			Trench (excavation)			
Job Number		201279					Aspect						
Location		Lot 32 DP 635721 Macarthur Road, ELDERSLIE					Slope						
Land Use		Lucerne Paddock					Topography			Floodplain			
Geology		Quaternary Alluvium					Soil Landscape Unit			Theresa Park			
ASC Classification		Stratic Rudosol					External Drainage			Poor			
Depth (m)	Graph	Horizon	Boundary	Munsell Colour	Colour Class	Texture	Coarse Fraction	Structure	Fabric	CaCO₃	pH	Drainage	Comments
0 to 0.5 (approx)		A1 ₁		10YR 2/2	Very Dark Brown	Fine sandy loam	-	Weak	Rough	-	N/A	Excellent	Deep humic topsoil.

0.5 to 3.5 (approx)		A1 ₂	clear	5YR 5/6	Yellowish red	Loamy sand (fine)	-	Apedal	Single	-	N/A	Excellent	Very fine sand. Alluvial bedding evident.
3.5 to 5.8 (approx)		A1 ₃	gradual	5YR 4/3	Reddish brown	Loamy sand (fine)	-	Apedal	Single	-	N/A	Excellent	Very fine sand. Alluvial bedding evident.
ASC: Australian Soil Classification N/A : Not assessed Notes: 1. Uniform profile.													
Author		JC											
Date Logged		3/05/2011											

SOIL PROFILE LOG: 201279-09			
Project	Salinity Assessment	Method of Investigation	Trench (excavation)
Job Number	201279	Aspect	
Location	Lot 32 DP 635721 Macarthur Road, ELDERSLIE	Slope	
Land Use	Lucerne Paddock	Topography	Floodplain

Geology		Quaternary Alluvium					Soil Landscape Unit			Theresa Park			
ASC Classification		Stratic Rudosol					External Drainage			Poor			
Depth (m)	Graph	Horizon	Boundary	Munsell Colour	Colour Class	Texture	Coarse Fraction	Structure	Fabric	CaCO ₃	pH	Drainage	Comments
0 to 0.5 (approx)		A1 ₁		10YR 2/2	Very Dark Brown	Fine sandy loam	-	Weak	Rough	-	N/A	Excellent	Deep humic topsoil.
0.5 to 4.5 (approx)		A1 ₂	clear	10YR 4/3	Brown	Fine sandy loam	-	Apedal	Single	-	N/A	Excellent	Very fine sand. Alluvial bedding evident.
4.5 to 5.4 (approx)		A1 ₃	gradual	5YR 4/3	Reddish brown	Loamy sand (fine) / clayey sand	-	Apedal	Single	-	N/A	Excellent	Very fine sand. Alluvial bedding evident.
ASC: Australian Soil Classification N/A : Not assessed Notes: 1. Uniform profile.													
Author		JC											
Date Logged		3/05/2011											

SOIL PROFILE LOG: 201279-10													
Project		Salinity Assessment					Method of Investigation			Trench (excavation)			
Job Number		201279					Aspect						
Location		Lot 32 DP 635721 Macarthur Road, ELDESLIE					Slope						
Land Use		Lucerne Paddock					Topography			Floodplain			
Geology		Quaternary Alluvium					Soil Landscape Unit			Theresa Park			
ASC Classification		Stratic Rudosol					External Drainage			Poor			
Depth (m)	Graph	Horizon	Boundary	Munsell Colour	Colour Class	Texture	Coarse Fraction	Structure	Fabric	CaCO ₃	pH	Drainage	Comments
0 to 1.0 (approx)		A1 ₁		7.5YR 3/2	Very Dark Brown	Fine sandy loam	-	Weak	Rough	-	N/A	Excellent	Deep humic topsoil.
1.0 to 4.5 (approx)		A1 ₂	gradual	7.5YR 3/1	Very dark grey	Sandy (fine) Clay	-	Apedal	Single grained	-	N/A	Moderate	Very fine sand. Alluvial bedding evident.
4.5 to 5.5 (approx)		B2	gradual	7.5YR 4/1	Gleyed dark gray	Sandy (fine) Clay	-	Apedal	Massive	-	N/A	Poor	Gleyed, mottled and moist.

ASC: Australian Soil Classification N/A : Not assessed Notes: 1. Uniform profile.	
Author	JC
Date Logged	3/05/2011

SOIL PROFILE LOG: 201279-11													
Project		Salinity Assessment					Method of Investigation			Trench (excavation)			
Job Number		201279					Aspect						
Location		Lot 32 DP 635721 Macarthur Road, ELDERSLIE					Slope						
Land Use		Lucerne Paddock					Topography			Floodplain			
Geology		Quaternary Alluvium					Soil Landscape Unit			Theresa Park			
ASC Classification		Stratic Rudosol					External Drainage			Poor			
Depth (m)	Graph	Horizon	Boundary	Munsell Colour	Colour Class	Texture	Coarse Fraction	Structure	Fabric	CaCO₃	pH	Drainage	Comments
0 to 1.0 (approx)		A1 ₁		10YR 3/1	Very Dark Grey	Clay loam	-	Apedal	Massive	-	N/A	Moderate	
1.0 to 4.5 (approx)		A1 ₂	gradual	5YR 4/4	Brown	Fine sandy loam	-	Apedal	Single	-	N/A	Excellent	Very fine sand. Alluvial bedding evident.

4.5 to 5.5 (approx)		A13	clear	2.5YR 5/4	Reddish brown	Sandy (fine) clay	-	Apedal	Single	-	N/A	Excellent	Very fine sand. Alluvial bedding evident.
ASC: Australian Soil Classification N/A : Not assessed Notes: 1. Gradational profile.													
Author		JC											
Date Logged		3/05/2011											

SOIL PROFILE LOG: 201279-12			
Project	Salinity Assessment	Method of Investigation	Trench (excavation)
Job Number	201279	Aspect	
Location	Lot 32 DP 635721 Macarthur Road, ELDERSLIE	Slope	
Land Use	Lucerne Paddock	Topography	Floodplain
Geology	Quaternary Alluvium	Soil Landscape Unit	Theresa Park
ASC Classification	Stratic Rudosol	External Drainage	Poor

Depth (m)	Graph	Horizon	Boundary	Munsell Colour	Colour Class	Texture	Coarse Fraction	Structure	Fabric	CaCO ₃	pH	Drainage	Comments
0 to 1.0 (approx)		A1 ₁		10YR 3/1	Very Dark Grey	Clay loam	-	Apedal	Massive	-	N/A	Moderate	
1.0 to 3.0 (approx)		A1 ₂	gradual	5YR 4/6	Yellowish red	Loamy sand	-	Apedal	Single	-	N/A	Excellent	Very fine sand. Alluvial bedding evident.
3.0 to 5.5 (approx)		A1 ₃	clear	10YR 6/6	Brownish yellow	Sand (fine)	-	Apedal	Single	-	N/A	Excellent	Very fine sand. Alluvial bedding evident.
ASC: Australian Soil Classification N/A : Not assessed Notes: 1. Uniform profile.													
Author		JC											
Date Logged		3/05/2011											

Appendix 2

Guidance information on Sydney Basin Central Groundwater Source, for the WSPGMRGS, and the Camden Weir Management Zone and Mid Nepean River Catchment Management Zone, for the WSPGMRURWS

Water Sharing Rules

Middle Nepean River Management Zones

Water Sharing Plan	
Plan	Greater Metropolitan Region Unregulated Water Sources
Plan Commencement Date	1 July 2011
Term of the Plan	10 years
Water Sharing Rules	These rules apply to all surface waters in the management zones.
Note: Nine management zones (MZs) have been included in this rules summary as planning for the Middle Nepean River Catchment was undertaken as a single management unit.	
Boundary Definition	
Menangle Weir MZ	Includes the reach of the Nepean River below Douglas Park Weir to and including Menangle Weir.
Camden Weir MZ	Includes the reach of the Nepean River below Menangle Weir to and including Camden Weir. This MZ includes Thurns Weir and Bergins Weir.
Sharpes Weir MZ	Includes the reach of the Nepean River below Camden Weir to and including Sharpes Weir.
Cobbity Weir MZ	Includes the reach of the Nepean River below Sharpes Weir to and including Cobbity Weir.
Mount Hunter Rivulet Weir MZ	Includes the reach of the Nepean River below Cobbity Weir to and including Mount Hunter Rivulet Weir.
Brownlow Hill Weir MZ	Includes the reach of the Nepean River below Mount Hunter Rivulet Weir to and including Brownlow Hill Weir.
Theresa Park Weir MZ	Includes the reach of the Nepean River below Brownlow Hill Weir to and including Theresa Park Weir.
Wallacia Weir MZ	Includes the reach of the Nepean River below Theresa Park Weir to and including Wallacia Park Weir.
Mid Nepean River Catchment MZ	Includes the hydrological catchment of the Nepean River below Douglas Park Weir to Wallacia Weir.

Rules Summary The following rules are a guide only. For more information about actual license conditions, contact the NSW Office of Water in Parramatta, phone 8838 7531.				
Management Zone	EFPR			Reference point
	When inflows to the dams > 80 th percentile	When inflows are between 80 th and 95 th percentile	When inflows are < 95 th percentile	
Menangle Weir	An EFPR will be in place when the weir is unable to pass the volume of water released from Pheasants Nest Weir and Broughtons Pass Weir in the previous 24 hours.	An EFPR will be in place when the weir is unable to pass (the volume of water released from Pheasants Nest Weir and Broughtons Pass Weir in the previous 24 hours) * 0.9.	An EFPR will be in place when the weir is unable to pass (the volume of water released from Pheasants Nest Weir and Broughtons Pass Weir in the previous 24 hours) * 0.8.	Nepean River at Menangle (212238).
Camden Weir	An EFPR will be in place when the weir is unable to pass the volume of water released from Pheasants Nest Weir and Broughtons Pass Weir in the previous 24 hours.	An EFPR will be in place when the weir is unable to pass (the volume of water released from Pheasants Nest Weir and Broughtons Pass Weir in the previous 24 hours) * 0.878.	An EFPR will be in place when the weir is unable to pass (the volume of water released from Pheasants Nest Weir and Broughtons Pass Weir in the previous 24 hours) * 0.761.	Camden Weir stage gauge.
Sharpes Weir	An EFPR will be in place when the weir is unable to pass the volume of water released from Pheasants Nest Weir and Broughtons Pass Weir in the previous 24 hours.	An EFPR will be in place when the weir is unable to pass (the volume of water released from Pheasants Nest Weir and Broughtons Pass Weir in the previous 24 hours) * 0.871.	An EFPR will be in place when the weir is unable to pass (the volume of water released from Pheasants Nest Weir and Broughtons Pass Weir in the previous 24 hours) * 0.748.	Sharpes Weir stage gauge.
Cobbity Weir	An EFPR will be in place when the weir is unable to pass the volume of water released from Pheasants Nest Weir and Broughtons Pass Weir in the previous 24 hours.	An EFPR will be in place when the weir is unable to pass (the volume of water released from Pheasants Nest Weir and Broughtons Pass Weir in the previous 24 hours) * 0.863.	An EFPR will be in place when the weir is unable to pass (the volume of water released from Pheasants Nest Weir and Broughtons Pass Weir in the previous 24 hours) * 0.734.	Cobbity Weir stage gauge.

Mount Hunter Rivulet Weir	An EFPR will be in place when the weir is unable to pass the volume of water released from Pheasants Nest Weir and Broughtons Pass Weir in the previous 24 hours.	An EFPR will be in place when the weir is unable to pass (the volume of water released from Pheasants Nest Weir and Broughtons Pass Weir in the previous 24 hours) * 0.858.	An EFPR will be in place when the weir is unable to pass (the volume of water released from Pheasants Nest Weir and Broughtons Pass Weir in the previous 24 hours) * 0.726.	Mount Hunter Rivulet Weir stage gauge.
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Brownlow Hill Weir	An EFPR will be in place when the weir is unable to pass the volume of water released from Pheasants Nest Weir and Broughtons Pass Weir in the previous 24 hours.	An EFPR will be in place when the weir is unable to pass (the volume of water released from Pheasants Nest Weir and Broughtons Pass Weir in the previous 24 hours) * 0.856.	An EFPR will be in place when the weir is unable to pass (the volume of water released from Pheasants Nest Weir and Broughtons Pass Weir in the previous 24 hours) * 0.734.	Brownlow Hill Weir stage gauge.
Theresa Park Weir	An EFPR will be in place when the weir is unable to pass the volume of water released from Pheasants Nest Weir and Broughtons Pass Weir in the previous 24 hours.	An EFPR will be in place when the weir is unable to pass (the volume of water released from Pheasants Nest Weir and Broughtons Pass Weir in the previous 24 hours) * 0.837.	An EFPR will be in place when the weir is unable to pass (the volume of water released from Pheasants Nest Weir and Broughtons Pass Weir in the previous 24 hours) * 0.687.	Theresa Park Weir stage gauge.
Wallacia Weir	An EFPR will be in place when the weir is unable to pass the volume of water released from Pheasants Nest Weir and Broughtons Pass Weir in the previous 24 hours.	An EFPR will be in place when the weir is unable to pass (the volume of water released from Pheasants Nest Weir and Broughtons Pass Weir in the previous 24 hours) * 0.810.	An EFPR will be in place when the weir is unable to pass (the volume of water released from Pheasants Nest Weir and Broughtons Pass Weir in the previous 24 hours) * 0.64.	Nepean River at Wallacia (212202).
Mid Nepean River Catchment	Pumping is not permitted when there is no visible flow at the pump site.			Pump site.

Note: Daily releases are not required to be made due to an emergency situation at that weir or an upstream weir and the holder notifies the Minister within 7 days of becoming aware of the emergency, the Minister is satisfied that releases cannot be made due to work capacity constraints or maintenance, refurbishment or modification work, at that weir or an

upstream one for a period of more than 24 hours; the Minister requires an alternate release to be made due to an emergency or maintenance activity upstream; the stage of the weir is less than the stage necessary to deliver the release at that weir or upstream; when Wallacia Weir is spilling at a rate equal to or greater than its release requirement and when, from years 1 to 5 of the Plan, releases cannot be made despite the best endeavors of the licence holder to meet them. If the Minister determines that any of the release requirements aforementioned cannot be met despite best efforts then the Minister may conduct a review into why release requirements are not being met.

Trading rules for the Menangle Weir Management Zone	
INTO management zone	Only permitted if trading from the Camden Weir Management Zone, Sharpes Weir Management Zone, Cobbity Weir Management Zone, Mount Hunter Rivulet Weir Management Zone, Brownlow Hill Weir Management Zone, Theresa Park Weir Management Zone or Wallacia Weir Management Zone if the trade will result in no net gain in entitlement to the water source.
WITHIN management zone	Permitted.
Conversion to High Flow Access Licence	Not permitted.
Trading rules for the Camden Weir Management Zone	
INTO management zone	Trading is permitted from Menangle Weir. Trading is only permitted from the Sharpes Weir Management Zone, Cobbity Weir Management Zone, Mount Hunter Rivulet Weir Management Zone, Brownlow Hill Weir Management Zone, Theresa Park Weir Management Zone or Wallacia Weir Management Zone if the trade will result in no net gain in entitlement to the water source.
WITHIN management zone	Permitted.
Conversion to High Flow Access Licence	Not permitted.
Trading rules for the Sharpes Weir Management Zone	
INTO management zone	Trading is permitted from Menangle Weir and Camden Weir. Trading is only permitted from the Cobbity Weir Management Zone, Mount Hunter Rivulet Weir Management Zone, Brownlow Hill Weir Management Zone, Theresa Park Weir Management Zone or Wallacia Weir Management Zone if the trade will result in no net gain in entitlement to the water source.
WITHIN management zone	Permitted.
Conversion to High Flow Access Licence	Not permitted.
Trading rules for the Cobbity Weir Management Zone	

INTO management zone	Trading is permitted from Menangle Weir, Camden Weir and Sharpes Weir. Trading is only permitted from the Mount Hunter Rivulet Weir Management Zone, Brownlow Hill Weir Management Zone, Theresa Park Weir Management Zone or Wallacia Weir Management Zone if the trade will result in no net gain in entitlement to the water source.
WITHIN management zone	Permitted.
Conversion to High Flow Access Licence	Not permitted.
Trading rules for the Mount Hunter Rivulet Weir Management Zone	
INTO management zone	Trading is permitted from Menangle Weir, Camden Weir, Sharpes Weir and Cobbity Weir. Trading is only permitted from the Brownlow Hill Weir Management Zone, Theresa Park Weir Management Zone or Wallacia Weir Management Zone if the trade will result in no net gain in entitlement to the water source.
WITHIN management zone	Permitted.
Conversion to High Flow Access Licence	Not permitted.
Trading rules for the Brownlow Hill Weir Management Zone	
INTO management zone	Trading is permitted from Menangle Weir, Camden Weir, Sharpes Weir, Cobbity Weir and Mount Hunter Rivulet Weir. Trading is only permitted from the Theresa Park Weir Management Zone or Wallacia Weir Management Zone if the trade will result in no net gain in entitlement to the water source.
WITHIN management zone	Permitted.
Conversion to High Flow Access Licence	Not permitted.
Trading rules for the Theresa Park Weir Management Zone	
INTO management zone	Trading is permitted from Menangle Weir, Camden Weir, Sharpes Weir, Cobbity Weir, Mount Hunter Rivulet Weir and Brownlow Hill Weir. Trading is only permitted from the Wallacia Weir Management Zone if the trade will result in no net gain in entitlement to the water source.

WITHIN management zone	Permitted.
Conversion to High Flow Access Licence	Not permitted.
Trading rules for the Wallacia Weir Management Zone	
INTO management zone	Trading is permitted from Menangle Weir, Camden Weir, Sharpes Weir, Cobbity Weir, Mount Hunter Rivulet Weir, Brownlow Hill Weir and Theresa Park Weir. Trading is not permitted from the Mid Nepean River Catchment Management Zone, Lower Nepean River Management Zone, Erskine Creek and Glenbrook Creek Management Zone, Grose River Management Zone, Capertee River Management Zone, Colo River Management Zone, Upper Hawkesbury River (Grose River to South Creek) Management Zone, Upper Hawkesbury River (South Creek to Cattai Creek) Management Zone, Upper Hawkesbury River (Cattai Creek to Colo River) Management Zone, Lower Hawkesbury River Management Zone, Macdonald River Management Zone, Upper South Creek Management Zone, Lower South Creek Management Zone, Cattai Creek Management Zone, Berowra Creek and Cowan Creek Management Zone and Warragamba River Management Zone.
WITHIN management zone	Permitted.
Conversion to High Flow Access Licence	Not permitted.
Trading rules for the Mid Nepean River Catchment Management Zone	
INTO management zone	Not permitted.
WITHIN management zone	Permitted.
Conversion to High Flow Access Licence	Not permitted.

Access to very low flows (due to a water shortage)

When a 'water shortage' is triggered there may be limited access to the very low flows during this period. A water shortage will be signalled when a 24 hour forecast temperature above or below a predefined temperature occurs along with consecutive previous days EFPR. The conditions which will trigger a 'water shortage' situation are shown in below. Note that the temperature conditions would be the 4:00 pm or later Bureau of Metrology forecast for Campbelltown for the following day.

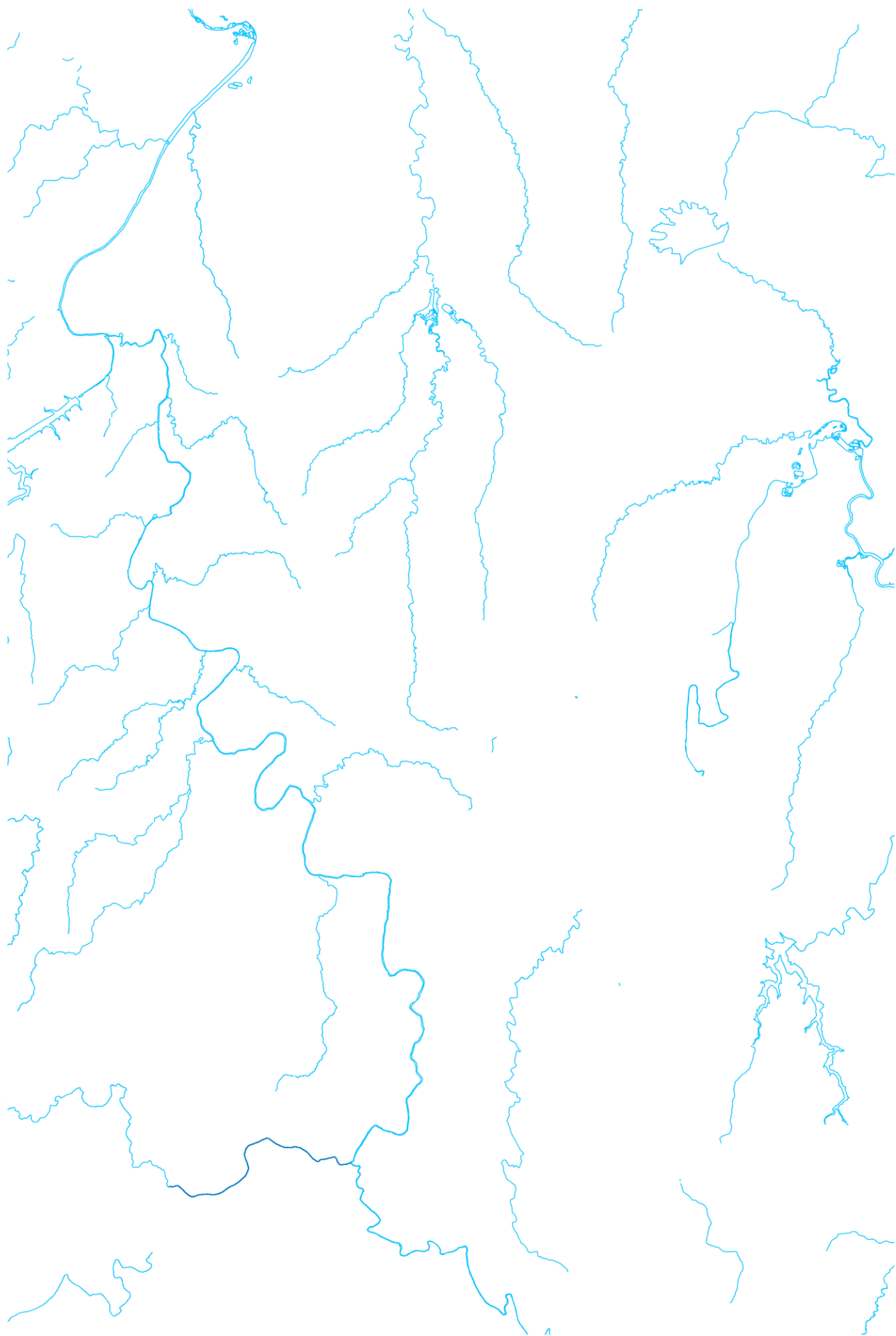
Forecast Temperature (T, °C)	No. of consecutive days EFPR before full exemption	Months
$T < 4$	0	All
$4 \leq T < 23$	14	May to August
	9	September to April
$23 \leq T < 28$	4	All
$28 \leq T < 31$	1	All
$31 \leq T$	0	All
Duration of water shortage	Once a water shortage exemption is signalled, it shall remain in force for 3 days irrespective of the pumping conditions and temperature	

The NSW Office of Water is to determine at the end of each water year the total volume of water extracted from very low flows during a water shortage. Where the volume of water extracted exceeds 41 ML/day, the Minister is to assess whether a total daily extraction limit is to be introduced for these management zones on extraction during periods of a water shortage.

Lagoon rules	
Trading onto a lagoon from a river	Not permitted.
Application for new works on a lagoon	Not permitted.

More information about the macro planning process for the Greater Metropolitan Region Unregulated Water Sources is available at: www.water.nsw.gov.au.

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APPENDIX 3

Sediment basins were sized according to the methodology outlined in Sections I4 & I5 of the guidelines entitled 'Managing Urban Stormwater, Soils and Construction' (the 'Blue Book'), 3rd Edition as produced by the NSW Department of Housing¹².

The site constraints which have been utilised in sediment basin sizing calculations are outlined in Table 1.

Table 1: Site soil constraints and values

Constraint and/or Characteristic	Value and/or rating for sediment basin calculations
Area disturbed	1ha
Rainfall erosivity value	2500
Soil erodibility factor	0.039
Slope gradient (%)	Maximum of 30
Calculated soil loss (tonnes/ha/yr)	674.31
Soil Texture Group	Type F ²
Soil Hydrologic Group	Group D ³
Runoff coefficient (Cv)	0.69 (as required by the NSW EPA)
Site Area (ha)	Per 1 hectare disturbed
R (90 th ile 5-day rainfall event (mm))	48.7

Based upon the above calculations the minimum required sediment basin size is **504m³** for each 1 ha of disturbed land.

The sediment basin is to have a minimum sediment storage volume of **87m³** per hectare of disturbed land.

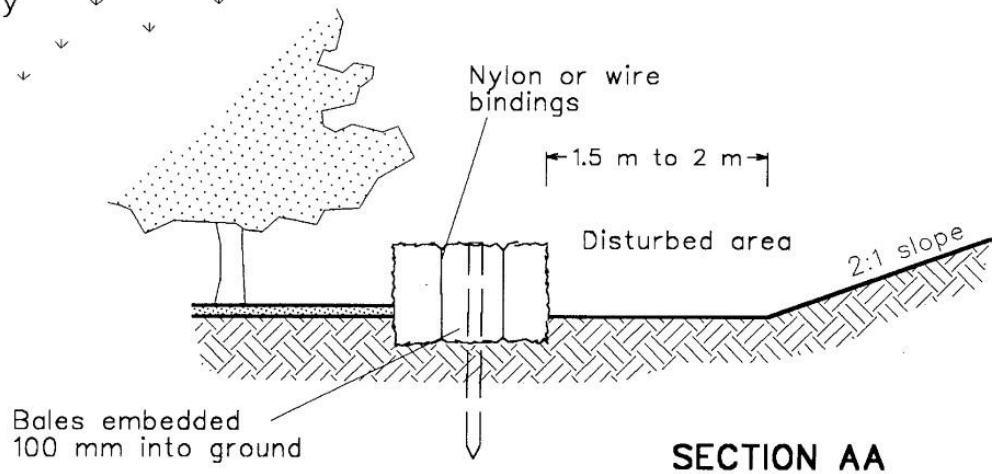
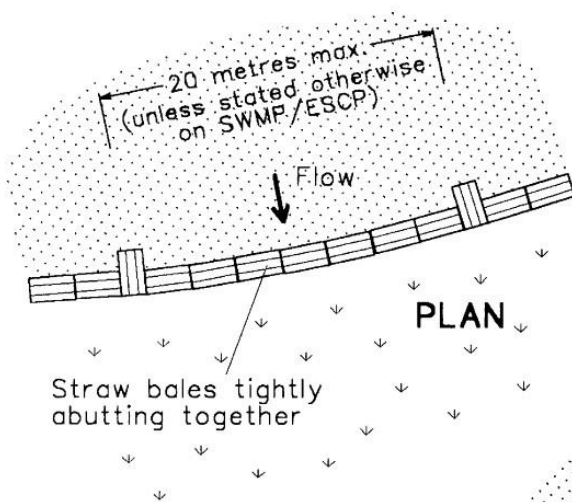
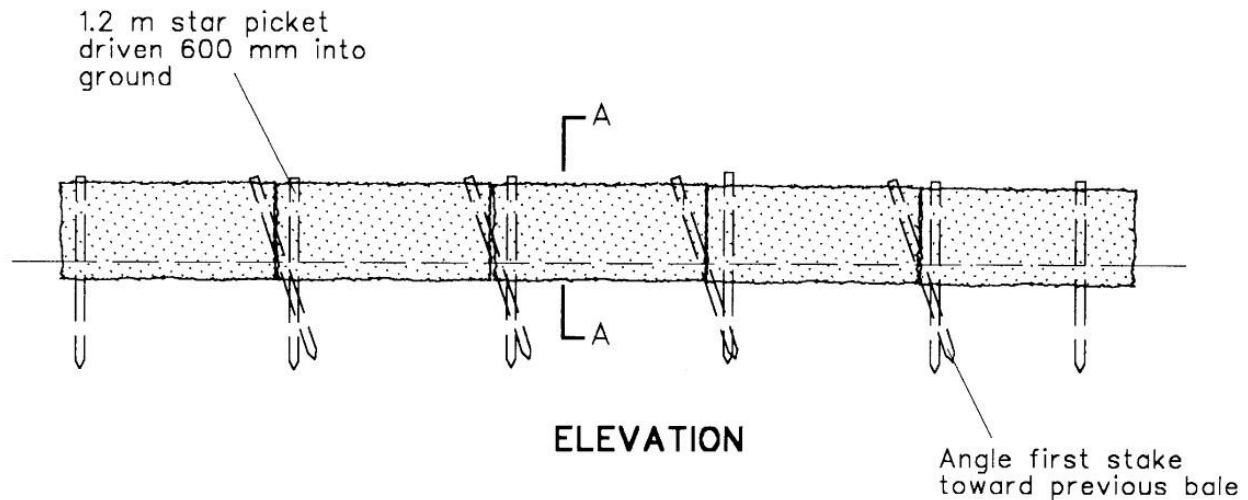
APPENDIX 4

¹ NSW Department of Housing (1998) *Managing Urban Stormwater - Soils and Construction*. NSW Department of Housing, Liverpool.

² It is noted that the predominant soil category present is 'Type C' (i.e. coarse), particularly along the bank of the Nepean River, but some Type F soils may be present, particularly at the base of the extraction cells. The sediment basin has therefore been sized based on 'Type F' soils as a conservative measure.

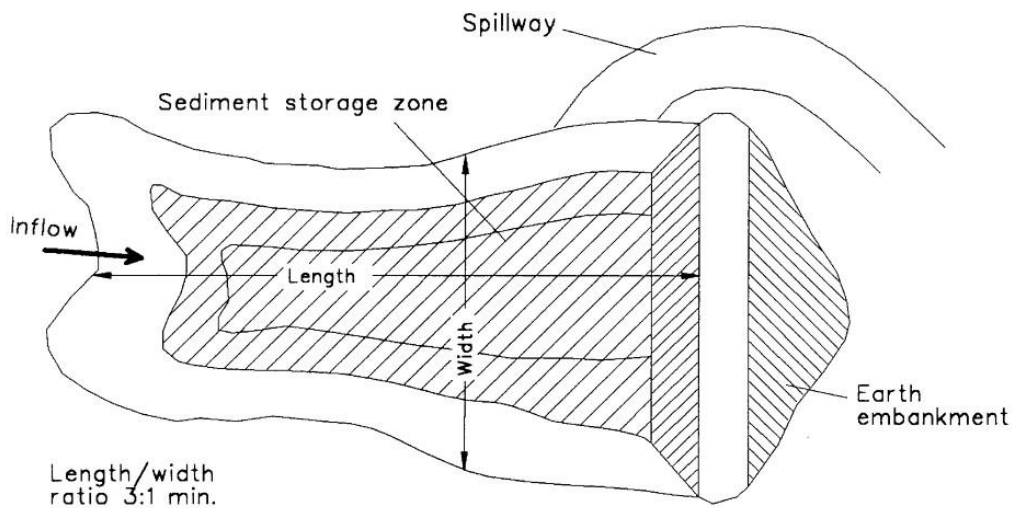
³ It is noted that the predominant hydraulic category of onsite soils is 'Group A', particularly along the portion of land adjacent to the Nepean River, but some 'Group D' material may be present, particularly on the base of the extraction cells. The sediment basin has therefore been sized based on a 'Group D' hydraulic group as a conservative measure.

General guidance for soil & water management devices from the 'Blue Book'

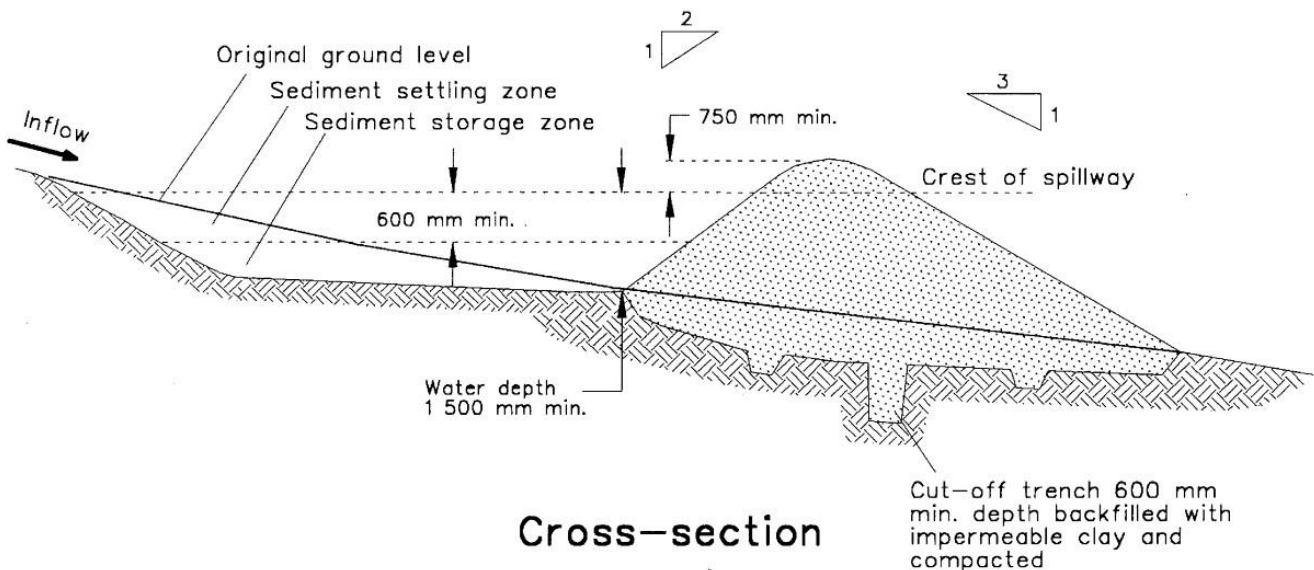


Construction Notes

1. Construct straw bale filter as close as possible to parallel to the contours of the site or at the toe of a slope.
2. Place bales lengthwise in a row with ends tightly abutting. Use straw to fill any gaps between bales. Straws to be placed parallel to ground.
3. Maximum height of filter is one bale.
4. On soft materials, embed each bale in the ground 75 mm to 100 mm and anchor with two 1.2 metre star pickets. Angle the first stake in each bale towards the previously laid bale. Drive stakes 600 mm into the ground and flush with the top of the bales.
5. Where a straw bale filter is constructed downslope from a disturbed batter the bales should be located 1.5 to 2 metres downslope from the toe of the batter.



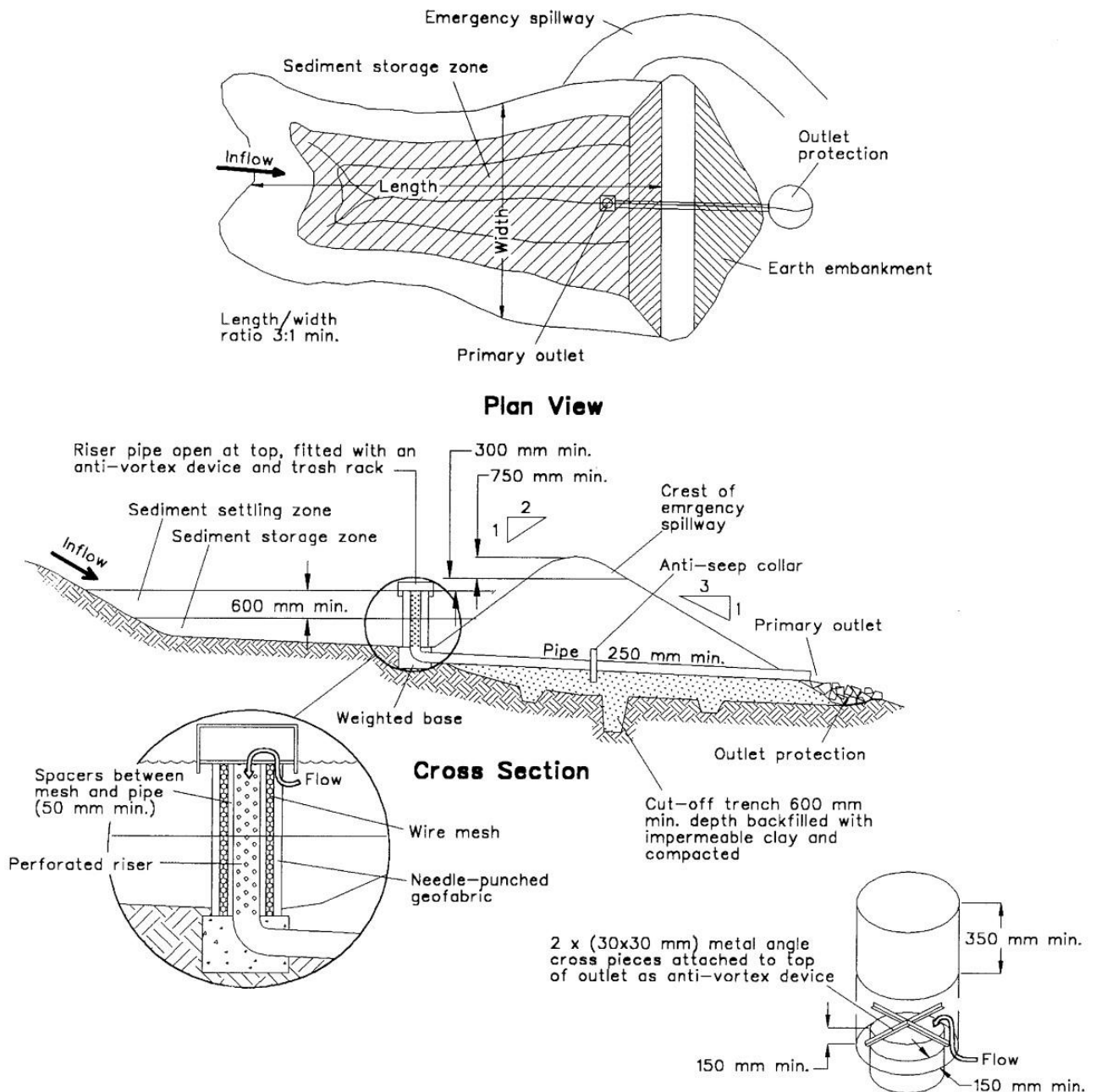
Plan View



Cross-section

Construction Notes

1. Remove all vegetation and topsoil from under the dam wall and from within the storage area.
2. Construct a cut-off trench 500 mm deep and 1 200 mm wide along the centreline of the embankment extending to a point on the gully wall level with the riser crest.
3. Maintain the trench free of water and recompact the materials with equipment specified in the SWMP to 95 per cent Standard Proctor Density.
4. Select fill according to the directions of the SWMP that is free of roots, wood, rock, large stone or foreign material.
5. Prepare the site under the embankment by ripping at least 100 mm deep to help bond compacted fill to existing substrate.
6. Spread fill in 100 mm to 150 mm layers and compact at optimum moisture content in accordance with the SWMP.
7. Construct emergency spillway.
8. Rehabilitate structure in accordance with the SWMP.
9. Place a "Full of Sediment" marker to show when less than design capacity occurs and sediment removal is required.



Construction Notes

1. Remove all vegetation and topsoil from under the dam wall and from within the storage area.
2. Form a cut off trench under the centreline of the embankment 600 mm deep and 1200 mm wide extending to a point on the gully wall above the riser sill level.
3. Maintain the trench free of water and recompact the materials with equipment as specified in the SWMP to 95 per cent Standard Proctor Density.
4. Select fill according to the directions of the SWMP that is free from roots, wood, rock, large stone or foreign material.
5. Prepare the site under the embankment by ripping at least 100 mm deep to help bond compacted fill to existing substrate.
6. Spread fill in 100 mm to 150 mm layers and compact at optimum moisture content in accordance with the SWMP.
7. Install pipe outlet with seepage collars as specified in SWMP.
8. Form batter grades at 2(H):1(V) upstream and 3(H):1(V) downstream or as specified in SWMP.
9. Install pipe riser as specified in SWMP.
10. Construct emergency spillway 300 mm above sill height of riser pipe.
11. Rehabilitate structure in accordance with the SWMP.
12. Geotextile to be replaced with the specified material if basin does not freely drain within four days.
13. Place a "Full of Sediment" marker to show when less than design capacity occurs and sediment removal is required.

EARTH BASIN - DRY
(APPLIES TO TYPE C SOILS ONLY)

SD 6-3

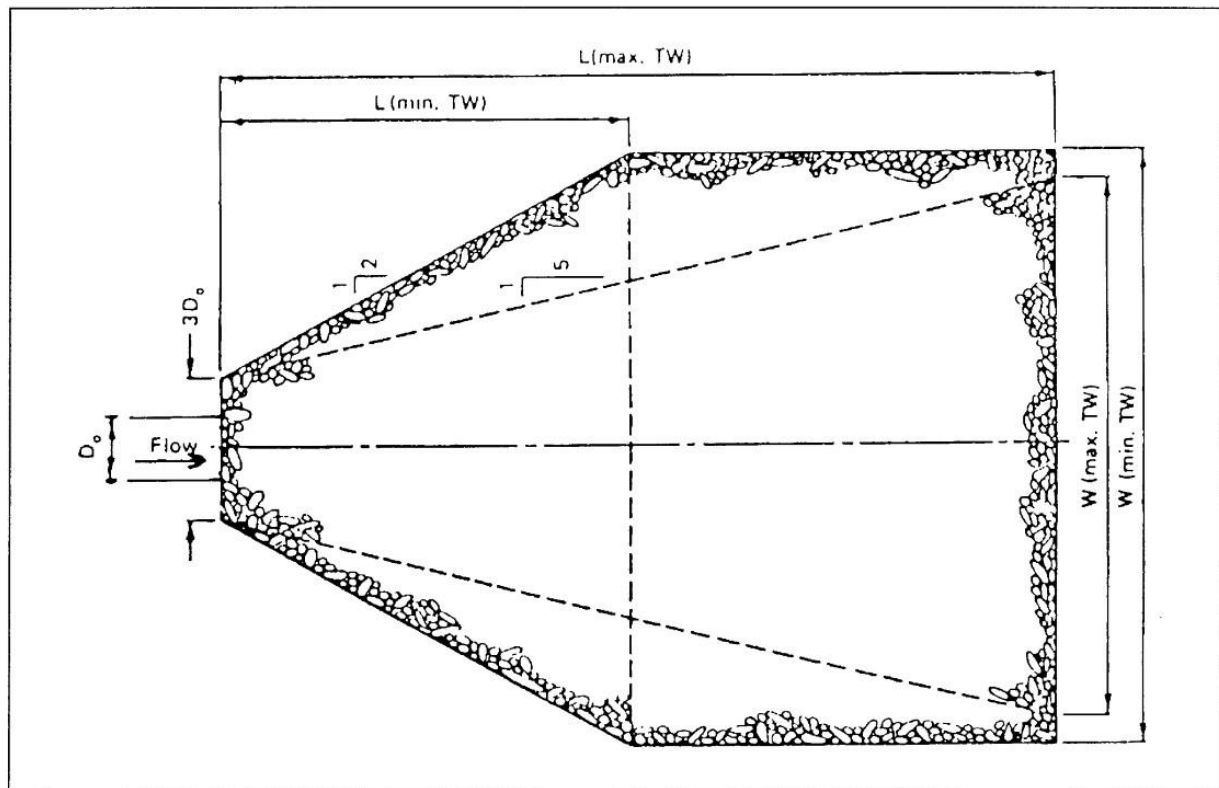
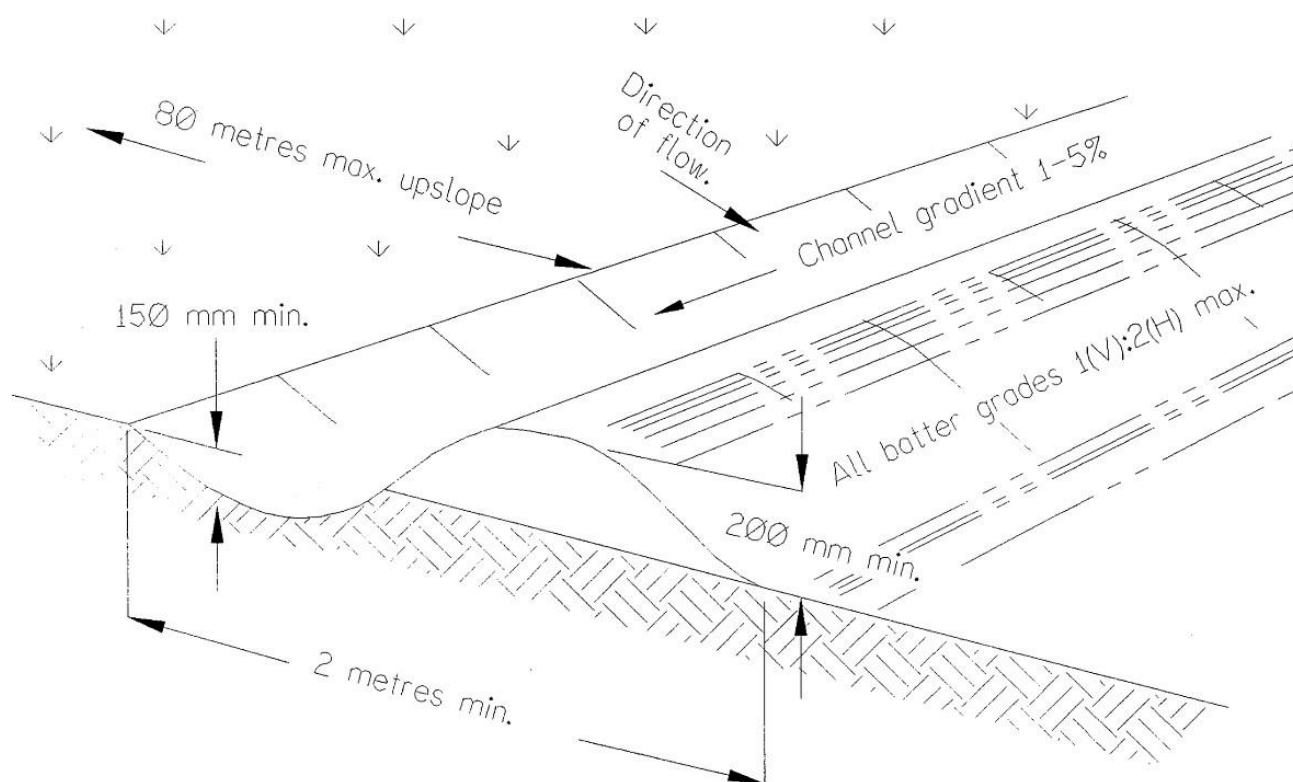


Figure 5.10 Riprap configuration for outlet protection under both maximum and minimum tailwater conditions (Bohan, 1970)

5.2.8. Subsoil Drainage

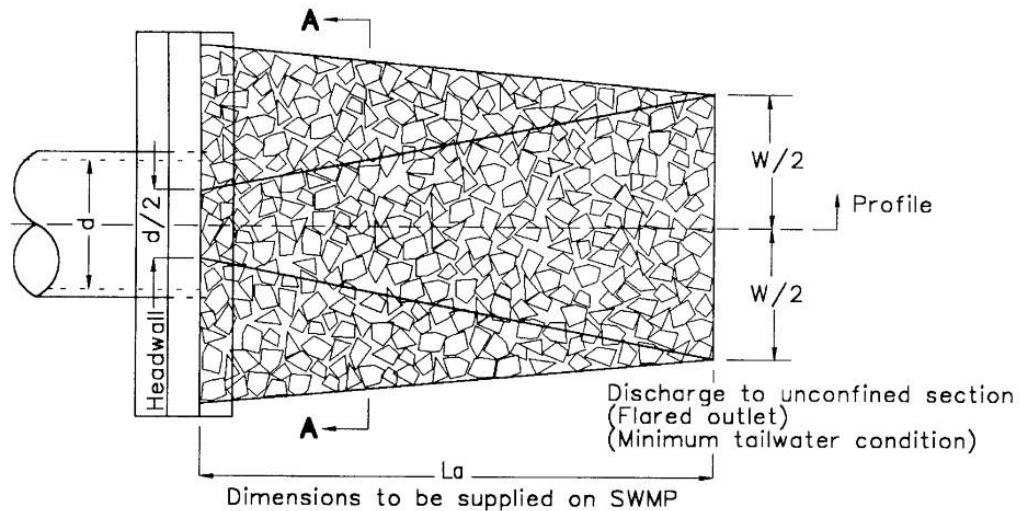
- (a) Subsoil drains provide a means for controlled flow of water through the soil. Types include:
 - (i) strip drains that comprise a geotextile filter over a non corroding, rot-proof, plastic core;
 - (ii) rubble drains; and
 - (iii) perforated or slotted pipes.
- (b) Subsoil drainage can be installed to:
 - (i) improve the soil environment for vegetative growth by regulating ground water flow, especially in grassed waterways and other low lying areas, recreation areas (such as ovals), and dry detention basins; and
 - (ii) provide drainage of ground water on steep slopes to improve stability.



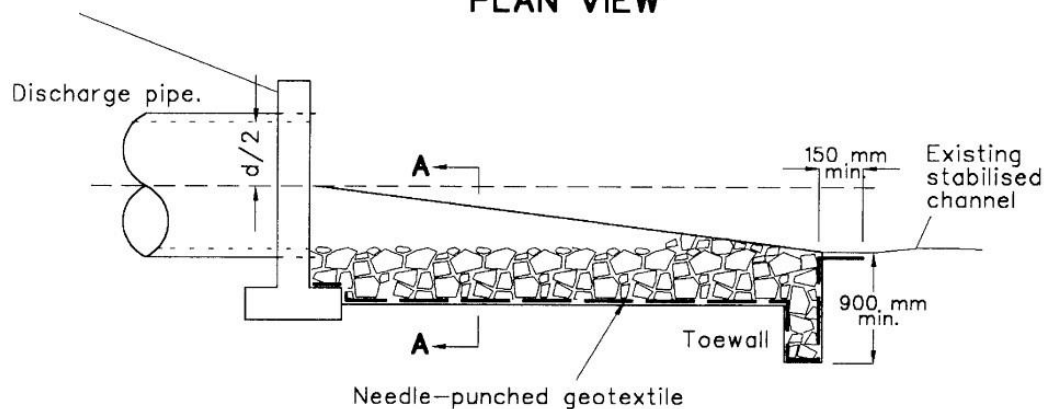
NOTE: Only to be used as temporary bank where max. upslope length is 80 metres.

Construction Notes

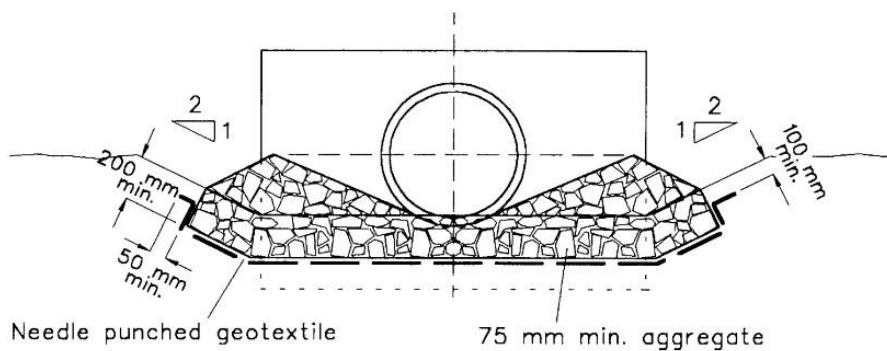
1. Construct along gradient as specified.
2. Maximum spacing between banks shall be 80 metres.
3. Drains to be of parabolic or trapezoidal cross section not V-shaped.
4. Earth banks to be adequately compacted in order to prevent failure.
5. Construction is of a temporary nature and shall be completed at the end a days work or immediately prior to rain.
6. All outlets from disturbed lands are to feed into a sediment basin or similar.
7. Discharge runoff collected from undisturbed lands onto either a stabilised or an undisturbed disposal site within the same subcatchment area from which the water originated.
8. Compact with a suitable implement in situations where they are required to function for more than five days.
9. Earth banks to be free of projections or other irregularities that will impede normal flow.



PLAN VIEW



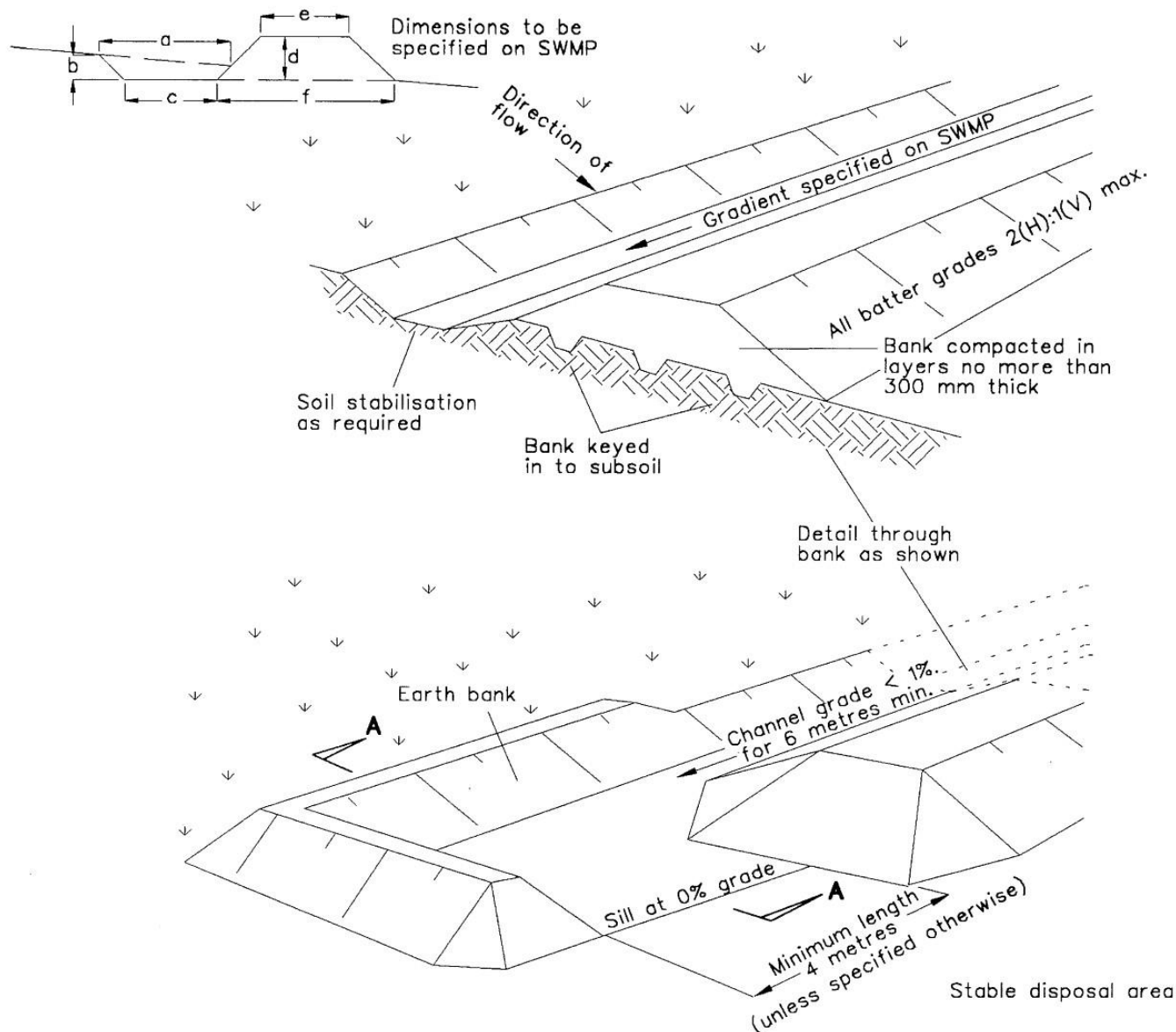
PLAN VIEW



CROSS SECTION AA

Construction Notes

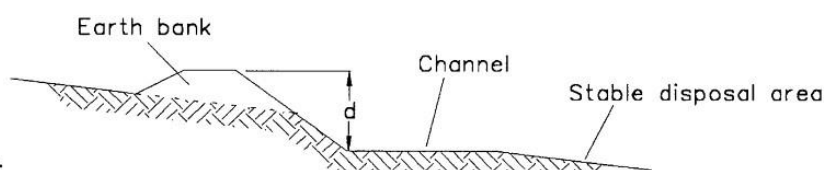
1. Subgrade fill to be compacted to the density of the surrounding undisturbed material.
2. Ensure that concrete or riprap used for energy dissipater or outlet protection conforms to the grading limits specified on the SWMP/ESCP.
3. Ensure that the geotextile does not sustain serious damage by preparing a smooth, even foundation.
4. Repair minor damage to the geotextile before spreading any aggregate. For repairs, patch one piece of fabric over the damage, making sure that all joints and patches overlap more than 300 mm.



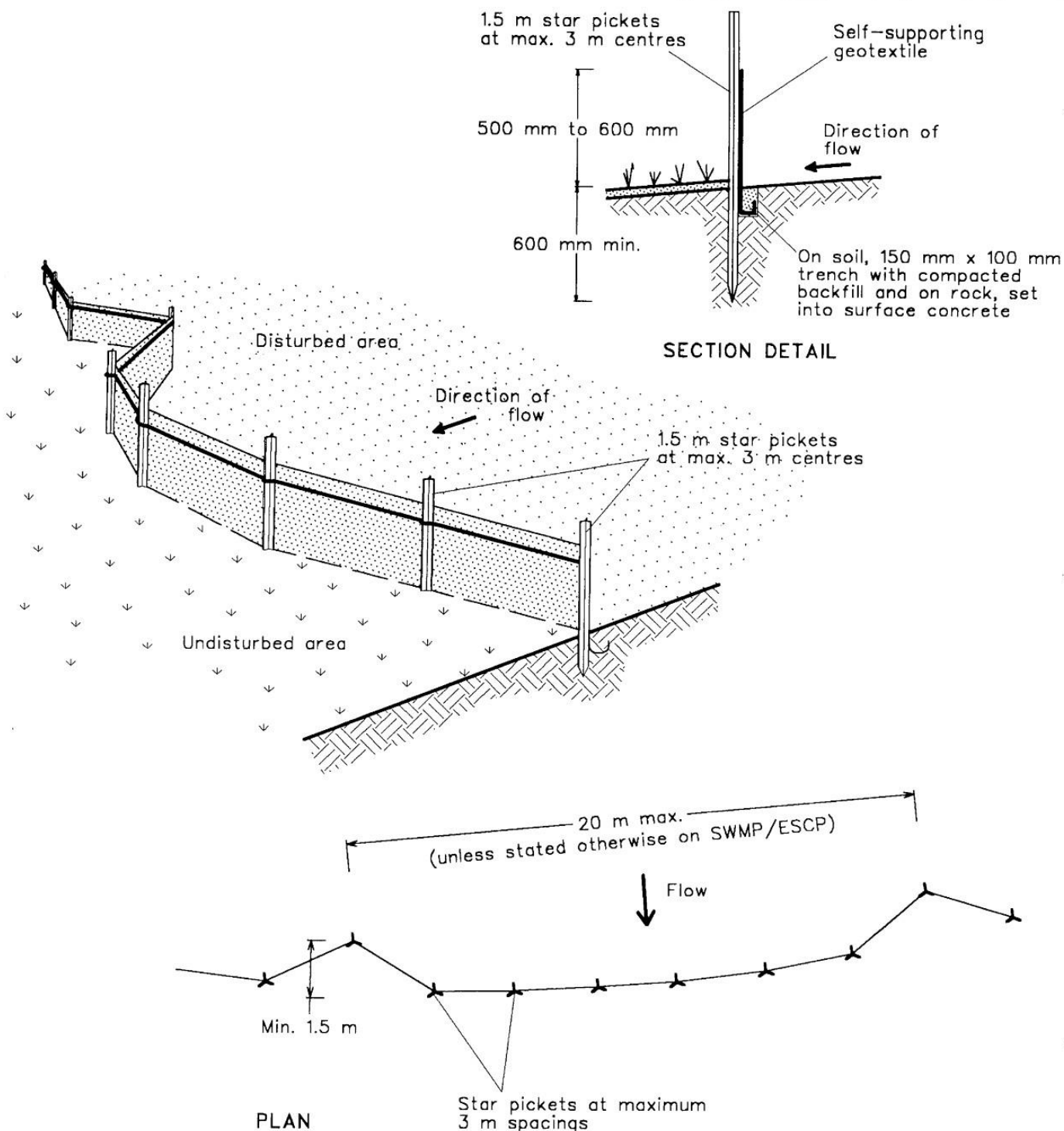
Level Spreader (or Sill)

Construction Notes

1. Construct along gradient as specified.
2. Avoid removing trees and shrubs if possible.
3. Drains to be of parabolic or trapezoidal cross section as opposed to V-shaped.
4. Earth banks to be adequately compacted in order to prevent failure.
5. Permanent or temporary stabilisation of the earth bank to be completed within 10 days of construction.
6. All outlets from disturbed lands are to feed into a sediment basin or similar.
7. Discharge runoff collected from undisturbed lands onto either a stabilised or an undisturbed disposal site within the same subcatchment area from which the water originated.
8. Compact with a suitable implement in situations where they are required to function for more than five days.
9. Earth banks to be free of projections or other irregularities that will impede normal flow.



Section AA



Construction Notes

1. Construct sediment fence as close as possible to parallel to the contours of the site.
2. Drive 1.5 metre long star pickets into ground, 3 metres apart.
3. Dig a 150 mm deep trench along the upslope line of the fence for the bottom of the fabric to be entrenched.
4. Backfill trench over base of fabric.
5. Fix self-supporting geotextile to upslope side of posts with wire ties or as recommended by geotextile manufacturer.
6. Join sections of fabric at a support post with a 150 mm overlap.

APPENDIX 5

Evidence of Consultation with Governing Authorities

Matt Collins
PO Box 55
MILPERRA NSW 2214

Our ref: 10 ERM2013/0830
File No: 9056802
Your Ref: 2604, DA75/256 Mod3

Attention:

13 November 2013

Dear

Re: Controlled activity approval number: – 10 ERM2013/0830
Described as: Sand and Soil Extraction
Being carried out at: Spring Farm and Nesbitt Site at Macarthur Road, ELDER
Date of Issue 8 October 2013 : Date of Expiry 8 October 2018.

The Office of Water is currently processing your request to return of a security it holds for above approval as exchange bond amount has been received.

Please be advised the original Bank Guarantee for \$43,850.00 will be sent directly to you our Finance unit.

If you do not receive this cheque or transfer within the next 28 working days, please contact by phone **02 8838 7535**, or email **mohammed.ismail@water.nsw.gov.au**, so the matter be followed up on your behalf.

Yours sincerely



Mohammed Ismail
Water Regulation Officer
NSW Office of Water
Water Regulatory Operations Sydney

Land:	Nesbitt Property	2011 DP587631	
	Spring Farm Property	Lo1 1 DP587631	
	Penman Property	Lot 32 DP635271	
Security:	*Nesbitt Property	Lot 22 5 June 2002	\$ 43,850
	Spring Farm Property	Lot 1 5 June 2002	\$45,200
	Penman Property	Lot 32 21 June 2013	\$43,850

* It is agreed this security is to be returned by NOW as it is replaced by Penman security

Summary: The Company's extractive industry operations are now covered by one consolidated activity approved 10ERM 2013/830.

Formerly it was regulated by the following permits:

Spring Farm Approval	04/4720
Nesbitt Approval	04/4722

As a result the new permit has consolidated the previously approved drawings of extraction, regeneration and also incorporated the new requirements for Penman Property.

The Register of Documents and plans that apply to the new approval 10ERM 2013/830 are:

1. Notice of Determination NOW 8 October, 2013 Pages 1 & 2
2. NOW Statement of Approval 8 October, 2013 Pages 1 to 7
3. Schedule 1 - Site Water and Sediment Run Off Management Page 1
4. Attachment 2 - Site Rehabilitation Pages 2, 3 & 4
5. Vegetation Management Plan (Gordon Limburg) Feb 1996 Pages 1 to 10
6. Harvest Scientific Services - Landscape Management Plan 24 April 2013
7. SMEC Urban Approval Plans:

Plan No	Sheet	Date
77310.01.P08	1	Feb 2012
77310.01.P09	2	Feb 2012
77310.01.P16	3	Feb 2012
77310.01.P11	4	Feb 2012
77310.01.P13	6	Feb 2012
77310.01.P12	5	Feb 2012
77310.01.P04	1	13/10/2012
77310.01.P05	2	13/10/2012
77310.01.P06	3	13/10/2012

Plan No	Drawing	Issue	D
JET 0989	2	4	30
JET 0989	3	4	13
JET 0989	4	4	13
JET 0989	7	2	13
JET 0989	8	1	13
JET 0989	9	0	30
JET 0989	10	0	30
JET 0328	11	3	2
JET 0328	12	2	2
JET 0328	13	2	2
JET 0328	14	2	2
JET 0328	15	2	2
JET 0328	16	2	2

9. Final Landform and Rehabilitation Management Plan Figure 3 No. 4 September, 2012

10. Haulage Routes to Spring Farm Quarry

EXPIRY DATE: 8 October, 2018 and an application to extend the approval must be made at least one month prior to the expiry date.

File Electronic: R/managing director/judy/M Collins & Sons Holdings Pty Ltd A 521 871/Consent File/NOW CAA 10ERM 2013 830

HARD COPY: NOW Controlled Activity Approval 10ERM 2013/830

Approved Plans: Storage Room/NOW/Controlled Activity Approval 10 ERM

Matt Collins
PO Box 55
MILPERRA NSW 2214

Our ref: 10 ERM2013/830
Previous Ref: ERM10/523 (ERM04/4720)
ERM10/210 (ERM04/4722)
File No: 9056802
Related Files: 0410826; 0151208
Development Ref: 75/256 Mod3; L & E 10
Other Related Approvals: DA252/93; 2604
27-1-89; Planning 75/256 (13-1

Attention: Matthew J. Collins

8 October 2013

Dear Sir

Re: Controlled activity approval – 10 ERM2013/830
For activity described as: Spring Farm Sand and Soil Extraction,
To be carried out at: 186 MacArthur Road, Elderslie
Date of Issue 8 October 2013; Date of Expiry 8 October 2018.

I refer to your application for a controlled activity approval under the *Water Management Act 2000* which was received at this office. Receipt of your application fee of \$2141 (\$864+\$854+\$423) is also acknowledged.

1. Controlled activity approval

The Office of Water has determined to grant you a controlled activity approval. Please find enclosed the **Notice of Determination** together with your **Statement of Approval**.

Please read carefully the conditions of the approval and seek clarification from the Office of Water for any condition not fully understood.

A **copy** of this approval and any annotated documentation should be **provided to council certifier** and to all **contractors** engaged in the implementation of this controlled activity and the Vegetation Management Plan (VMP) to ensure they are also aware of the conditions.

The controlled activity approval must be kept **current until** the controlled activity has been **completed**. Applications for **extending the approval** should be made to the Office of Water in writing, at least **one month** prior to the expiry date on the approval.

2. Security (bond or bank guarantee)

The Office of Water acknowledges receipt of your security as follows:

Number	Provider	Value
1	M Collins and Sons Holdings PL	\$43,850.
2	M Collins and Sons Holdings PL	\$45,200.

in the event the Office of Water may also alter or vary the amount of the security.

Please also note that a security release fee will apply to the release, replacement or exchange of a security held by the Office of Water.

3. Inspections and fees

As the approval holder, you are required to notify the Office of Water on completion of the controlled activity. A site inspection may be needed to confirm that all of your obligations under the controlled activity approval have been carried out.

Costs associated with a single inspection may be covered by the application fee. However, if extra inspections or significant reassessment is required then additional fees will be incurred.

Fees will also apply to any amendments requested or any extension of this approval. The current fee schedule is available at:

www.water.nsw.gov.au [Water licensing](#) > [Approvals](#) > [Controlled activities](#)

4. Other approvals may be required

Subject to the conditions of the attached Statement of Approval, the approval holder is authorised to carry out the controlled activity described at the location specified.

The attached Statement of Approval does not relieve the approval holder of any obligations which may exist to also obtain permission / approval / consent from any other agency which may have some form of control over the site or the proposed development.

In the event that there is an inconsistency between the drawings, other documentation and the conditions herein, the interpretation that will result in the best outcome for the stabilisation of the Site and the subsequent rehabilitation and maintenance of the Site and protected land adjacent to the river, is to prevail. Such interpretation is to be applied in consultation with, and with the approval of the Office of Water.

You need to implement all practicable measures to prevent or minimise any harm to the environment that may result from the operation you intend to carry out according to the Controlled Activity Approval and rehabilitate the site.

Any questions regarding this correspondence should be directed to **Mohammed Ismail** at mohammed.ismail@water.nsw.gov.au.

Yours sincerely



Mohammed Ismail
Water Regulation Officer
NSW Office of Water

Enc:
Notice of Determination; Statement of Approval

Approval Number

10 ERM2013/0830

First applicant

Mr

Last Name

Collins

First Name

Matt

Address

PO Box 55

MILPERRA NSW 2214

Contact

0297741544

Fax:

Email

matt@mcollins.com.au

Second applicant (if applicable)

Last Name

First Name

Address

Town:

State:

P/Code:

Contact

Ph:

Fax:

Email

Determination

Application type

Controlled Activity Approval

to be issued under Part 3, Chapter 3 of the *Water Management Act 2000* matters assessed as integrated development under Part 4 of the *Environmental Planning & Assessment Act 1979*

Determination

☒ Granted (subject to conditions)☐ Refused

Date of Determination

8 October 2013

Reasons for Determination

see Attachment 1

Date of Expiry

8 October 2018

Location

Spring Farm and Nesbitt Site at Macarthur Road, ELDERSLIE

Description of activity

Sand and Soil Extraction

Determining Officer

Signature



Name

Mohammed Ismail

by delegation from the Minister administering the
Water Management Act 2000

Right of Appeal: Section 368 of the *Water Management Act 2000* gives a right of appeal in certain circumstances. As this application has been assessed as integrated development it will not be subject to any third party appeal under the *Water Management Act 2000*. This does not affect any right of appeal an objector may be entitled to under section 98 of the *Environmental Planning and Assessment Act, 1979*.

Reason for determination

Approval Number: 10 ERM2013/0830

Reason:

This controlled activity approval is granted on the basis that the of Water is satisfied the proposed development has adequate arrangements in place to ensure that no more than minimal harm is done to waterfront land at this site as a consequence of carrying out the proposed controlled activity.

This controlled activity approval is subject to the attached conditions.

	Town/City MILPERRA	State NSW	P/
Holder's name(2):			
Postal Address:			
	Town/City	State	P/
Company Name:	M Collins & Sons Holdings Pty Ltd		
ACN (if applicable):	000521871		
Office Address:	17 Fitzpatrick Street		
	Town/City REVERSBY	State NSW	P/

Property/land owner's details

Name of Owner/s (1)	Matt Collins		
Postal Address:	PO Box 55		
	Town/City MILPERRA	State NSW	P/C
Name of Owner/s (2)	Gregory Penman		
Postal Address:	172 Macarthur Road		
	Town/City Spring Farm	State NSW	P/C

IMPORTANT NOTICE – Change of approval holder or landholder or contact person

Please advise the Office of Water in the event of any of the following as soon as practicable.

- If there is a change in the ownership or occupation of the land benefited by this approval (see Schedule 2). Under the *Water Management Act 2000*, an approval is typically held by the owner or lawful occupier of the benefited land. Consequently, a change in ownership may change in your legal obligations as an approval holder. *
- If there is a change to the contact person or their contact details. You will be required to provide a written statement signed by all the approval holders. *
- If there is a change in the mailing address for the nominated contact person. This must be notified by the contact person in writing.

* An updated Statement of Approval reflecting these changes will be issued free of charge.

Approval details

Approval No: **10 ERM2013/0830**

File

Previous Ref: ERM10/523 (ERM04/4720)
ERM10/210 (ERM04/4722)

Status: CURRENT *

Approval type: Controlled Activity Approval

Water sharing plan: not applicable

Period of Approval

Date of effect: 8 October 2013

Expiry date: 8 October 2018

Approval holder(s): Schedule 1

Description of activity: Schedule 2

Conditions: Schedule 3

Contact for service of documents

Name: Matt Collins

Address: PO Box 55, MILPERRA, NSW, 2214

* NOTE: An approval has effect for such period as is specified in the approval, or extended under section 105 of the *Water Management Act 2000*, that extended period if an application for extension of an approval is lodged before the approval expires, the expiring approval is extended until either the date of the final decision on the application or the date fixed by the Minister for the approval, whichever is the later date. An approval can be the subject of an application to extend it but it needs to be accompanied by a declaration of the reasons for the delay in making the application. If the Minister is satisfied on reasonable grounds the term of the approval is taken to have been extended, and the application is dealt with, as if the application had been made before the approval expired.

It is an offence under the *Water Management Act 2000* to breach a term or condition of an approval or to construct or carry out a controlled activity to which the approval does not apply if the approval has expired, been surrendered or cancelled.

Subject to the conditions of this approval, in relation to the controlled activity of
holders of this approval are authorised to construct and carry out the controlled
location specified:

Controlled activity: Sand and Soil Extraction,

Property Name:

Site address: 186 Macarthur Road, Spring Farm NSW 2570

Lot 1	DP 587631	Parish	County
Lot 22	DP 833317	Parish	County
Lot 32	DP 635271	Parish	County

Local Council: Camden Council

Development

Reference: 75/256 Mod3; L&E 10409/1995; (DA252/93)
(if applicable)

Name of watercourse: Nepean River

Catchment name: Hawkesbury Nepean

Security Details (if applicable)

Number	Provider	Value
1	M Collins and Sons Holdings PL	\$43,850.00
2	M Collins and Sons Holdings PL	\$45,200.00

1

Application fees

Fee: \$ 2,141.00 has been paid exclusive of GST

Receipt No: PAR13-06933; PAR13-693, PAR13-815

Approval issued by

Officer's name Mohammed Ismail

Number	Condition
Plans, standards and guidelines	
1	This Controlled Activity Approval number 10 ERM2013/0830 only applies to the controlled activity at the location marked on the Aerial Site Photo as approved by the NSW Office of Water and on 8 October 2013. This Controlled Activity Approval does not permit controlled activities at any other location.
2	The approval holder must not transfer this Controlled Activity Approval 10 ERM2013/0830 without the approval of the NSW Office of Water.
3	The approval holder must keep a copy of the current Controlled Activity Approval 10 ERM2013/0830 at all times and make this approval available to officers from the NSW Office of Water on request.
4	If the controlled activities described in this Controlled Activity Approval 10 ERM2013/0830, have commenced or been completed within the period of this approval, the approval holder must apply to the NSW Office of Water for a new approval or seek an extension prior to the lapsing of the current approval.
5	The approval holder must notify the NSW Office of Water in writing within 14 calendar days of the approval holder: (i) site management; (ii) land ownership; (iii) land occupation.
6	The approval holder must comply with the requirements of each of the plans approved by the NSW Office of Water and stamped on 8 October 2013 (or as indicated) as follows: i. Plan No. 77310.01.P08, Original Surface Contours (1983) by SMEC Urban ii. Plan No. 77310.01.P09, Current Surface Contours (2008) by SMEC Urban iii. Plan no. 77310.01.P16, Design Final Surface Contours by SMEC Urban. iv. Plans Nos. 77310.01.P04, 77310.01.P05, 77310.01.P06, 77310.01.P11, 77310.01.P12, 77310.01.P13, Sand Mining Cross Sections by SMEC Urban. v. Plans No JET0328 drawing Nos 11 (issue 3) and 12 to 16 (inclusive all issue 2) by JET Environmental Technology as indorsed by Department Land & Water (now office of Environment and Planning). vi. Plans No JET0989 drawing 2 to 4 inclusive and 7 to 10 inclusive.
7	The approval holder must carry out all vegetation management, erosion and sediment control and rehabilitation activities in accordance with the plans and schedules approved by the NSW Office of Water and stamped on 8 August 2013 as follows: i. Landscape Management Plan dated 24 April 2013 by Harvest Scientific Services Pty Ltd ii. Figure 3 Final Landform and Rehabilitation Management Plan No 201279 dated 4 September 2012 by Harvest Scientific Services iii. Attachment 1 to this CAA, Site drainage and erosion control measures. iv. Attachment 2 to this CAA, Site Rehabilitation v. Vegetation Management Plan (VMP), The Knoll, Spring Farm, Elderslie NSW date 10/08/2012
8	The approval holder must submit for approval, by the NSW Office of Water, any amendment to the plans in Condition 6 (six) prior to carrying out any works in relation to the approved controlled activity.
9	The approval holder must clearly mark on the ground, the boundaries of the areas where the controlled activity is to be carried out before commencement of the controlled activity, and maintain these boundaries until the works are completed.

	or water and clearly mark these cross sections with stakes using a GPS with an agreed coo
11	The approval holder must comply with the requirements of the approved Vegetation Manage dated February 2002 to the extent that it relates to the carrying out of the rehabilitation activi which is the subject of this controlled activity approval.
12 - 15	N/A
16	The approval holder must maintain the approved controlled activity on waterfront land for a p years from the date of completion of the controlled activity works.
17	The approval holder must complete a maintenance period of two (2) years after final planting described in the Vegetation Management Plans (VMP) approved by the NSW Office of Water
18	The approval holder must reinstate land in the manner and to the extent described in the reh stated in condition 7, approved by the NSW Office of Water and stamped on 8 August 2013.
19	N/A.
20	The approval holder must submit survey plans to a professional standard of work as execute information required by the NSW Office of Water within 14 days of completion of the controlle
21	At practical completion and/or at the end of the maintenance period, the approval holder mus written report to the NSW Office of Water evidencing completion of the approved controlled a
22	The approval holder must provide a report on the implementation of the vegetation managem to the NSW Office of Water at the completion of the revegetation works at every twelve (12) m end of the maintenance period that must include: (i) a schedule and map showing the vegetation species, number and location of initial a replacement plantings and propagation materials, and (ii) the date of planting of vegetation, and (iii) the percentage cover of groundcover, shrubs, trees and weeds, and (iv) any problems that impacted on the survival rates of plants including climatic, fire, floo vandalism, and (v) a map of the location of any staged activities, and (vi) photographs showing the revegetation works during the reporting period.
23	The approval holder must provide the NSW Office of Water with a certificate of completion of activities and also a certificate of completion of maintenance to best practice provided by pers experienced and/or qualified in such certification at the completion of the maintenance period.
24	The approval holder must provide a progress report to the NSW Office of Water every twelve
25	The approval holder must notify the NSW Office of Water in writing within seven (7) days if the activity (i) ceases for a period of more than 30 calendar days; or (ii) is terminated before its full completion, or (iii) is resumed.
Security deposits	
26	The approval holder must provide security of \$ 45,200 and \$43,850 by way of bank guarantee Office of Water prior to commencing the controlled activity work. The security deposit will be h time as the controlled activity, together with any rehabilitation or revegetation works, have bee accordance with the conditions of this approval. The approval holder must certify compliance v conditions of this Controlled Activity Approval (certificate of compliance) prior to the release of being held for the controlled activity.

35	The approval holder must relocate any material outside the designated riparian corridor.
36	The approval holder must not leave materials which could obstruct the flow of water or damage on waterfront land at any time.
37	The approval holder must remove surplus material when operations cease and the controlled completed.
38	The approval holder must not put materials in the drainage line or river or in any area that has vegetation and/or that is identified as part of the riparian corridor.
Drainage and Stormwater	
39	The approval holder must establish all drainage control works in accordance with any Plan approved by the NSW Office of Water.
40 - 41	N/A
Erosion control	
42	The approval holder must establish erosion and sediment control works in accordance with F and approved by the NSW Office of Water prior to the commencement of any other works on
43	The approval holder must not locate permanent basins within 40 meters of the highest bank
44	The approval holder must use only biodegradable materials for any erosion control matting in corridor.
45	The approval holder must decommission all erosion and sediment control works using a suit person.
46	The approval holder must (i) implement erosion and sediment control measures in accordance requirements of the Managing Urban Stormwater Manual, Volume 1, Soils and Construction Edition, March 2004) prior to any works commencing at the site; and (ii) maintain the control the duration of the approval to prevent sediment and dirty water entering the waterway.
47 - 48	N/A
Excavation	
49	The approval holder must not excavate beyond a depth of 3 metres above the normal flow v as R55.63).
50	The approval holder must not excavate beyond: i. The depth shown on Plans No. 77310.01.P04, 77310.01.P05, 77310.01.P06, 77310.01.P12 & 77310.01.P13, Sand Mining Cross Sections by SMEC Urban app NSW Office of Water and stamped on 8 October, 2013. ii. The approval holder must not excavate below the depth shown on plans JET0328 14, & 15 (all issue 2) prepared by Johnstone Environmental technology Stamped c iii. The approval holder must not excavate below the depth shown on plans JET0.98 issues 1, drawing 9 issues 0 and drawing 10 issues 0.
51 - 52	N/A
53	The approval holder must not allow machinery to enter or work in the Nepean River at any
54	N/A
Maintaining river	
55	The approval holder must not reduce river width, divert or realign the river from its existing otherwise than in accordance with a Plan approved by the NSW Office of Water.

5	The approval holder must grade the surfaces of river banks to a grade no flatter than 1 vertical to 3 horizontal, and no steeper than 1 vertical to 3 horizontal and grade them smooth and free of ridges.
58 - 65	N/A
66	The approval holder must maintain and protect vegetation growing along the toe and face of and 3 metres above normal flow level of the river.
67	N/A
Vegetation management and riparian corridor	
68	The approval holder must delineate, protect and maintain a riparian corridor with a width of 4 measured horizontally landward from the top of the river bank, otherwise than in accordance approved by the NSW Office of Water.
69 - 70	N/A
71	The approval holder must not remove or damage vegetation on waterfront land otherwise than with a Plan approved by the NSW Office of Water.
72	The approval holder must not compromise the implementation of the Vegetation Management for any work and/or controlled activity at the site.
73	N/A
74	The approval holder must only use virgin excavated natural material (VENM) that does not contain weed plants or seeds as fill within the tailings emplacement area.
75	N/A
END OF CONDITIONS	

31st January, 2013.

Mr. Jeremy Swan,
Acting Director Development and Environment,
Camden Council,
P O Box 183,
CAMDEN NSW 2570

Dear Jeremy,

**RE: s75W Modification of Development Consent granted by the Minister of Planning
(DOPI) for the Spring Farm Quarry at 186 Macarthur Road, Spring Farm NSW 2570**

On 25 October, 2012 the abovementioned consent was issued to carry out extractive and processing operations on the adjoining property Lot 32 DP635271 at 172 Macarthur Road, Spring Farm NSW 2570 in accordance with the Environmental Assessment titled Modification of Spring Farm Quarry Development Consent (DA75/2056) prepared by Pascoe Planning Solutions dated April 2012 including response to submissions titled Review of Exhibition/Consultation Submissions, Part 1 August 2012 and Part 2 dated September, 2012.

The DOPI has instructed that we consult with Council in relation to the updated management plans that incorporate the additional scope of works that will occur at Lot 32 DP635271.

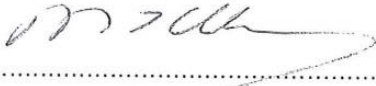
Accordingly we are pleased to attach copies of the following plans for your review.

- Waste Management Plan prepared by Harvest Scientific Services (201279) dated 20 April, 2012
- Landscape & Management Plan including the Rehabilitation Management Plan prepared by Harvest Scientific Services (201279) dated 20 April, 2012..

We will contact you in the near future to arrange a meeting to discuss any further information you may require in relation to the abovementioned plans.

Yours faithfully,

M. COLLINS & SONS HOLDINGS PTY LTD


.....
Matthew J. Collins
Managing Director

20 June 2012

Attention: Mr Kane Winwood
Major Development Assessment
Department of Planning and Infrastructure
GPO Box 39
SYDNEY NSW 2001



Dear Sir,

RE: SPRING FARM QUARRY EXTENSION (DA 75/253 MOD 3)

**PROPERTY: Macarthur Road, Spring Farm
LOT: 32 DP: 635271 and LOT: 22 DP 833317**

I refer to the Department's letter dated 22 May 2012 regarding the proposed modification of the existing Spring Farm Quarry consent, which seeks approval for the further extraction of approximately 400,000 cubic metres of sand/soil at the above site.

Thank you for inviting Council to comment on this proposal. A review has been undertaken of the Environmental Assessment (EA) and the supporting reports provided and Council is generally supportive of the proposal. Below are our comments in relation to the proposal:

Acoustic

The recommendations of the acoustic report are considered acceptable and should be adopted in any modified development consent.

The proposed extension of quarrying activity must adopt the following operational constraints in-order to comply with adopted noise criterion:

- A maximum of two 40 tonne caterpillar dump trucks travel in /out of extraction site (per 15 minute period);
- One 36 tonne caterpillar operates continuously digging the sand / soil;
- One caterpillar 966 loader travelling within and operating within the extraction pit;
- A maximum of one power screen machine operating continuously.

Salinity

Council believes that the recommendations in the Salinity Management Plan that involve specific and general construction and management advice and the adoption of groundwater management protocols (produced by Harvest Scientific Services) be adopted and applied to the site.

Contamination

Council does not accept the report's recommendation that consent or approval be issued with conditions for further detailed contamination soil assessment for identified Areas of Environmental Concern (AEC's).

Council's Management of Contaminated Lands policy requires a Phase 2 - detailed investigation to be undertaken for all AEC's identified as part of a Phase 1 investigation prior to any approval / consent being issued for a development proposal.

Where contamination is identified after the Phase 2, a Remediation Action Plan (RAP) would also be required to be provided (to Council) for approval. Only after acceptance of a RAP (by Council) would suitable conditions be placed on a consent for remediation.

Stormwater

The MUSIC modelling results in the report prepared by Harvest Scientific Services Pty Ltd, ref 201279, dated 15 February 2012, should be reviewed and assessed by a person with suitable knowledge and/or expertise at the Department of Planning and Infrastructure, to confirm that the data, methodology adopted and outcomes are acceptable.

Groundwater

Council is satisfied with the outcomes of the groundwater assessment. The recommendations of the report should be adopted in any modified development consent.

Environmental Monitoring

Council agrees with the recommendation of the Annual Environmental Monitoring Report that air quality particulates will need to be monitored to ensure that Total Suspended Particles and PM10 are compliant.

Flora and Fauna

Council has reviewed the revised Flora and Fauna Assessment prepared by Actinour Environmental Consultants, February 2012 and makes the following comment regarding Part 3.4.1.3 "Tracts of contiguous natural vegetation":

In relation to no works occurring within the drip-line of any natural community, it is recommended that a condition of consent require the drip-line area be clearly labelled and marked on corresponding maps of the site – ensuring that works do not occur within this area. The drip-line of the vegetation community should be determined by a person with suitable knowledge and/or expertise.

Landscape

Council has reviewed the Landscape Management Plan (LMP) prepared by Harvest Scientific Services Pty Ltd, February 2012 (HSS) and makes the following comments in relation to Part (a) "Water Management Act 2000 and Controlled Activity Approval":

The current Controlled Activity Approval (CAA) from the NSW Office of Water expires on 8 April 2013 and will not reflect the proposed works. As such, it is recommended that a condition of consent require an amended CAA for the period of works and that the applicant provide Council with an amended CAA prior to works commencing. Further, that all conditions listed in the amended CAA be strictly adhered to.

Council makes the following comments in relation to Part 5.7 "Revegetation program":

In regards to the restoration zones known as Zone 1 the Nepean River and Zone 2 Dry River Anabranche, it is recommended that a condition of consent require the applicant to follow the processes and techniques as specified by HSS in their LMP to ensure that the Office of Environment and Heritage's targets as outlined in *How to Prepare a Vegetation Management Plan, Version 6* are achieved, and that these areas will provide over the longer term a greater diversity of habitats suitable for flora and fauna, thus increasing the overall biodiversity of the area.

Council makes the following comments in relation to Part 5.10.1 "Improving habitat value":

HSS have specified in their report that all plantings are to be mulched with recycled green waste. It is recommended that a condition of consent require that any recycled green waste that is used for this purpose be free from weed seeds and pathogens. Ideally it should come from a reputable source. If weeds do germinate in the green waste, they need to be appropriately treated as soon as possible to reduce the potential for further spread of weeds resulting in the degradation of habitat areas.

Traffic and Engineering

The contractors provided a Statement of Commitments for Spring Farm Quarry to the Department of Planning in April 2009, in which they committed to record and maintain comprehensive logs of truck movements. The daily truck movements data provided by the contractors for 2010-2011 clearly demonstrates that the recent truck movements to the adjacent public roads from the quarry is 12 per day (when averaged over any working week) or a maximum of 54 on any working day (refer page 79 of the Environmental Assessment). The number of truck movements from the quarry to Macarthur/Springs Road reflected in the graphical presentation for 2010-2011 is tolerable and acceptable.

Heavy vehicle movements in Macarthur Road will have a significant impact on Council's proposed Spring Farm residential development frontage to Macarthur Road. Any increase from current trend of truck use (average 12 per day or maximum of 54 on any working day) in Macarthur/Springs Road is not supported by Council.

The proposal has not assessed or commented on the safety of the current design of the Macarthur Road/Springs Road intersection. The performance of the intersection needs to be re-assessed, considering the anticipated traffic from the Spring Farm residential area adjacent to the quarry, as this area is gradually (and fully) developed in the future.

The NSW Roads and Maritime Service should be consulted further about the above aspects of the proposal.

Council recently reviewed the maintenance levy for damage to Macarthur Road caused by truck movements and is currently satisfied that the levy rate (including CP indexes) payable until the project's completion in 2019 will cover the maintenance and reconstruction costs associated with the truck movements.

Aboriginal and European Heritage

It is recommended that conditions of consent which appropriately protect potential Aboriginal archaeology found within the subsurface of the subject site be adopted.

Similarly, conditions of consent which require that upon the conclusion of the excavation operations, the final landform be reinstated to complement the landscape vista of the Nepean River Alluvial Flats.

Strategic Planning Comments

Council considers that the amended EA has now adequately addressed the vital role that the resource plays on the local, regional and metropolitan level; the lifecycle of the site; and that the EA appropriately details the post extractive land use as reinstating the final landform as Class 1 agricultural land.

The proposal is consistent with the strategy for resource recovery and is generally compatible with the staged rollout of the residential development throughout the Spring Farm Urban Release area in a strategic land use context (subject to the comments made above in this correspondence).

Should you have any enquiries in relation to this matter, please do not hesitate to contact the undersigned on (02) 4654 7774.

Yours sincerely,



Ms A M Jones
TOWN PLANNER
(Development Branch)

Service (TIS) on 131 450 and ask them to contact Council on 02 4654-7777 on your behalf.

English

Arabic

Croatian

Ove informacije su važne. Ako vam treba pomoć da biste razumjeli ovaj dokument, molimo vas da nazovete Službu prevodilača i tumača (TIS) na 131 450 i zamolite ih da u vaše ime nazovu Opštinu na 02 4654 7777.

German

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Greek

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Italian

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Maltese

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Spanish

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Tagalog

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Chinese

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To: Jim Cupitt

Subject: RE: Landscape Management Plan - M Collins site - Lot 22 DP 833317

Jim,

The Landscape Management Plan is satisfactory and also complies with Controlled Activity Approval site

I should also mention that DWE the Dept of Water & Energy has recently been name changed to NSW Office of Water.

regards

Dominic (Nick) Bruszewski
Landscape Development Officer

Camden Council | PO Box 183, Camden NSW 2570

P: 02 4654 7742 M: 0419 628 9751 Email: dominic.bruszewski@camden.nsw.gov.au |

www.camden.nsw.gov.au

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From: Jim Cupitt [mailto:jimcupitt@harvestscientific.com.au]

Sent: Tuesday, 17 November 2009 8:53 AM

To: Dominic Bruszewski

Cc: 'Mart Rampe'

Subject: Landscape Management Plan - M Collins site - Lot 22 DP 833317

Dear Nick,

Further to our conversation today, please find appended hereto:

- 1) A copy of the draft Landscape Management Plan (LMP) for the M Collins Spring Farm site (Lot 22 DP 833317); and
- 2) A copy of the Department of Planning (DoP) 'Notice of Determination' for your reference.

The LMP has been provided to allow Camden Council the opportunity to comment on the recommendations outlined in that document – as per the DoP recommendations.

Should you have any further questions please do not hesitate to contact me.

Regards

Jim Cupitt
Senior Environmental Scientist

Harvest Scientific Services

Tel: 02 4647 6177

Fax: 02 4647 7332

Email: jimcupitt@harvestscientific.com.au



Think of the environment, please don't print this e-mail or any attachments unless you really need to.

17/11/2009

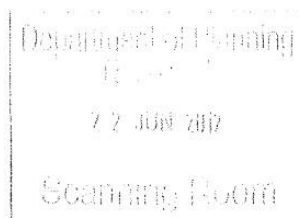


Camden Council
37 John Street, Camden NSW 2570 DX 25807
PO Box 183, Camden 2570 ABN: 31 117 341 764
Telephone: 02 4654 7777 Fax: 02 4654 7829
Email: mail@camden.nsw.gov.au



20 June 2012

Attention: Mr Kane Winwood
Major Development Assessment
Department of Planning and Infrastructure
GPO Box 39
SYDNEY NSW 2001



Dear Sir,

RE: SPRING FARM QUARRY EXTENSION (DA 75/253 MOD 3)

**PROPERTY: Macarthur Road, Spring Farm
LOT: 32 DP: 635271 and LOT: 22 DP 833317**

I refer to the Department's letter dated 22 May 2012 regarding the proposed modification of the existing Spring Farm Quarry consent, which seeks approval for the further extraction of approximately 400,000 cubic metres of sand/soil at the above site.

Thank you for inviting Council to comment on this proposal. A review has been undertaken of the Environmental Assessment (EA) and the supporting reports provided and Council is generally supportive of the proposal. Below are our comments in relation to the proposal:

Acoustic

The recommendations of the acoustic report are considered acceptable and should be adopted in any modified development consent.

The proposed extension of quarrying activity must adopt the following operational constraints in-order to comply with adopted noise criterion:

- A maximum of two 40 tonne caterpillar dump trucks travel in /out of extraction site (per 15 minute period);
- One 36 tonne caterpillar operates continuously digging the sand / soil;
- One caterpillar 966 loader travelling within and operating within the extraction pit;
- A maximum of one power screen machine operating continuously.

Salinity

Council believes that the recommendations in the Salinity Management Plan that involve specific and general construction and management advice and the adoption of groundwater management protocols (produced by Harvest Scientific Services) be adopted and applied to the site.

English

"This information is important. If you need help understanding this document please call the Translating and Interpreting Service (TIS) on 131 450 and ask them to contact Council on 02 4654-7777 on your behalf."

Arabic

هذه المعلومات هامة. إذا كنت بحاجة مساعدة لفهم هذا المستند، يرجى الاتصال بخدمات الترجمة والتفسير (TIS) على الرقم 131 450 واطلب منهم الاتصال بمجلس على الرقم 02 4654-7777 نيابة عنك.

Croatian

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Greek

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Contamination

Council does not accept the report's recommendation that consent or approval be issued with conditions for further detailed contamination soil assessment for identified Areas of Environmental Concern (AEC's).

Council's Management of Contaminated Lands policy requires a Phase 2 - detailed investigation to be undertaken for all AEC's identified as part of a Phase 1 investigation prior to any approval / consent being issued for a development proposal.

Where contamination is identified after the Phase 2, a Remediation Action Plan (RAP) would also be required to be provided (to Council) for approval. Only after acceptance of a RAP (by Council) would suitable conditions be placed on a consent for remediation.

Stormwater

The MUSIC modelling results in the report prepared by Harvest Scientific Services Pty Ltd, ref 201279, dated 15 February 2012, should be reviewed and assessed by a person with suitable knowledge and/or expertise at the Department of Planning and Infrastructure, to confirm that the data, methodology adopted and outcomes are acceptable.

Groundwater

Council is satisfied with the outcomes of the groundwater assessment. The recommendations of the report should be adopted in any modified development consent.

Environmental Monitoring

Council agrees with the recommendation of the Annual Environmental Monitoring Report that air quality particulates will need to be monitored to ensure that Total Suspended Particles and PM10 are compliant.

Flora and Fauna

Council has reviewed the revised Flora and Fauna Assessment prepared by Actinous Environmental Consultants, February 2012 and makes the following comments regarding Part 3.4.1.3 "Tracts of contiguous natural vegetation":

In relation to no works occurring within the drip-line of any natural community, it is recommended that a condition of consent require the drip-line area be clearly labelled and marked on corresponding maps of the site – ensuring that works do not occur within this area. The drip-line of the vegetation community should be determined by a person with suitable knowledge and/or expertise.



Landscape

Council has reviewed the Landscape Management Plan (LMP) prepared by Harvest Scientific Services Pty Ltd, February 2012 (HSS) and makes the following comments in relation to Part (a) "Water Management Act 2000 and Controlled Activity Approval":

The current Controlled Activity Approval (CAA) from the NSW Office of Water expires on 8 April 2013 and will not reflect the proposed works. As such, it is recommended that a condition of consent require an amended CAA for the period of works and that the applicant provide Council with an amended CAA prior to works commencing. Further, that all conditions listed in the amended CAA be strictly adhered to.

Council makes the following comments in relation to Part 5.7 "Revegetation program":

In regards to the restoration zones known as Zone 1 the Nepean River and Zone 2 Dry River Anabranch, it is recommended that a condition of consent require the applicant to follow the processes and techniques as specified by HSS in their LMP to ensure that the Office of Environment and Heritage's targets as outlined in *How to Prepare a Vegetation Management Plan, Version 6* are achieved, and that these areas will provide over the longer term a greater diversity of habitats suitable for flora and fauna, thus increasing the overall biodiversity of the area.

Council makes the following comments in relation to Part 5.10.1 "Improving habitat value":

HSS have specified in their report that all plantings are to be mulched with recycled green waste. It is recommended that a condition of consent require that any recycled green waste that is used for this purpose be free from weed seeds and pathogens. Ideally it should come from a reputable source. If weeds do germinate in the green waste, they need to be appropriately treated as soon as possible to reduce the potential for further spread of weeds resulting in the degradation of habitat areas.

Traffic and Engineering

The contractors provided a Statement of Commitments for Spring Farm Quarry to the Department of Planning in April 2009, in which they committed to record and maintain comprehensive logs of truck movements. The daily truck movements data provided by the contractors for 2010-2011 clearly demonstrates that the recent truck movements to the adjacent public roads from the quarry is 12 per day (when averaged over any working week) or a maximum of 54 on any working day (refer page 79 of the Environmental Assessment). The number of truck movements from the quarry to Macarthur/Springs Road reflected in the graphical presentation for 2010-2011 is tolerable and acceptable.

Heavy vehicle movements in Macarthur Road will have a significant impact on Council's proposed Spring Farm residential development frontage to Macarthur Road. Any increase from current trend of truck use (average 12 per day or maximum of 54 on any working day) in Macarthur/Springs Road is not supported by Council.



The proposal has not assessed or commented on the safety of the current design of the Macarthur Road/Springs Road intersection. The performance of the intersection needs to be re-assessed, considering the anticipated traffic from the Spring Farm residential area adjacent to the quarry, as this area is gradually (and fully) developed in the future.

The NSW Roads and Maritime Service should be consulted further about the above aspects of the proposal.

Council recently reviewed the maintenance levy for damage to Macarthur Road caused by truck movements and is currently satisfied that the levy rate (including CPI indexes) payable until the project's completion in 2019 will cover the maintenance and reconstruction costs associated with the truck movements.

Aboriginal and European Heritage

It is recommended that conditions of consent which appropriately protect potential Aboriginal archaeology found within the subsurface of the subject site be adopted.

Similarly, conditions of consent which require that upon the conclusion of the excavation operations, the final landform be reinstated to complement the landscape vista of the Nepean River Alluvial Flats.

Strategic Planning Comments

Council considers that the amended EA has now adequately addressed the vital role that the resource plays on the local, regional and metropolitan level; the lifecycle of the site; and that the EA appropriately details the post extractive land use as reinstating the final landform as Class 1 agricultural land.

The proposal is consistent with the strategy for resource recovery and is generally compatible with the staged rollout of the residential development throughout the Spring Farm Urban Release area in a strategic land use context (subject to the comments made above in this correspondence).

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Yours sincerely,

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