Appendix A

Water and Leachate Management Plan

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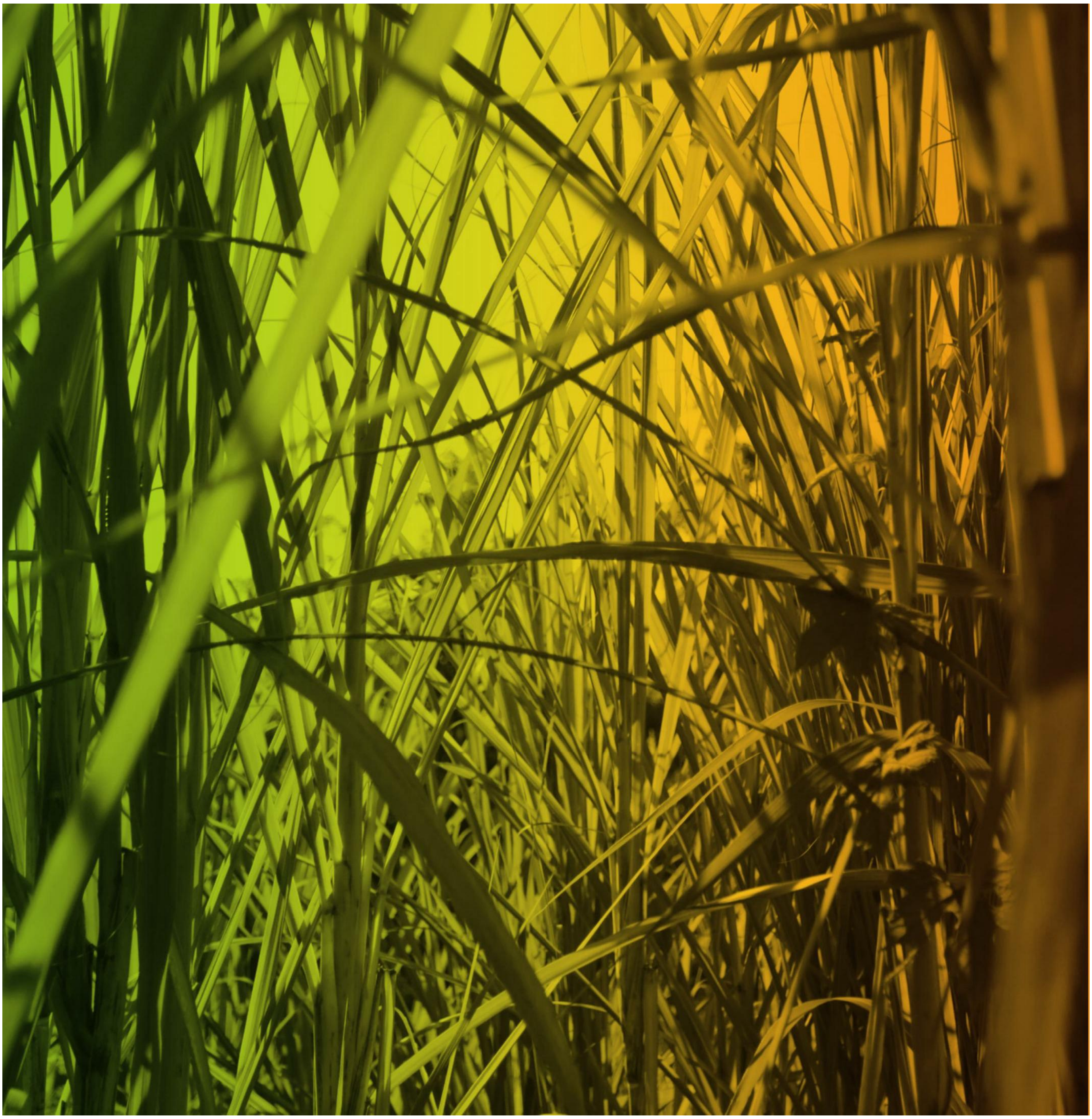
Armidale Regional Landfill Facility



Armidale Regional Landfill Facility

Water and Leachate Management Plan

Prepared for

Armidale Dumaresq Council

Prepared by

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1.0 Introduction

Armidale Dumaresq Council (Council) is proposing a new regional landfill facility to service the Armidale, Uralla, Walcha and Guyra Local Government Areas (LGA). AECOM has been commissioned by Council to provide project management and consultancy services to manage the establishment of the new regional landfill facility.

A Water and Leachate Management Plan has been developed for the proposed Armidale Dumaresq Regional Landfill Facility (proposed landfill facility). It has been developed to ensure that both surface water and leachate is successfully controlled and managed during the operational life of the landfill.

This Water and Leachate Management Plan details all aspects of the surface water and leachate storage at the landfill including the design of a permanent Leachate Pond, Sedimentation Basin and Dry Basin. It includes information on their storage capacities, contingency measures in the event that these capacities are exceeded, and ongoing monitoring requirements that will be undertaken to minimise risk of possible contamination of surface water on the landfill site during operation

This plan forms part of the landfill's environmental management planning process and accompanies the following documents:

- EA related documents
- LEMP related documents

This plan addresses the following NSW EPA Solid Waste Guideline's Benchmark Technique(s):

- 3: Surface Water Controls
- 7: Surface Water Monitoring Program
- 8: Leachate Monitoring Program

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2.0 Existing Site Characteristics

The proposed landfill facility is located 12km east of Armidale, off Waterfall Way (also known as Grafton Road) and approximately one kilometre west of the Gara River. A locality map of the Project Site and its surroundings is shown in Figure 1.

Key attributes of the study area, which have influenced the location and design of the proposed landfill facility, include:

- The distance to the Gara River, which is located approximately 1km to the east of the site
- The proximity of the Oxley Wild Rivers National Park (ORWNP) and Gondwana Rainforests of Australia World Heritage Area (GRAWHA) which is located 4 km south of the Project Site.
- The Gara Travelling Stock Route (TSR), which is a partially protected remnant of good-quality, native vegetation positioned between Waterfall Way and the Edington property boundary.
- Vegetation on the site, which also provides habitat for fauna species. The vegetated areas are located in the TSR area and in the southern portion of the Project Site.
- Proximity of the Project Site to rural residential properties occur within two km of the site to the west (Strathaven) and south (Sherraloy), accordingly it is considered that there is an appropriate environmental buffer to the nearest sensitive receptors.
- The ambient rural locality of the area.

The Project Site falls within part of the Gara River catchment. The Gara River runs to Macleay River, which reaches the ocean at South West Rocks in Northern NSW. There are two unnamed creeks within the site. Both creeks are seasonal, only flowing during wet weather. The flow regime of the creeks has been modified by farm dams located upstream in the adjacent property.

In order to minimise the potential for an offsite impact during construction and operation of the new landfill, proposed measures (refer Section 4 in this report) are provided to minimise erosion and sedimentation include retaining all dirty water and leachate on site to ensure that downstream water quality is not adversely affected by the proposal.

Runoff from the proposed landfill facility falls to the north towards a tributary of the Gara River. There are two small man-made dams within the site. Typical slopes in the upper reaches of the catchment to the south ranges from 15% to 22%, with slopes flattening in the lower reaches to 4 to 6%.

The location of the proposed landfill facility is in the upper reach of the catchment. The closest structure to the creek will be the Dry Basin, which is located approximately 100m from the downstream creek channel. No detailed flood studies have been conducted by Council in this area, hence no flood levels were available. An estimation of the 100 year ARI flow was calculated and a simple Manning's calculation was used to determine the 100 year flood level in these creeks. The preliminary results indicated that the landfill site is outside of the 100 year floodplain.

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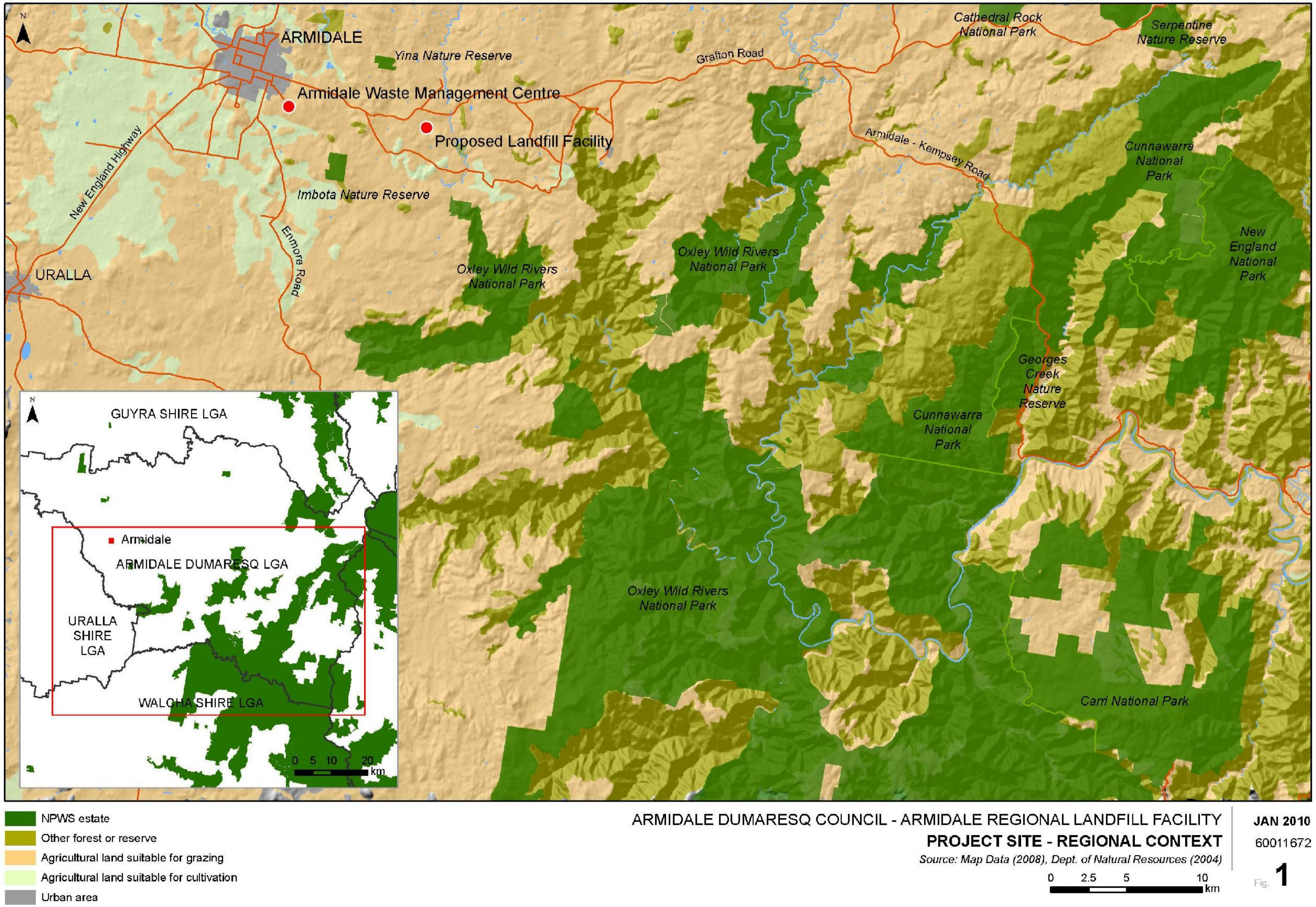
ARMIDALE
Yina Nature Reserve
Armidale Waste Management Centre
Proposed Landfill Facility
Grafton Road
Cathedral Rock National Park
Serpentine Nature Reserve
Armidale - Kempsey Road
New England Highway
Imbota Nature Reserve
Enmore Road
URALLA
Oxley Wild Rivers National Park
Cunnawarra National Park
New England National Park
Georges Creek Nature Reserve
Carri National Park
GUYRA SHIRE LGA
Armidale
ARMIDALE DUMARESQ LGA
URALLA SHIRE LGA
WALCHA SHIRE LGA
0 5 10 20 km
NPWS estate
Other forest or reserve
Agricultural land suitable for grazing
Agricultural land suitable for cultivation
Urban area
ARMIDALE DUMARESQ COUNCIL - ARMIDALE REGIONAL LANDFILL FACILITY
PROJECT SITE - REGIONAL CONTEXT
Source: Map Data (2008), Dept. of Natural Resources (2004)
0 2.5 5 10 km
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Fig. 1

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3.0 Proposed Landfill Design

The proposed landfill facility will be licensed as a General Solid Waste (putrescible) landfill to allow disposal of that class of material when required. However, it will be routinely operated as a General Solid Waste (non-putrescible) landfill. In order to facilitate this, Council is planning to introduce additional waste processing facilities at the existing Waste Management Centre on Long Swamp Road in association with the proposed landfill facility.

It is anticipated that approximately 15,000 tonnes will be diverted to the landfill annually. The total development area would be approximately 86 hectares, including buffer zones and biodiversity offsets/conservation area. The footprint of the landfill within the development area however will be finalised during the concept and detailed design phases.

Investigations are also taking place into alternative waste processing facilities and/or resource recovery facilities at the Armidale Waste Management Centre, with the overall aim of diverting wastes from the landfill.

The proposed landfill facility is located 1km south of Waterfall Way and 12km East of Armidale. The Project Site would be situated over a portion of each of the two properties, being 'Sherraloy' (193.3 hectares on Lot 2 DP 253346 and Lot 1 DP 820271) and 'Edington'(274.6 hectares on Lot 1 DP 253346).

It is proposed to design a conventional landfill constructed above the natural ground level which blends with the natural topography, although there will be some excavation of the footprint area.

Major features of the landfill are as follows:

- Total landfill is divided into five cells that will each contain approximately 211,000m^3 of insitu waste, with a cell life of approximately 10 years.
- Typical cell dimensions are approximately 80m wide, 275m long, and 14m high.
- An underlying leachate barrier and leachate collection and conveyance system.
- Intermediate cover applied to landfilled areas that will be exposed for more than one year.
- Final clay capping will occur towards the end of each cell life.
- Revegetation will occur after the final capping to return the site to its pre-existing state.
- A site access road will also be constructed from the Gara Travelling Stock Route onto the site. Gara Travelling Stock Route connects onto Waterfall Way.
- The final landform will complement the existing topography of the area.
- Auxiliary, right turn, passing lane and a priority T-junction are proposed.
- Tertiary water management controls are required (for leachate and stormwater) on site.

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4.0 Water and Leachate Management Plan

4.1 EPA Requirements

Surface water controls are to conform with the following principles, as per the EPA Guidelines *Solid Waste Landfills* (1996)*:*

- All water that has entered waste filled areas, and water that has been contaminated by leachate, should be handled and treated in the same manner as leachate.
- All surface water that has been collected from cleared or non-vegetated surfaces should be treated in accordance with Landcom's publication *Managing Urban Stormwater: Soils and Construction* (2004)*.*
- The exposed or cleared areas at the proposed landfill facility should be minimised at all times, and all topsoil set aside for revegetation purposes. All completed areas of the landfill should be progressively revegetated, and any areas exposed for greater than 30 days should be stabilised so as to prevent soil erosion.

4.2 Classification of Site Water

Water on a landfill site generally falls into three main categories as follows:

- "Clean" stormwater – All water which falls on undisturbed areas outside the outer batter of the cell's perimeter dirty water drain and from all undeveloped areas of the landfill site. Also includes surface runoff from fully capped and revegetated landfill cells.
- "Dirty" stormwater – All water which falls outside active waste cell area/s but over all disturbed landfill areas and is potentially contaminated from debris, sediments, and oils/grease. This will include runoff from all daily and intermediate cover areas.
- "Leachate" water – All water that have imparted waste or leachate collection system and as a result are potentially contaminated by waste materials. Leachate consists of all rainfall infiltration through the landfill active and capped areas and includes injection disposal into the landfill and waste and cover moisture.

4.3 Water Management Strategy

The proposed water management flow diagram for the site is illustrated in the flow diagram provided in Figure 2 below.

The water management strategy at the staging of each landfill cell is provided in Appendix C.

The containment, management and disposal of "clean, "dirty" and "leachate" water within the site is further discussed in the sections below.

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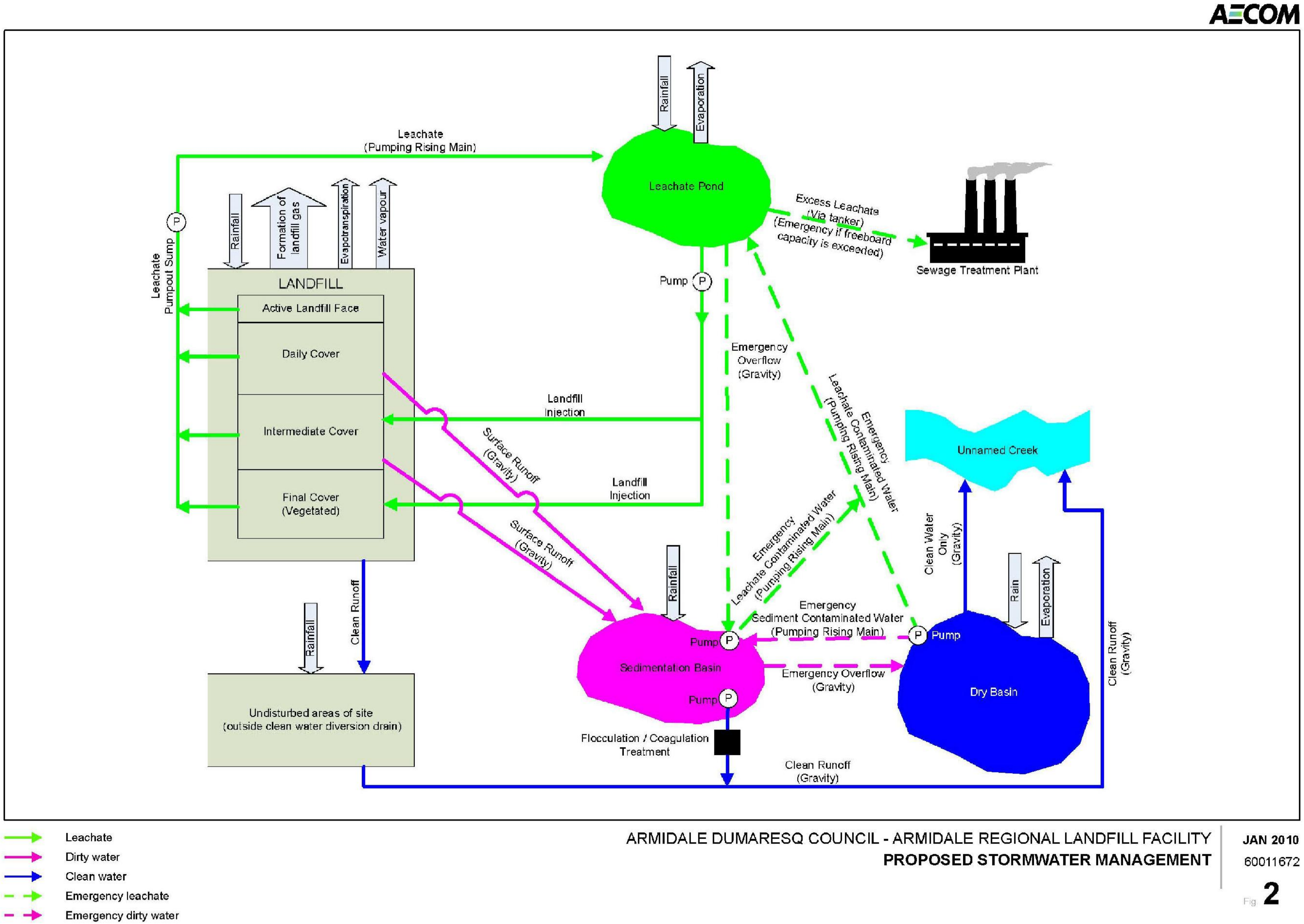

ARMIDALE DUMARESQ COUNCIL - ARMIDALE REGIONAL LANDFILL FACILITY
PROPOSED STORMWATER MANAGEMENT

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Fig **2**

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4.3.1 Clean Water Management

All "Clean" stormwater within the site would be collected via the clean water diversion drains to be constructed around the site. Clean water would be directed to the Dry Basin and then discharged directly into the existing unnamed watercourse downstream of the Project Site with no treatment and/or containment required.

The control and management of "clean" stormwater is summarised below:

- Construction of a clean water drain/bund around the entire active landfill area to prevent "clean" surface water entering the landfill from run on or localised flood waters.
- Construction of a Dry Basin which would capture clean water from the clean water diversion drains, prior to being discharged directly to the unnamed watercourse.
- Construction of a dirty water diversion drain around the constructed landfill cells (prior to final capping and vegetation) to collect all runoff from disturbed areas with containment within the site.
- Collection of clean water within existing farm dams located within the site (including the Dry Basin) for non-potable use, such as the wheel wash facility, washing, dust suppression etc.

4.3.2 Dirty Water Management

All "dirty" stormwater comprising runoff from disturbed areas (but outside exposed/uncapped active waste cell area/s) would be collected in dirty water diversion drains constructed around the landfill cells, Dirty water would be effectively controlled, managed and treated within the site prior to any release from site. Such water would be potentially contaminated with debris, sediments and minor or oils/grease etc (i.e. not leachate water) and would require treatment for all contaminants only prior to discharge to the downstream environment.

The control and management of "dirty" stormwater is summarised below:

- Staged filling with individual cells to be constructed as required to minimise area to be disturbed.
- The exposed/uncapped active waste cell areas would be minimised and bunded to prevent run-on entering these areas. Progressively filled areas would be covered with daily cover (150mm minimum thickness) on a daily basis to minimise contact of surface waters with waste, and therefore minimise the generation of leachate water. Water collected within these exposed/uncapped active waste cell areas would be designated as leachate water.
- Construction of a permanent Sedimentation Basin located outside the landfill area to collect and treat contaminated (mainly sediments) laden water with emergency overflow to the Dry Basin. Treated water would be pumped to the clean water diversion drains.
- Construction of a dirty water diversion drain around the constructed landfill cells (prior to final capping and vegetation) to collect all runoff from disturbed areas (but outside exposed/uncapped active waste cell area/s) which would drain to the downstream Sedimentation Basin.
- Progressively diverting clean surface runoff from the final capped and vegetated surface of the landfill.
- Construction of a permanent Dry Basin designed to store surface runoff from all undisturbed landfill areas (excluding final capped and vegetated areas) and also hold any emergency overflow from the Sedimentation Basin and Leachate Pond.
- Wheel wash facility to store and treat and dispose dirty water to the Sedimentation Basin, with clean top-up from the clean water dams.

4.3.3 Leachate Water

All "leachate" water comprising rainfall infiltration through the landfill active and capped areas (including injection disposal into the landfill and waste and cover moisture) would be effectively controlled and disposed within the site with no controlled release from site. Leachate is pumped out from the landfill area to the leachate pond and is pumped back for reinjection into the landfill.

"Leachate" water would be stored and managed through the construction of a permanent Leachate Pond. The amount of leachate produced will also be regularly monitored. In the unlikely emergency case of Leachate Pond overflowing, overflow would be transferred to the permanent Sedimentation Basin, and then to the Dry Basin. "Leachate" water may also be spray irrigated on uncapped areas as an alternative management option when conditions allow.

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5.0 Preliminary Design of Water Structures

As discussed in Section 4, the proposed Water and Leachate Management Plan for the proposed landfill facility incorporates a number of water drainage and containment structures for the effective control and management of clean, dirty and leachate water generated within the site during operation. These include the following:

- Surface Runoff Diversion Drains
- Permanent Leachate Pond
- Sedimentation Basin
- Dry Basin

The preliminary design and sizing of these water structures are provided below and the location and typical section and details are shown in Appendix C.

5.1 Surface Runoff Diversion Drains

The diversion drains that collect both the "clean" and "dirty" stormwater runoff will be designed to convey the peak flows from the 1 in 100 year ARI storm event from the catchment. This event has been chosen to minimise the risk of downstream contamination of downstream waters.

The locations of site diversion drains during each staging of the landfill operation cells are shown in Appendix C. The drains will generally be grassed lined, however on high slopes (up to 16%), the drains will likely be rock lined to prevent soil erosion and scouring during high flow events. A rock lined energy dissipator structure will be provided at the outlet of the clean water diversion drain to prevent erosion/scouring prior to release from site and into the existing creek system.

The preliminary location, extent and sizing of these drains are provided in Appendix C.

5.2 Permanent Leachate Pond

A Leachate Pond is to be constructed to temporarily store and for the disposal of leachate water produced from the landfill waste mass. The pond would be constructed as part of the initial construction works and would be utilised as a leachate pond during and post operation of the landfill facility. Its location will be outside of the landfill footprint, to the north as shown in Appendix C.

5.2.1 Design Assumptions

Several assumptions were used to model the size of the permanent Leachate Pond. The landfill was assumed to contain 5 cells, with a landfill life of 10 years for each cell. Computer design software (12D) was used to obtain the following approximate footprint areas for each landfill cell. A total area comprising approximately 14.3 ha was used in modelling the Leachate Pond, with cell areas as follows:

- Cell 1 – 33,403 m^2
- Cell 2 – 24,237 m^2
- Cell 3 – 24,017 m^2
- Cell 4 – 25,163 m^2
- Cell 5 – 35,889 m^2.

Approximately 10% of each cell was also assumed to be active each year. For example, in the first year of landfill operation, 10% of Cell 1 will be active. In the second year, this 10% of Cell 1 will be covered with intermediate cover and a new 10% of Cell 1 will be active. In the third year a new 10% of the cell will be active, the area that was active will be covered with intermediate cover, increasing the intermediate cover to 20%. Final cover will be installed on the cell after the whole cell is covered by intermediate cover, ie after ten years of operation. During the final cover for Cell 1, the cycle begins again for Cell 2.

Water infiltration rates were determined for each type of cover constructed on the landfill cells during operations. Landfill hydrological modelling (using HELP) was utilised to obtain intercepting rainfall percentages that typically infiltrate the various different types of landfill cover during operation. Typical rainfall infiltration percentages (which include evapotranspiration rates) that were adopted in the modelling for the Leachate Pond are as follows:

- Daily Cover – 20%

- Intermediate Cover – 10%
- Final Cover – 3%.

Other major design assumptions also include:

- Waste is received at the landfill at a rate of 15,000 tonnes per year for the life of the landfill. This rate is not expected to change from year to year according to the static population as stated in State of the Environment 2004/05;
- A worst case scenario of compaction is 0.85 t/m^3;
- The cover-void ratio is 20% by volume;
- The solid waste moisture content by weight is 25% (Tchobanoglous *et al*, 1993);
- The daily cover moisture content is 15% by weight;
- The ratio of daily cover to waste is 25% by volume;
- The pan evaporation factor is 0.8;
- The daily rainfall for Armidale was obtained from data provided by the Bureau of Meteorology (BOM);
- The daily evaporation rates for Armidale for each month are those presented in Table 1;
- Leachate density assumed to be 1t/m3;
- It is assumed that there is no time lag for the transport of leachate from the landfill to leachate pond;
- Intermediate surface runoff assumed as part of the input into the Sedimentation Basin;
- Final surface runoff assumed as part of the input to stormwater pond; and
- Rainfall infiltration through the daily, intermediate and final caps are considered in water balance of the landfill and Leachate Pond.

Table 1 Daily Evaporation Rates for Site

Month	Daily Evaporation Rate (mm)
January	5.39
February	4.67
March	3.83
April	2.61
May	1.66
June	1.28
July	1.39
August	2.12
September	3.27
October	4.16
November	4.57
December	5.36

The Leachate Pond was then sized from a daily water balance model taking into account the following components (refer Figure 2):

- Rainfall infiltration from daily, intermediate and final covers;
- Direct rainfall input on the pond;
- Daily evaporation output from the pond;
- Field capacity of the waste;
- Leachate produced from solid waste moisture; and
- Injection through the waste and daily and intermediate covers.

The water balance model used to size the Leachate Pond adopted 10 years of average daily rainfall data for Armidale between 1982 to1991 as it represented overall average annual rainfall and included a range of wet, dry and the 10%AEP years[1]. This 10 year period was used to assess the water balance for each stage of the landfill development.

The pond was initially assumed to be empty. Due to the presence of hard rock below the ground surface and economic considerations, it was concluded not to have a pond deeper than 3m. The size (length and width) of the pond was altered until there was no overflow from the pond (by regulating the pond size) for 50 years of landfill operation. The detailed design calculations for the leachate evaporation pond are provided in Appendix A. The results for the required minimum size of the Leachate Pond is summarised in Table 2 below.

Table 2 Minimum Size Requirements for Permanent Leachate Pond

Component	Size
Pond Base Dimensions (m x m)	70 x 70
Total Volume at 2m (m^3)	11,624
Full Surface Area at 2m (m^2)	6,724
Total Depth (m)	2.8m (comprising 2m leachate storage, 0.3m freeboard storage and 0.5m spillway depth)
Total Volume at 2.3m (including freeboard) (m^3)	13,711
Total Volume at 2.8m (including spillway) (m^3)	17,408

Figure 4 in Appendix A depicts the variation of leachate volume in the Leachate Pond with time. It was found that the leachate pond with approximately 12ML capacity (up to freeboard) would be sufficient to manage the potential leachate that would be generated during operation of the proposed landfill.

5.2.2 Assessment of Climate Change Impacts on Leachate Volumes

The effects of climate change were taken into consideration for the sizing of the leachate pond. The rainfall data used in the modelling was amended to reflect the projected worst case rainfall changes resulting from climate change, i.e. maximum wetting, based on the data as follows:

- Autumn (from March to May): 10% increase in daily rainfall.
- Winter (from June to August): 20% decrease in daily rainfall.
- Spring (from September to November); 10% increase in daily rainfall.
- Summer (from December to February): 20% increase in daily rainfall.

As quantitative assessment of future evaporation couldn't be predicted, it is assumed that the effect of climate change on evaporation is negligible (i.e. worst case). The water balance model was rerun taking account:

- The above revised rainfall values for the latter thirty years of operation of the landfill i.e from the 21st to the 50th year of operation; and
- All the other assumptions and inputs to the model remain the same as that for the original water balance as in Section 5.2.1 and Appendix A including the assumption that evaporation rates remain the same as in Table 1.

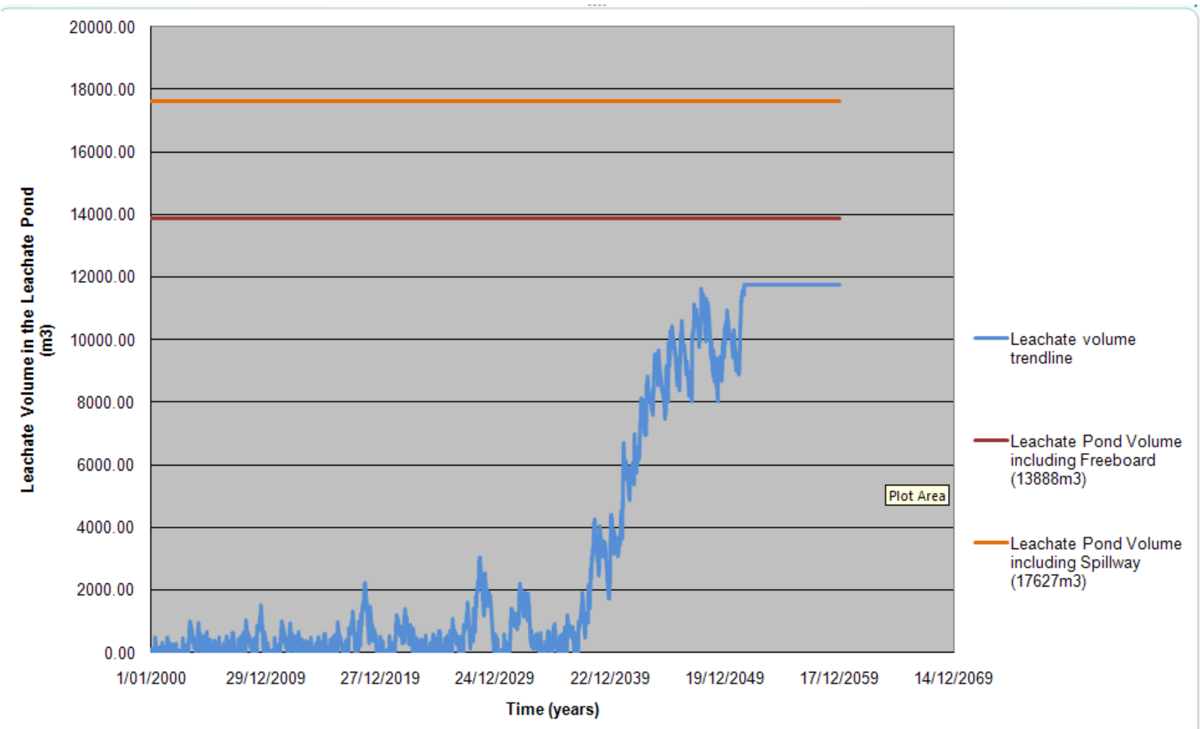
[1] AECOM used the daily rainfall data from 1980 to 2003 in order to analyse the rainfall intensity at the study area. A cumulative of ten years rainfall data, e.g.1980-1989, 1981-1992, etc were then compared. It was observed that the rainfall data set for the period from 1982 to 1991 contained the wet, dry and average years for the whole data range that was analysed. The daily rainfall data set was then replicated for each 10 year period for the 50 year landfill life. The 10% AEP in the range from 1982-1991 was estimated to be for the year 1990 and 10%AEP for the data range 1980-1993 was estimated to be in the year 1983 and 1990. All the 10%AEP wet years fall within the data set that was used in our leachate model.

The size of the pond was altered until there was no overflow from the pond (by regulating the pond size). The results for no leachate overflow from the leachate pond are presented in Table 3. Graphical representation of the variation in leachate volumes in the pond with respect to time are presented in Figure 3. It was found that the leachate pond with 12ML capacity (up to freeboard) would be sufficient to manage the potential excess leachate (considering climate change) that would be generated during operation of the proposed landfill.

Table 3 Leachate Pond Size to include climate change impacts

Component	Size
Pond Base Dimensions (m x m)	71 x 70
Total Volume at 2m (m^3)	11,776
Full Surface Area at 2m (m^2)	6,806
Total Depth (m)	2.8m (comprising 2m leachate storage, 0.3m freeboard storage and 0.5m spillway depth)
Total Volume at 2.3m (including freeboard) (m^3)	13,888
Total Volume at 2.8m (including freeboard) (m^3)	17,627

Figure 3: Leachate volume (using climate change predictions from the 21st year to 50th year of operation) in Leachate pond vs time



5.2.3 Preliminary Design Features

The preliminary design features and details of the permanent Leachate Pond are shown in Appendix C and summarised as follows:

- Perimeter bund walls of the leachate pond to be constructed using compacted clay materials;
- Freeboard of 300mm has been allowed comprising 150mm to capture the 100 year ARI, 24hr storm volume from direct rainfall over the pond surface, and an additional 150mm for wave action on the water surface;
- The internal floor and batters of the pond to be lined with 300mm thick compacted clay and 1.5mm thick HDPE liner;
- An emergency overflow spillway to be provided at a level 0.5m below the crest level, with discharge directed to the dirty water diversion drain, with ultimate storage in the Sedimentation Basin; and
- Erosion control to be provided at the spillway outlet.

5.2.4 Disposal Requirements

The Leachate Pond will collect leachate from the landfill via a leachate collection system and leachate sump well. The leachate is to be disposed in the leachate pond through evaporation and also by injection back into the landfill as required during operation.

5.3 Sedimentation Basin

A Sedimentation Basin is to be located outside the landfill cell area to temporarily store surface runoff from the landfill's daily and intermediate cover areas, but excluding the active landfill tipping face areas. The purpose of the basin is to:

- Separate/isolate surface runoff within the site from the leachate water generated from landfilling activities;
- Enable stored water to be treated to remove contaminates (mainly suspended sediments) prior to discharge to the downstream creek system; and
- Act as backup storage for overflows from the permanent Leachate Pond.

The basin is to be located outside of the landfill area, to the north, as shown on Appendix C. The Sedimentation Basin would be constructed as part of the construction works and would be utilised as a permanent Sedimentation Basin during the entire operational phase.

5.3.1 Design Assumptions

The Sedimentation Basin has been designed to capture all runoff from the disturbed landfill areas during operation. The maximum disturbed landfill area for design of the basin assumed 3 cell areas consisting of 2 active cells and 1 cell capped but not vegetated.

Calculations according to the criteria in Managing Urban Stormwater Soils and Construction (2004) were undertaken to determine the volume of the basin required for both settlement and storage of the sediment. The basin storage was designed to fully contain the 5 day 90th percentile rainfall depth for the landfill site. The contributing catchment area was determined to be approximately 10.87ha for 3 landfill cells (Cells 3, 4 and 5). Further details of input data and assumptions used in the design of the basin are outlined in Appendix B.

The Sedimentation Basin has been located between the Leachate Pond and the Dry Basin. Inflow from the contributing catchment will be directed to the Sedimentation Basin through the use of the dirty water diversion drains, as shown on Appendix C.

5.3.2 Basin Storage Capacity

The Sedimentation Basin is to be designed and constructed in accordance with Landcom's *Managing Urban Stormwater: Soils and Construction* (2004). The design criteria applied is outlined as follows:

- Sedimentation Basin capacity has been designed based on the 90th percentile, 5 day duration event (37.4mm) for determining the settling zone and the sediment zone and sized to store at least an averaged two month sediment yield; and
- Dry weather discharges shall not have a TSS exceeding 50 mg/L.

Soils at the site have been classified as a mixture of Type C, D and F soils according to the criteria in *Managing Urban Stormwater: Soils and Construction (*2004). Runoff containing Type D and F soils are harder to treat, containing fine grained particles that are often dispersive (Type D) and also require a longer "residence" time to settle. Consequently the Sedimentation Basin has been designed to treat both Type D and F soils. The design of the basin followed the guidelines in *Managing Urban Stormwater: Soils and Construction* (2004).

The detailed design calculations for the basin are provided in Appendix B. The results for the minimum required settling and sediment zone capacities for the Sedimentation Basin at the site are shown in the Table 4.

Table 4 Minimum Sedimentation Basin Capacity

Component	Size
Sediment Zone Volume (m^3)	250
Settling Zone Volume (m^3)	2600
Total Volume (m^3)	2850
Total Depth (m)	2.0m (comprising 1.5m settling zone and sediment storage and 0.5m spillway depth)

5.3.3 Design Features

The preliminary design features of the Sedimentation Basin is shown in Appendix C and summarised as follows:

- Perimeter bund walls of the basin to be constructed using compacted clay materials.
- The internal floor and batters of the basin to be lined with 300mm thick compacted clay (if required – to be confirmed during detailed design).
- The basin is to contain a low lying sump for ease of pump-out and maintenance.
- An overflow spillway to be provided at a level 0.5m below the crest level (ie. sufficient capacity to accommodate the 100 year peak discharge from the catchment).
- Erosion control to be provided at the spillway outlet.

Height pegs or markers are to be installed and maintained within the basin to indicate the maximum level of the sediment zone. When the markers indicate that the sediment zone has reached (or is reaching) full capacity, then stored sediments would need to be removed/disposed, to maintain the minimum water storage capacity within the basin.

5.3.4 Treatment and Discharge Requirements

With basins that capture runoff from Type F soils, stormwater in the settling zone should be drained or pumped out within the time period adopted in the design of the basin provided that the nominated water quality targets have been met. A period of 5 days has been allowed for in the design of this basin but this can be increased to up to 20 days if site conditions allow.

Type D soils are present within the soil profile at the Project Site and may be exposed during construction. Type D soils contain a significant level of dispersible material. If the water stored in the Sedimentation Basin has a suspended solids reading of higher than 50mg/L after sufficient time has elapsed to allow natural settling, the water would be treated by a flocculation/coagulation treatment system. Stored water within the Sedimentation Basin would be pumped through the treatment system. Treated water from the Sedimentation Basin will be discharged to the clean water drain and directed to the downstream environment. In the event of emergency overflow from the Sedimentation Basin, water will also be fully contained in the Dry Basin.

5.4 Dry Basin

A permanent Dry Basin is to be located outside the landfill cell area and downstream of the Sedimentation Basin and Leachate Pond. The primary objective of the Dry Basin is to provide emergency containment storage in the event of uncontrolled overflow from the Sedimentation Basin and/or Leachate Pond, thus reducing the risk of potential downstream contamination from the landfill operation.

5.4.1 Design Assumptions

The main assumptions of the Dry Basin design are summarised below.

- The Dry Basin has been designed to capture all runoff from the disturbed landfill area (3 cells consisting of 2 active cells and 1 cell capped but not vegetated), including the Sedimentation Basin and Dry Basin surface area, for the 1 in 100 year ARI 24 hour duration storm event. The contributing catchment area is approximately 13.5ha. Volumetric runoff calculations were undertaken to determine the volume of the basin required to capture this event;
- The basin has been designed as a bund located downstream of the disturbed landfill area and the Leachate Pond and Sedimentation Basin; and
- Runoff from the contributing catchment areas is to be directed to the Dry Basin, through the use of bunds and diversion drains. “Clean” runoff is to be diverted around the Dry Basin and to external clean water diversions where possible.

The minimum basin volume required to capture the design storm event was determined to be 19,000m^3 (or 19ML). This volume will be reviewed and confirmed during detailed design.

5.4.2 Design Features

The preliminary design features of the Dry Basin is shown in Appendix C and summarised as follows:

- Outflow from the Dry Basin will be controlled by a low flow pipe with a valve;
- Perimeter bund walls of the basin to be constructed using compacted clay materials;
- The internal floor and batters of the basin to be lined with 300mm thick compacted clay (if required – to be confirmed during detailed design);
- The basin is to contain a low lying sump for ease of pump-out and maintenance;
- An overflow spillway to be provided at a level 0.5m below the crest level (ie. sufficient capacity to accommodate the 100 year peak discharge from the upslope catchment); and
- Erosion control to be provided at the spillway outlet.

5.4.3 Discharge Requirements

Water stored in the Dry Basin will be retained and tested prior to any discharge to the downstream environment to determine if any contamination has occurred. If tested to be clean, then it will be discharged to the existing watercourse downstream by opening the valve on the low flow outlet pipe.

6.0 Operations and Maintenance Requirements

6.1 Monitoring Requirements

As per EPA Guidelines, *Solid Waste Landfills* the surface water monitoring program must be able to demonstrate that surface water is not polluted by the landfill.

The guidelines recommend that surveyed monitoring points be established in the receiving waters at all site discharge locations, both upstream and downstream of the proposed landfill facility. Quarterly monitoring is recommended and the stormwater treatment system should be checked after all significant rainfall events. Tests should be conducted from a representative sample for all the indicators selected for the groundwater monitoring program (Table 2) in the LEMP, and also for total suspended solids. This sampling and analysis program should use the same quality control program nominated for the groundwater monitoring program in the LEMP.

If the surface water monitoring program detects water pollution, the occupier should follow the procedures outlined in a Water Contamination Remediation Plan, that would be prepared for the Project Site, to investigate surface water pollution.

The preliminary surface water monitoring points for the proposed landfill facility will include:

- Upstream of site (ongoing baseline data during operation);
- Sedimentation Basin (water will need to be tested for total suspended solids prior to discharge);
- Dry Basin stored water (water to be tested prior to release to downstream watercourse off-site, water to be tested for potential suspended solids and leachate contamination);
- Leachate Pond stored water (water to be tested for leachate contamination concentrations);
- Dry Basin release water (tested to confirm water quality); and
- Downstream discharge point/s (ie. Gara River).

Surface water monitoring points will be finalised once the detailed design of the landfill has been completed.

It is recommended that testing be carried out before the landfill construction to obtain baseline level of water quality.

6.2 Emergency Conditions and Response Actions

Figure 2 schematically shows all possible surface water flows within the system during periods of normal operation and emergency situations. As discussed, all surface water will be managed between the Leachate Pond, Sedimentation Basin and Dry Basin to minimise the risk of uncontrolled overflow to the environment downstream.

There are three types of situations that will require emergency response as follows:

- Freeboard capacity of the Leachate Pond is exceeded with the potential to overtop the spillway;
- Dry Basin water has been contaminated with either leachate or sediment and stored water is unable to be released to the downstream environment; and
- Water quality results at downstream monitoring point/s are elevated above the criteria listed in Table 2 of *Solid Waste Landfills*.

6.2.1 Leachate Pond Freeboard Capacity Exceeded

During and immediately post periods of high rainfall which may result in the Leachate Pond storage capacity exceeding its freeboard level, the emergency response actions shall be implemented:

- Re-injection back into the landfill if there is sufficient storage available within landfill waste mass; or
- If unable to re-inject, removal off site to the nearest Sewage Treatment Plant (STP) that is able to accept the leachate wastewater.

6.2.2 Contamination of the Dry Basin Water

If the Dry Basin water has been contaminated with either leachate or sediment and stored water is unable to be released to the downstream environment, the following emergency response actions shall be implemented:

- If the water has been contaminated with sediments (only) then it will be pumped back to the Sedimentation Basin for treatment and disposal; or
- If contaminated with leachate then it will be pumped to the Leachate Pond for temporary storage and disposal by landfill re-injection or nearest sewage treatment facility (if unable to be re-injected).

6.2.3 Remediation of the Sedimentation and Dry Basins

In the event that leachate flows into the Sedimentation or Dry Basins, the sediment within these basins has the potential to become contaminated either through deposition of contaminated sediments within the leachate or contamination of existing sediments through contact with the leachate. Water subsequently flowing into these basins then has the potential to become contaminated from contact with the contaminated sediments.

To prevent this occurring, the following procedure will be implemented each time leachate flows into the sedimentation and /or Dry Basin:

- Leachate and water mixed with leachate will be removed from the basins in accordance with the procedures in Section 6.2.2.
- Once the impacted water has been removed samples will be collected from the sediments within the basins at a suitable rate (say in the order of a 20m x 20m grid). The samples will be analysed at a NATA registered laboratory for:
  - Heavy Metals (As, Cd, Ch, Cu, Pb, Ni, Zn, Hg)
  - Total Petroleum Hydrocarbons (TPH)
  - Total Phenols
  - Nutrients (Nitrate, Nitrate, Ammonia, Kjeildal Nitrogen, Phosphate, Total Phosphorus)
  - Polycyclic aromatic hydrocarbons (PAHs)
  - TCLP for any contaminants exceeding the CT1 general solid waste criteria in the NSW DECC (2008) Waste Classification Guidelines
- A visual inspection would also be undertaken to assess for aesthetic impacts to the sediments such as odours or staining.
- A baseline round of samples will be collected from the sediments shortly after construction of the basins to assess background concentrations in the sediments.
- Sediments within the leachate pond will also be tested periodically and any contaminants identified at significant concentrations will be added to the above suite.
- Results from the analysis will be compared to the higher of the ANZECC (2000) Sediment Quality Criteria and the background concentrations established in the baseline sampling. Where concentrations exceed these criteria or where there is visual or olfactory evidence of contamination then this indicates the leachate has impacted the sediments and remediation of the sediments will be required. Where concentrations are below these criteria and there are no visual / olfactory evidence of contamination then this would indicate the leachate has not impacted the sediments and no further action will be required.
- While the landfill is in operation the remedial strategy would typically involve stripping the impacted sediments and placing them in the landfill cell. The waste classification of the sediments would be assessed based on the above sampling. Providing the results met the General Solid Waste Criteria then the stripped sediment could be disposed directly to the landfill cell. In the unlikely event the sediments exceeded the General Solid Waste Criteria (i.e. classifying as Restricted Solid Waste or Hazardous Waste) then pre-treatment of the sediments would be required prior to disposal. Post landfill closure the sediment would need to be disposed of to another suitably licensed landfill site or an alternate remediation option for the sediment would need to be adopted.
- Once the impacted sediment has been stripped then validation samples would be collected from the stripped surface. The validation samples would be collected at the same rate as above and would be tested for any contaminants that were identified above background / above guideline in the pre-remediation sampling. Validation results would be compared against the criteria discussed in Point 3 above. In the event that validation samples exceed these criteria or where there is remaining visual or olfactory evidence of contamination then further remediation followed by revalidation of the impacted area would be required.

6.2.4 Downstream Surface Water Contamination

If surface water pollution has been detected at the monitoring points, further investigation shall be undertaken consisting of re-sampling duplicates to check accuracy of results. Surface water monitoring at additional locations and analysis of additional parameters may be required to further characterise the pattern of discharge of contaminants from the landfill.

For this situation the following steps will be undertaken:

- Take immediate action to contain the pollution;
- Prepare a report to the EPA detailing:
  - the nature and source of contamination/spill;
  - any actions taken;
  - future actions to prevent recurrence; and
- Implementation of approved actions.

6.3 Maintenance Requirements

6.3.1 Surface Runoff Diversion Drains

The maintenance program for the drainage infrastructure should include the following minimum tasks:

- Catch drains that have become blocked through sediment pollution, sand/spoil/soil being deposited in or too close to them are to be cleaned out when identified by inspection;
- Catch drains are to be checked to ensure operating as intended, in particular checking that:
  - No low points exist which can overtop in a large storm event;
  - Areas of erosion are repaired;
- Clean water diversion drains are to be inspected regularly to ensure no dirty water or leachate is entering the drains; and
- Energy dissipation are to inspected regularly to ensure they are performing adequately and that there is no evidence of erosion.

6.3.2 Leachate Pond

The maintenance program should include the following minimum tasks:

- Sludge is removed if build up exceeds approximately 300mm; and
- Inspect and repair HDPE liner if required;

6.3.3 Sedimentation Basin

The Sedimentation Basin should be inspected after all significant rainfall events and debris will be removed when identified by inspection, or on a programmed basis.

The maintenance program should include the following minimum tasks:

- Sediment to be removed if the design capacity or less remains in the settling zone; and
- Dispose of any collected sediments from Sedimentation Basin to the landfill.

6.3.4 Dry Basin

The maintenance program should include the following minimum tasks:

- Inspection after all significant rainfall events and debris to be removed;
- Sediment to be removed periodically;
- Dispose of any collected sediments from the Dry Basin to the landfill; and
- Inspect outlet pipe for blockages.

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7.0 References

1) EA Systems, 2005, Armidale Dumaresq Regional Landfill Geotechnical Assessment, Rpt No. 20969.6182.

2) Armidale Dumaresq Council, Stormwater Drainage and Flooding Code for Developments, October 2000.

3) Hancock, S., Fox-Lane, B., Gallagher, R., Jorgensen, M. and Buss, P., Sustainable Landfill Design by Monitoring and Managing Cap Infiltration, URS Australia Pty Ltd.

4) Landcom, New South Wales Government, Managing Urban Stormwater: Soils and Construction, Volume 1,4th Edition.

5) Tchobanoglous, G., Theisen, H. and Vigil, S., 1993, Integrated Solid Waste Management, McGraw-Hill, Inc.

6) ITRC (Interstate Technology & Regulatory Council). 2005. Characterization, Design, Construction, and Monitoring of Bioreactor Landfills. ALT-3. Washington, D.C.: Interstate Technology & Regulatory Council, Alternative Landfill Technologies Team., www.itrcweb.org.

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Appendix A

Preliminary Leachate Pond Design

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Appendix A Preliminary Leachate Pond Design

The leachate evaporation pond was designed to manage leachate formation during 50 years of landfill operation. A water balance was carried out to determine the appropriate volume of the pond using parameters shown in Table 5.

Table 5: Parameters for Leachate Evaporation Pond Design

Quantity	Unit	Description
33403	m2	Approximate footprint area of landfill cell 1
24237	m2	Approximate footprint area of landfill cell 2
24017	m2	Approximate footprint area of landfill cell 3
25163	m2	Approximate footprint area of landfill cell 4
35889	m2	Approximate footprint area of landfill cell 5
15000	t/annum	Waste disposal quantity
0.85	t/m3	Waste Compaction
20	%	Cover/void ratio by volume
25	%	Solid Waste Moisture Content by weight
95	%	Liquid waste moisture content by weight
0	t	Liquid waste accepted per year
15	%	Daily cover moisture content by weight
25	%	Ratio of daily cover to waste (by volume)
1.8	t/m3	Bulk density of cover soil (gravely clay and weathered rock - LEMP)
20	%	Intercepting rainfall that infiltrates (daily cover)
10	%	Intercepting rainfall that infiltrates (intermediate cover)
3	%	Post closure infiltration percentage (of intercepted rainfall)
40	%	Field capacity
0.8		Pan Evaporation Factor

The pond base width, length and depth were firstly assigned. The following parameters were then calculated, assuming that the sides of the pond have a slope of 1:3:

- Base area (m^2) = base width (m) x base length (m);
- Full pond width (m) = base width (m) + 2 x 3 x depth (m);
- Full pond length (m) = base length (m) + 2 x 3 x depth (m);
- Full pond surface area (m^2) = full pond width (m) x full pond length (m); and
- Full pond volume (m^3) = (base area (m^2) x full pond surface area (m^2))/2 x depth (m).

The model employed the average 10 years of daily rainfall data from 1980-2003, which were 1982-1991. The pond was initially assumed to be empty. The following calculations were performed for each day[1]:

- Direct rainfall (m^3) = Full pond area (m^2) x daily rainfall (m);
- From day 1 onwards, Rainfall infiltration (m^3) Includes rainfall infiltrating into the waste from daily, intermediate and final covers (m^3)

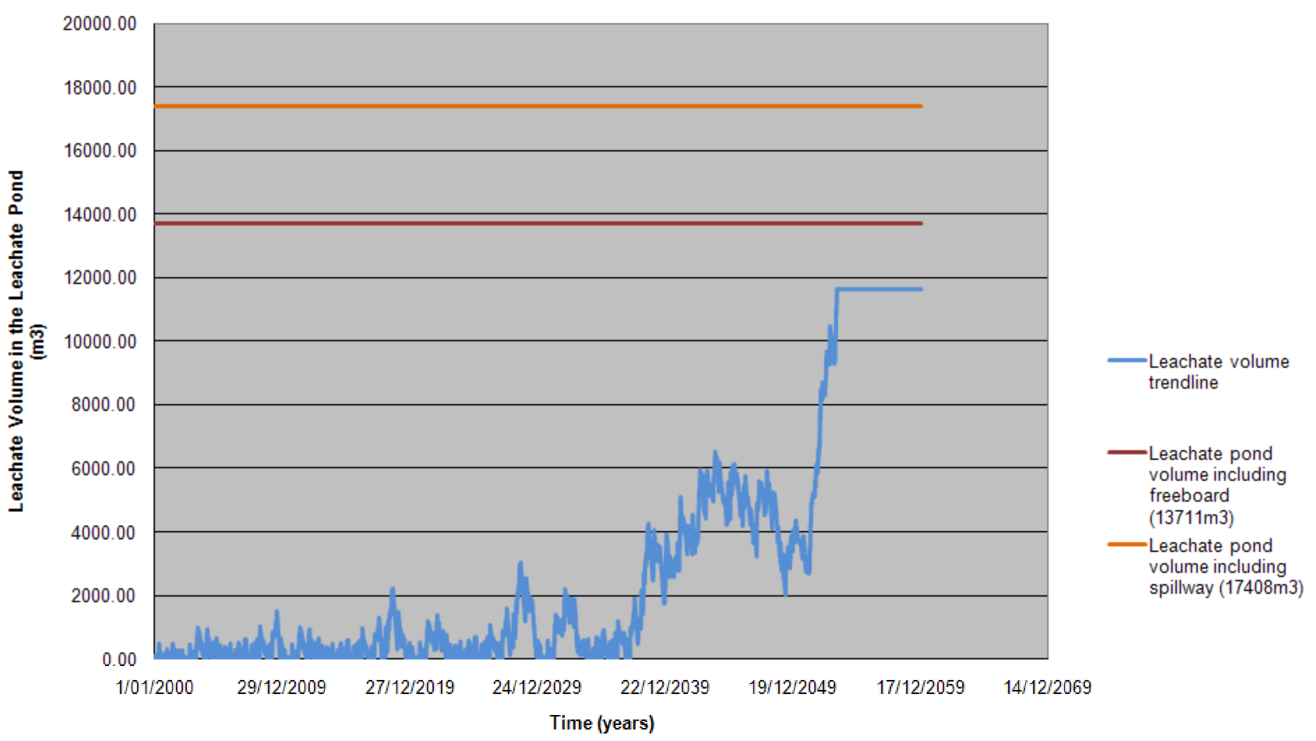
  = [daily rainfall (m) x daily cover area (m^2) x infiltration through daily cover (%) + daily rainfall (m) x intermediate cover area (m^2) x infiltration through intermediate cover (%) + daily rainfall (m) x final cap area (m^2) x infiltration through final cap (%)];

[1] It is assumed that leachate density =1t/m^3, thus 1t = 1m^3 for leachate

- Waste volume (m^3) = waste mass (t) / waste compaction (t/m^3);
- Cover volume (m^3) = waste volume (m^3) x cover-waste ratio;
- Cover mass (t) = cover volume (m^3) x cover density (t/m^3);
- Solid waste moisture (t) = waste mass (t) x solid waste moisture content (%);
- Cover moisture (t) = cover mass (t) x daily cover moisture content (%);
- **Total daily moisture in landfill (**m^3**)** = rainfall infiltration+ solid waste moisture (t) + injection (m^3) – water consumed during landfill gas formation (t) – water lost as water vapour (t) – leachate produced (t);
- **Daily evaporation from the leachate pond** (m^3) = Leachate Pond area of previous day (m^2) x daily evaporation rate (m) x pan evaporation factor;
- **Dry waste mass (t)**= dry waste density (t/m^3) * total daily volume of waste (m^3);
- **Maximum Injection Rate** (m^3)= moisture mass at field capacity (t) +water consumed during landfill gas formation (t) + water lost as water vapour (t) - Solid waste moisture (t);
- **Total daily moisture in landfill** (m^3)**=** maximum injection rate (m^3) + Solid waste moisture (t) – water consumed during landfill gas formation (t) – water lost as water vapour (t);
- **Water consumed in formation of landfill gas** (m^3)**=** Product of dry waste mass,organic content available in the waste for degradation and moisture consumed for degradation;
- **Water lost as water vapour** (m^3)= Product of dry waste mass, organic content available in the waste for degradation, water vapour generated during degradation;
- **Leachate Generated in Landfill** (m^3) **=** Rainfall infiltration (m^3);
- **Leachate volume in the Leachate Pond** (m^3) **=** Previous days leachate volume **+** Leachate Generated in Landfill (m^3) – evaporation from the Leachate Pond – Injection;
- **Moisture Content (%) =**(Total daily moisture in landfill (m^3) /dry waste mass at field capacity (t))*100;
- **Spill (**m^3**)** = full pond volume (m^3)- Leachate volume in the Leachate Pond (m^3);
- **Volume at end of day (**m^3**)** = Leachate volume in the Leachate Pond (m^3)– spill (m^3); and
- New surface area and depth is then calculated from this volume at the end of each day.

The dimensions of the pond were altered until there was no overflow from the Leachate Pond during 50 years of the landfills operational life.

Figure 4: Leachate Volume in Leachate Pond vs Time



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Appendix B

Preliminary Sedimentation Basin Design

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Appendix B Preliminary Sedimentation Basin Design

The Sedimentation Basin capacity (V) for a Type F or D basin is as follows:

V = Sediment Settling Zone + Sediment Storage Zone

The determination of the settling and sediment storage zone requirements of the proposed Sedimentation Basin is outlined below.

Sediment Settling Zone Capacity

The design of Type F/D Sedimentation Basins reflects the fact that the traditional approach for Sedimentation Basin design, which is based on the settling of a design sediment particle is generally ineffective in trapping very fine sediment. Hence the adopted basis for design is the containment of runoff expected from a design rainfall event.

The key component in the design of Type F/D sediment retention basins is determining the required settling zone volume or capacity. The settling zone capacity is determined using a "risk-based" approach that takes account of local rainfall patterns. The settling zone is determined as that capacity necessary to contain all runoff expected from the catchment under a particular design rainfall event using the following formula:

$$\text{Settling Zone Capacity } (m^3) = 10 \times Cv \times A \times Ry$$

Where:

- Cv = volumetric rainfall coefficient, defined as that proportion of rainfall which runs off as stormwater[1] (a value of 0.64 is recommended in Landcom (2004) since depth is between 31-40 mm);
- A = catchment area (ha) of the basin (i.e. 2 active landfill cells and 1 capped landfill cell = 10.87 ha); and
- Ry = the 5 day total rainfall depth (mm) which is not exceeded in y percent of rainfall events.

As stated above, a five day rainfall depth (Ry) is to be adopted in the design of settling zones based on the requirement that a period of five days following a rainfall event would be necessary to achieve sufficient settling time or flocculation (if required) of fine sediments and the subsequent discharge/ pump-out of the supernatant water. A five day rainfall, 90^{th} percentile event of 37.4 mm for the Armidale area was used in the calculations.

Sediment Storage Zone Capacity

The sediment storage zone is to be designed to have a capacity to store at least the estimated average two month sediment yield from its catchment. Based on the Landcom (2004) guidelines, the two month sediment storage capacity can be determined using the following modified RUSLE[2] equation:

$$\text{Sediment Storage Capacity } (m^3) = [0.17 \times A \times (R \times K \times LS \times P \times C)]/ 1.3$$

Where:

- 0.17 = the proportion of annual sediment yield (ie. 2 months/12 months);
- A = total catchment area = 10.87ha (based on a contributing catchment area of approximately 10.87ha for 3 landfill cells - Cells 3, 4 and 5);
- R = rainfall erosivity factor (R = 1483 for site from R = 164.74((1.177)^S)*S^0.6444 according to Landcom (2004) where S = 7.83 mm/hr from IFD using ARR);
- K = soil erodibility factor (adopt K = 0.055 for the soil type);
- LS = slope length/gradient factor (adopt LS = 1.644 for 6.6% average slope and 80 m slope length);
- P = erosion control practice factor (adopt P = 1.3 for Type F/D soils);
- C = cover factor (adopt C = 1.0 for fully disturbed area); and
- 1.3 = average bulk density of sediments.

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[1]Note that this value differs from the "peak discharge" runoff coefficient as used in determining the peak discharge from a catchment.

[2] RUSLE – Revised Universal Soil Loss Equation.

The results for the minimum required settling and sediment zone capacities for the Sedimentation Basin at the site are shown in the Table 6.

Table 6: Minimum Sedimentation Basin Capacity

Storage Zone	Volume (m^3)
Sediment Zone	250
Settling Zone	2600
TOTAL	2850

Appendix C

Preliminary Water Management Drawings

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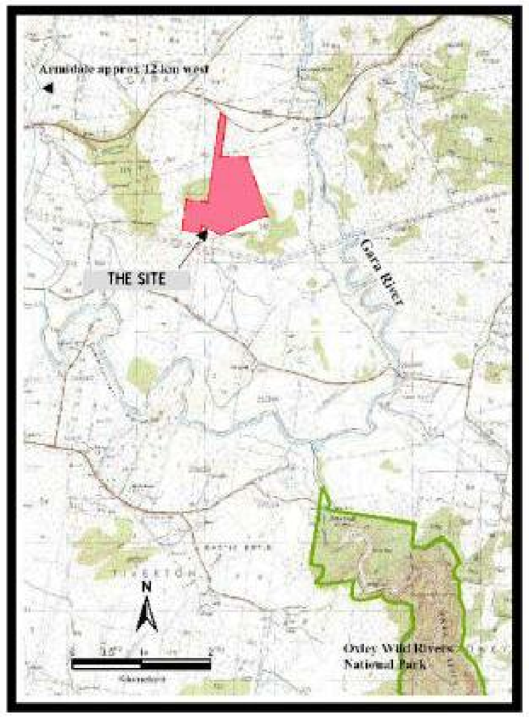
CLIENT:

DESIGNER:

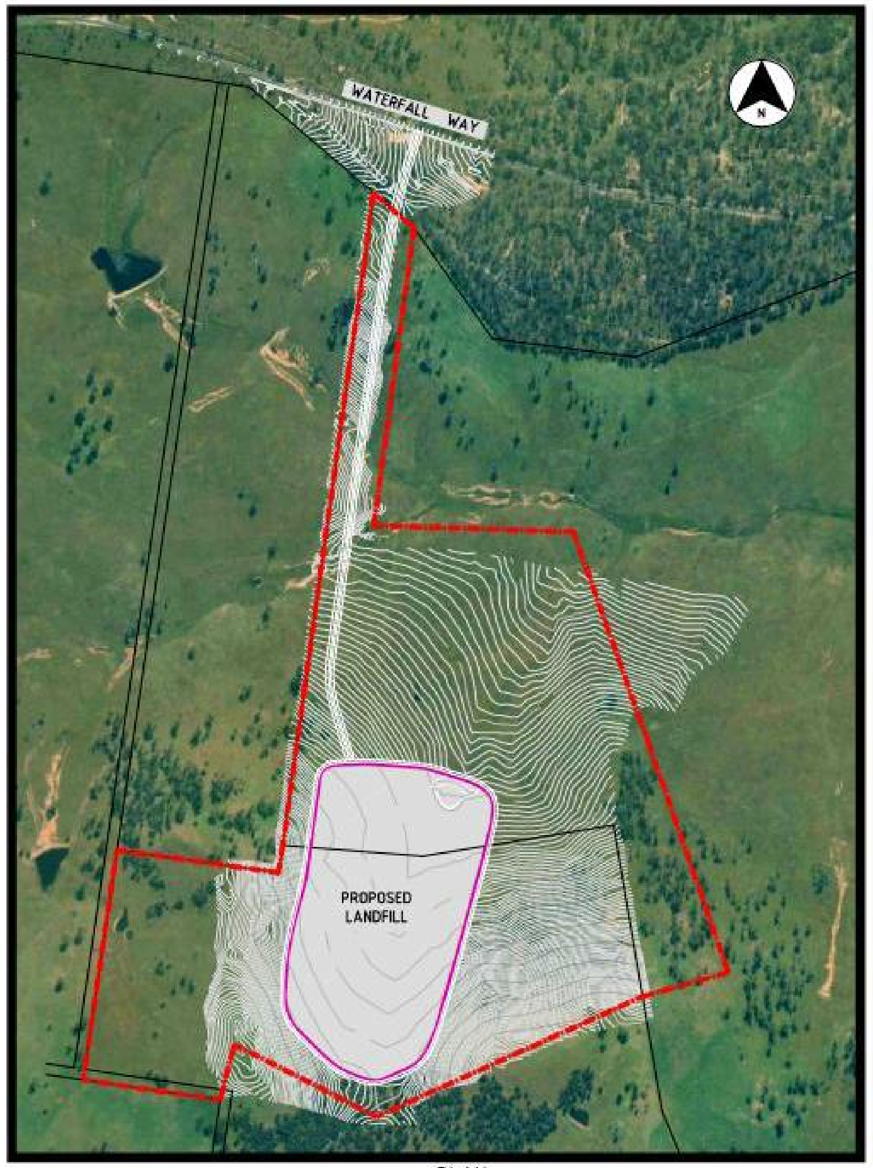
AECOM Australia Pty Ltd A.B.N. 20 093 846 925

ARMIDALE LANDFILL

DESIGN AND WATER MANAGEMENT DRAWINGS



LOCALITY PLAN



PLAN
SCALE 1:5000 (A1)

DRAWING LIST

DRAWING No.	DRAWING TITLE
20017605-CI-100	DRAWING LIST AND LOCALITY PLAN
20017605-CI-101	SITE LAYOUT PLAN
20017605-CI-102	LANDFILL FOOTPRINT
20017605-CI-103	LANDFILL SECTIONS
20017605-CI-110	STAGE 1 WATER MANAGEMENT PLAN
20017605-CI-111	STAGE 2 WATER MANAGEMENT PLAN
20017605-CI-112	STAGE 3 WATER MANAGEMENT PLAN
20017605-CI-113	STAGE 4 WATER MANAGEMENT PLAN
20017605-CI-114	STAGE 5 WATER MANAGEMENT PLAN
20017605-CI-120	TYPICAL DRAIN DETAILS AND SECTIONS
20017605-CI-121	TYPICAL DETAILS
20017605-CI-130	LEACHATE POND, SEDIMENTATION BASIN AND DRY BASIN SECTIONS

NOTES:

1. CO-ORDINATES ARE TO MAP GRID OF AUSTRALIAIN 1994 ON M.G.A.
2. LEVELS ARE IN METRES WITH RESPECT TO THE AUSTRALIAN HEIGHT DATUM (AHD).
3. ALL DIMENSIONS ARE IN MILLIMETRES UNO.

This drawing is confidential and shall only be used for the purposes of this project.

No.	BY	DATE	DESCRIPTION	APPD
D	AJC	23.12.09	UPDATED CONCEPT DESIGN	JP
C	TT	16.06.08	FINAL ISSUE	AK
B	TT	15.05.08	FINAL FOR REPORT BONDARY REVISED	AK
A	TT	05.05.08	FINAL FOR REPORT	AK

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001-2000

DESIGNED	AK	CHECKED	
DRAWN	TT / AC	CHECKED	PH
APPROVED	JP	DATE	16.06.08

SCALES: 0 100 200 250m — 1:10000 (A3) 1:5000 (A1)

CLIENT:

CONTRACTOR:

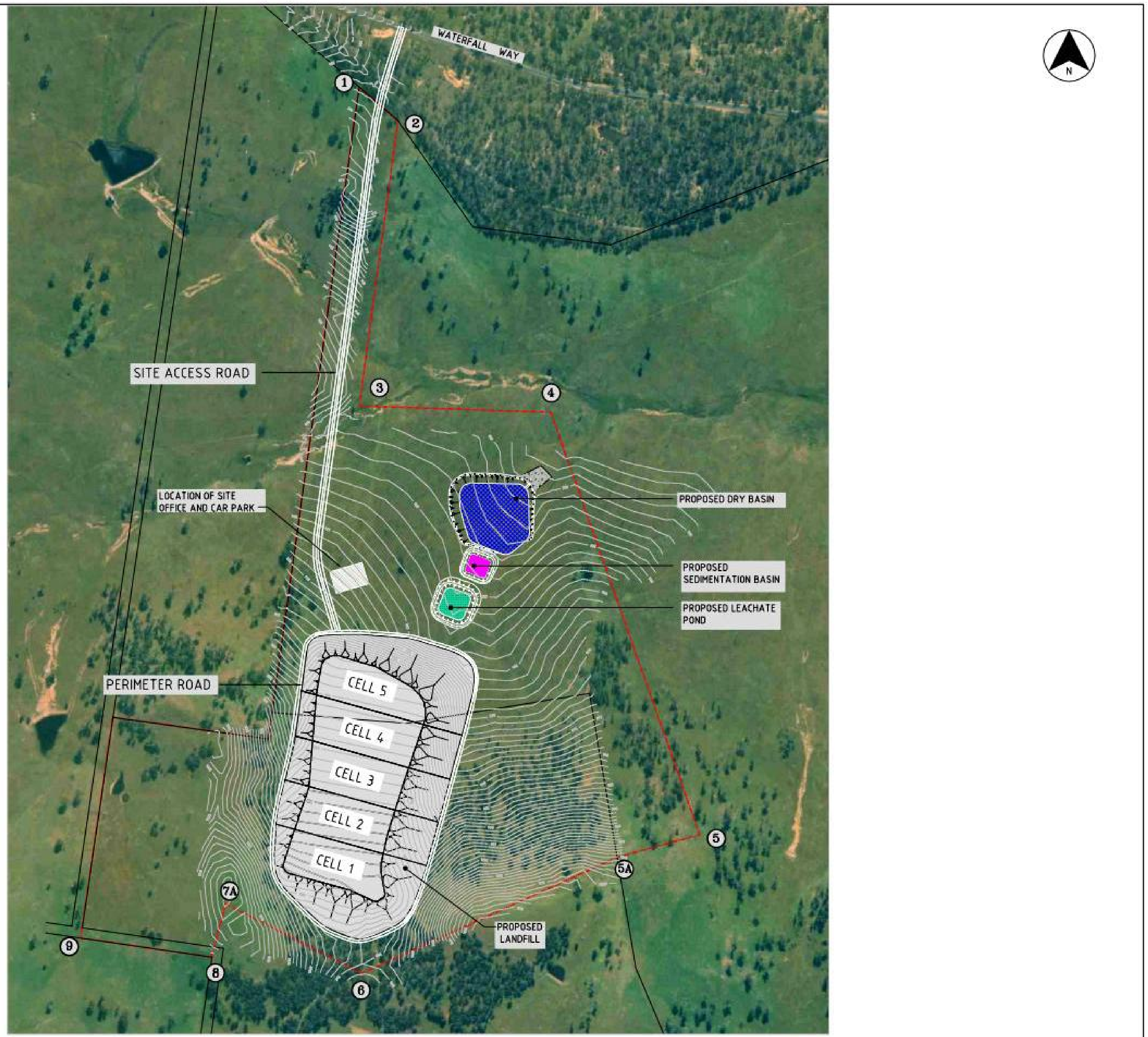
DESIGNER: AECOM
RPEQ No.
AECOM Australia Pty Ltd A.B.N. 20 093 846 925

ARMIDALE LANDFILL
DRAWING LIST AND LOCALITY PLAN

STATUS: DETAILED CONCEPT | DRAWING NO: 20017605-CI-100 | REV: D

REFERENCE POINTS

POINT	EASTING	NORTHING
1	383333	6620325
2	383409	6620260
3	383334	6619705
4	383706	6619693
5	383995	6618872
5A	383837	6618829
6	383339	6618603
7A	383068	6618713
8	383047	6618634
9	382792	6618672



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C	TT	16.06.08	FINAL ISSUE	AK
B	TT	15.05.08	FINAL FOR REPORT BONDARY REVISED	AK
A	TT	05.05.08	FINAL FOR REPORT	AK

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001-2000

DESIGNED	AK	CHECKED	
DRAWN	TT / AC	CHECKED	PM
APPROVED	JP	DATE	16.06.08

SCALES: 0 40 80 120 160 200m 1:4000 (A3) 1:4000 (A1)

CLIENT:

CONTRACTOR:

DESIGNER: AECOM

RPEQ No.
AECOM Australia Pty Ltd A.B.N. 20 093 846 925

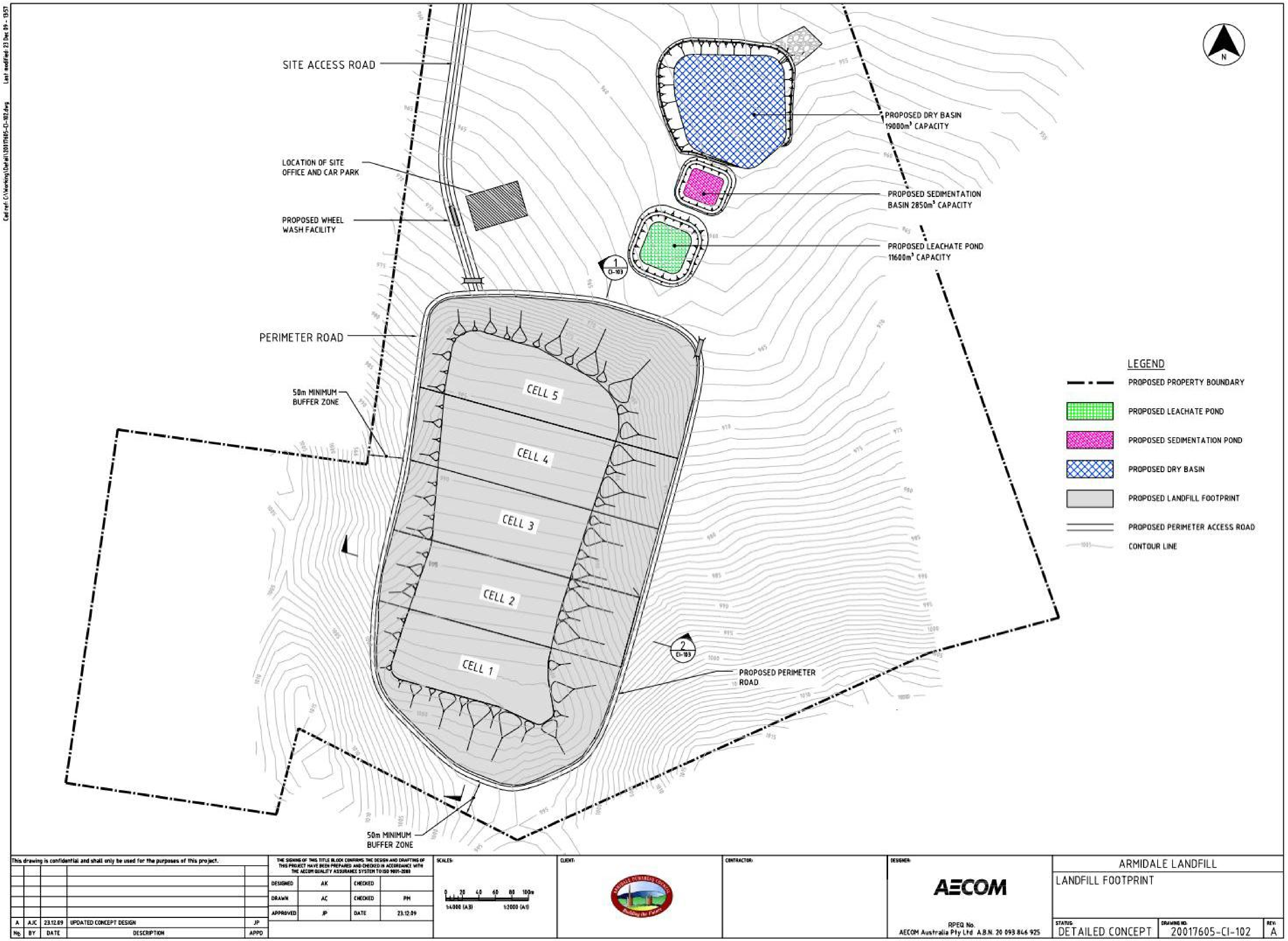
ARMIDALE LANDFILL

SITE LAYOUT PLAN

STATUS: DETAILED CONCEPT

DRAWING NO: 20017605-CI-101

REV: D


SITE ACCESS ROAD
LOCATION OF SITE OFFICE AND CAR PARK
PROPOSED WHEEL WASH FACILITY
PERIMETER ROAD
50m MINIMUM BUFFER ZONE
CELL 5
CELL 4
CELL 3
CELL 2
CELL 1
PROPOSED DRY BASIN 19000m³ CAPACITY
PROPOSED SEDIMENTATION BASIN 2850m³ CAPACITY
PROPOSED LEACHATE POND 11600m³ CAPACITY
PROPOSED PERIMETER ROAD
50m MINIMUM BUFFER ZONE
N
LEGEND
PROPOSED PROPERTY BOUNDARY
PROPOSED LEACHATE POND
PROPOSED SEDIMENTATION POND
PROPOSED DRY BASIN
PROPOSED LANDFILL FOOTPRINT
PROPOSED PERIMETER ACCESS ROAD
CONTOUR LINE
This drawing is confidential and shall only be used for the purposes of this project.
A AJC 23.12.09 UPDATED CONCEPT DESIGN JP
No. BY DATE DESCRIPTION APPD
DESIGNED AK CHECKED
DRAWN AC CHECKED PM
APPROVED JP DATE 23.12.09
SCALES: 1:4000 (A3) 1:2000 (A1)
CLIENT:
CONTRACTOR:
DESIGNER:
AECOM
AECOM Australia Pty Ltd A.B.N. 20 093 846 925
ARMIDALE LANDFILL
LANDFILL FOOTPRINT
STATUS: DETAILED CONCEPT
DRAWING NO: 20017605-CI-102
REV: A

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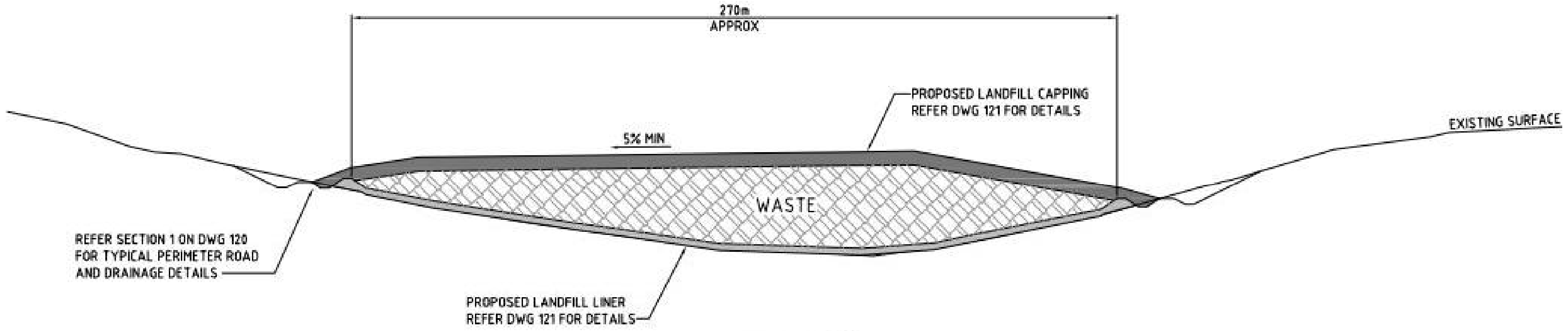

SECTION 2 (CI-102)

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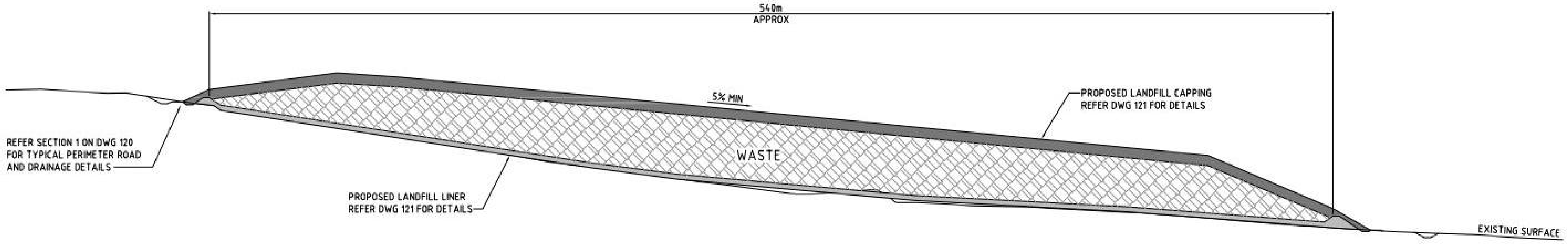
1:500 VERT (A1)



SECTION 1 (CI-102)

1:1000 HORIZ (A1)
1:500 VERT (A1)

This drawing is confidential and shall only be used for the purposes of this project.

No.	BY	DATE	DESCRIPTION	APPD
A	AJC	23.12.09	UPDATED CONCEPT DESIGN	JP

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001-2000

DESIGNED	AK	CHECKED	
DRAWN	AJC	CHECKED	
APPROVED		DATE	

SCALES:
0 10 20 25m
1:1000 (A3) 1:500 (A1) VERT
0 10 20 30 40 50m
1:2000 (A3) 1:1000 (A1) HORIZ

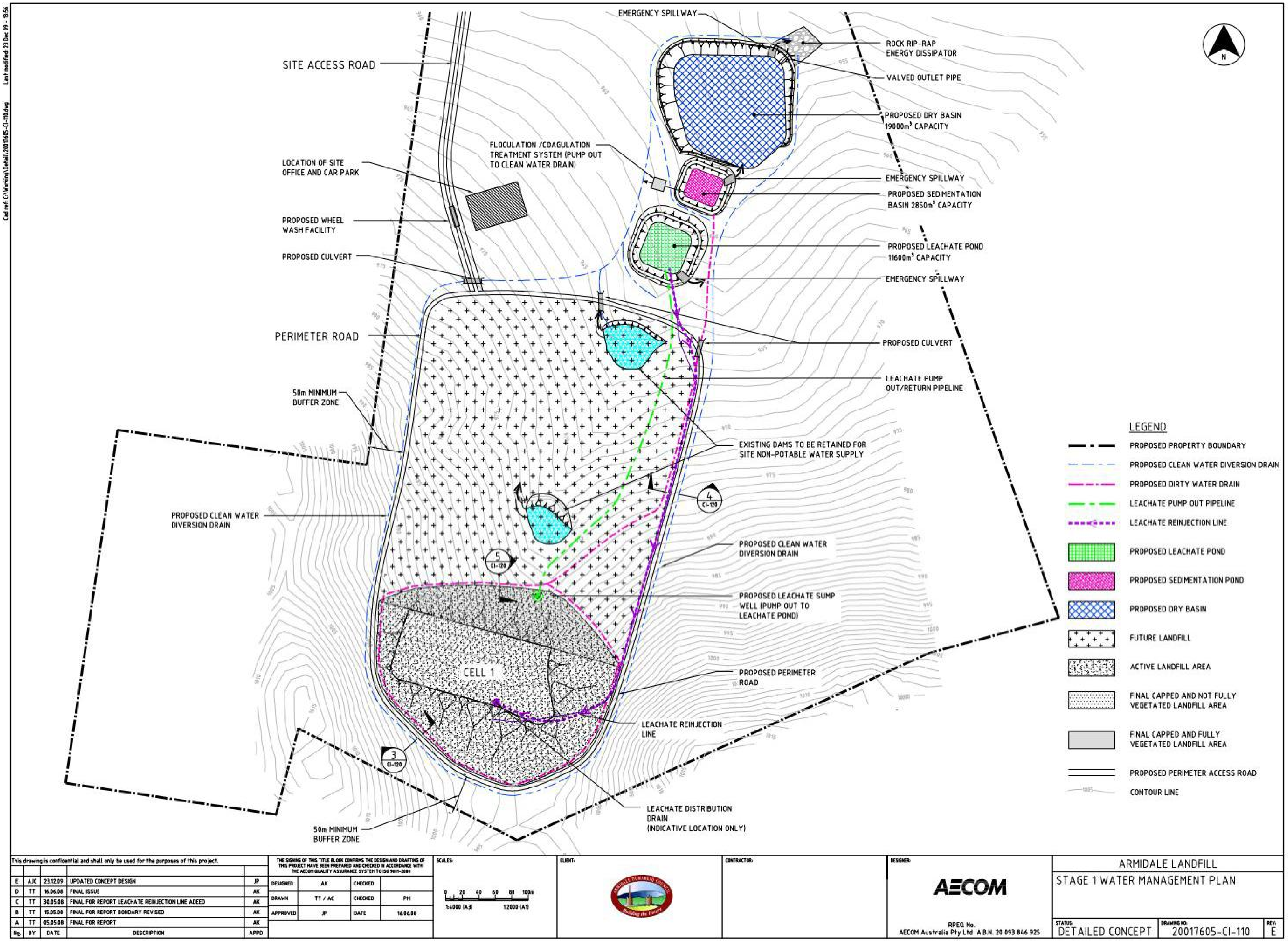
CLIENT:

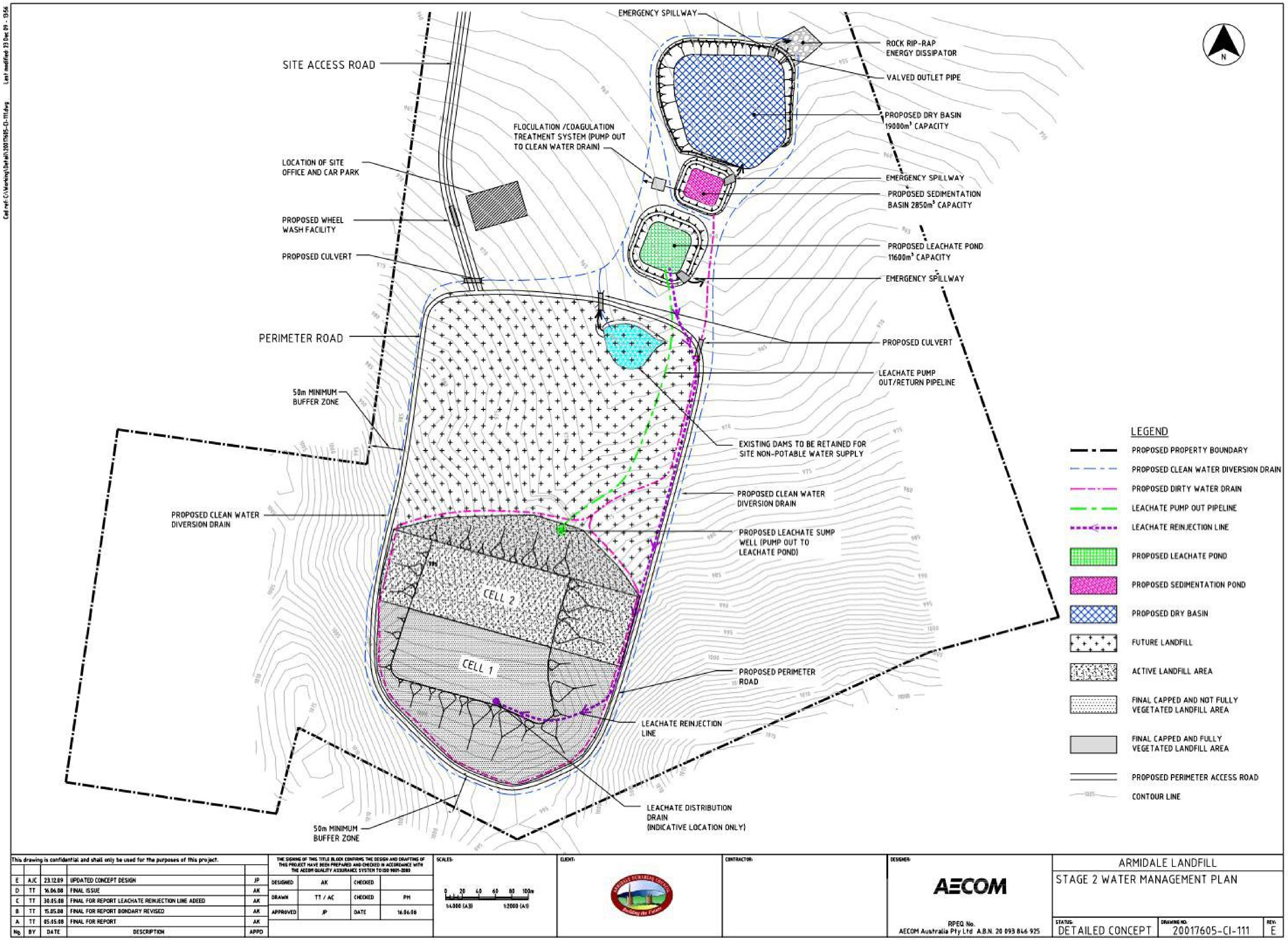
CONTRACTOR:

DESIGNER:
AECOM
RPEQ No.
AECOM Australia Pty Ltd A.B.N. 20 093 846 925

ARMIDALE LANDFILL
LANDFILL SECTIONS

STATUS: DETAILED CONCEPT
DRAWING NO: 20017605-CI-103
REV: A


EMERGENCY SPILLWAY
ROCK RIP-RAP ENERGY DISSIPATOR
VALVED OUTLET PIPE
SITE ACCESS ROAD
PROPOSED DRY BASIN 19000m³ CAPACITY
FLOCULATION /COAGULATION TREATMENT SYSTEM (PUMP OUT TO CLEAN WATER DRAIN)
LOCATION OF SITE OFFICE AND CAR PARK
EMERGENCY SPILLWAY
PROPOSED SEDIMENTATION BASIN 2850m³ CAPACITY
PROPOSED WHEEL WASH FACILITY
PROPOSED LEACHATE POND 11600m³ CAPACITY
PROPOSED CULVERT
EMERGENCY SPILLWAY
PERIMETER ROAD
PROPOSED CULVERT
LEACHATE PUMP OUT/RETURN PIPELINE
50m MINIMUM BUFFER ZONE
EXISTING DAMS TO BE RETAINED FOR SITE NON-POTABLE WATER SUPPLY
PROPOSED CLEAN WATER DIVERSION DRAIN
PROPOSED CLEAN WATER DIVERSION DRAIN
PROPOSED LEACHATE SUMP WELL (PUMP OUT TO LEACHATE POND)
CELL 1
PROPOSED PERIMETER ROAD
LEACHATE REINJECTION LINE
LEACHATE DISTRIBUTION DRAIN (INDICATIVE LOCATION ONLY)
50m MINIMUM BUFFER ZONE
LEGEND
PROPOSED PROPERTY BOUNDARY
PROPOSED CLEAN WATER DIVERSION DRAIN
PROPOSED DIRTY WATER DRAIN
LEACHATE PUMP OUT PIPELINE
LEACHATE REINJECTION LINE
PROPOSED LEACHATE POND
PROPOSED SEDIMENTATION POND
PROPOSED DRY BASIN
FUTURE LANDFILL
ACTIVE LANDFILL AREA
FINAL CAPPED AND NOT FULLY VEGETATED LANDFILL AREA
FINAL CAPPED AND FULLY VEGETATED LANDFILL AREA
PROPOSED PERIMETER ACCESS ROAD
CONTOUR LINE
This drawing is confidential and shall only be used for the purposes of this project.
E AJC 23.12.09 UPDATED CONCEPT DESIGN JP
D TT 16.06.08 FINAL ISSUE AK
C TT 30.05.08 FINAL FOR REPORT LEACHATE REINJECTION LINE ADEED AK
B TT 15.05.08 FINAL FOR REPORT BONDARY REVISED AK
A TT 05.05.08 FINAL FOR REPORT AK
No. BY DATE DESCRIPTION APPD
THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001-2000
DESIGNED AK CHECKED
DRAWN TT / AC CHECKED PM
APPROVED JP DATE 16.06.08
SCALES:
1:4000 (A3) 1:2000 (A1)
CLIENT:
CONTRACTOR:
DESIGNER:
AECOM
RPEQ No.
AECOM Australia Pty Ltd A.B.N. 20 093 846 925
ARMIDALE LANDFILL
STAGE 1 WATER MANAGEMENT PLAN
STATUS: DETAILED CONCEPT
DRAWING NO: 20017605-CI-110
REV: E


SITE ACCESS ROAD
EMERGENCY SPILLWAY
ROCK RIP-RAP ENERGY DISSIPATOR
VALVED OUTLET PIPE
PROPOSED DRY BASIN 19000m³ CAPACITY
FLOCULATION /COAGULATION TREATMENT SYSTEM (PUMP OUT TO CLEAN WATER DRAIN)
LOCATION OF SITE OFFICE AND CAR PARK
EMERGENCY SPILLWAY
PROPOSED SEDIMENTATION BASIN 2850m³ CAPACITY
PROPOSED WHEEL WASH FACILITY
PROPOSED CULVERT
PROPOSED LEACHATE POND 11600m³ CAPACITY
EMERGENCY SPILLWAY
PERIMETER ROAD
PROPOSED CULVERT
LEACHATE PUMP OUT/RETURN PIPELINE
50m MINIMUM BUFFER ZONE
EXISTING DAMS TO BE RETAINED FOR SITE NON-POTABLE WATER SUPPLY
PROPOSED CLEAN WATER DIVERSION DRAIN
PROPOSED CLEAN WATER DIVERSION DRAIN
PROPOSED LEACHATE SUMP WELL (PUMP OUT TO LEACHATE POND)
CELL 2
CELL 1
PROPOSED PERIMETER ROAD
LEACHATE REINJECTION LINE
LEACHATE DISTRIBUTION DRAIN (INDICATIVE LOCATION ONLY)
50m MINIMUM BUFFER ZONE
N
LEGEND
PROPOSED PROPERTY BOUNDARY
PROPOSED CLEAN WATER DIVERSION DRAIN
PROPOSED DIRTY WATER DRAIN
LEACHATE PUMP OUT PIPELINE
LEACHATE REINJECTION LINE
PROPOSED LEACHATE POND
PROPOSED SEDIMENTATION POND
PROPOSED DRY BASIN
FUTURE LANDFILL
ACTIVE LANDFILL AREA
FINAL CAPPED AND NOT FULLY VEGETATED LANDFILL AREA
FINAL CAPPED AND FULLY VEGETATED LANDFILL AREA
PROPOSED PERIMETER ACCESS ROAD
CONTOUR LINE
This drawing is confidential and shall only be used for the purposes of this project.
E AJC 23.12.09 UPDATED CONCEPT DESIGN JP
D TT 16.06.08 FINAL ISSUE AK
C TT 30.05.08 FINAL FOR REPORT LEACHATE REINJECTION LINE ADEED AK
B TT 15.05.08 FINAL FOR REPORT BONDARY REVISED AK
A TT 05.05.08 FINAL FOR REPORT AK
No. BY DATE DESCRIPTION APPD
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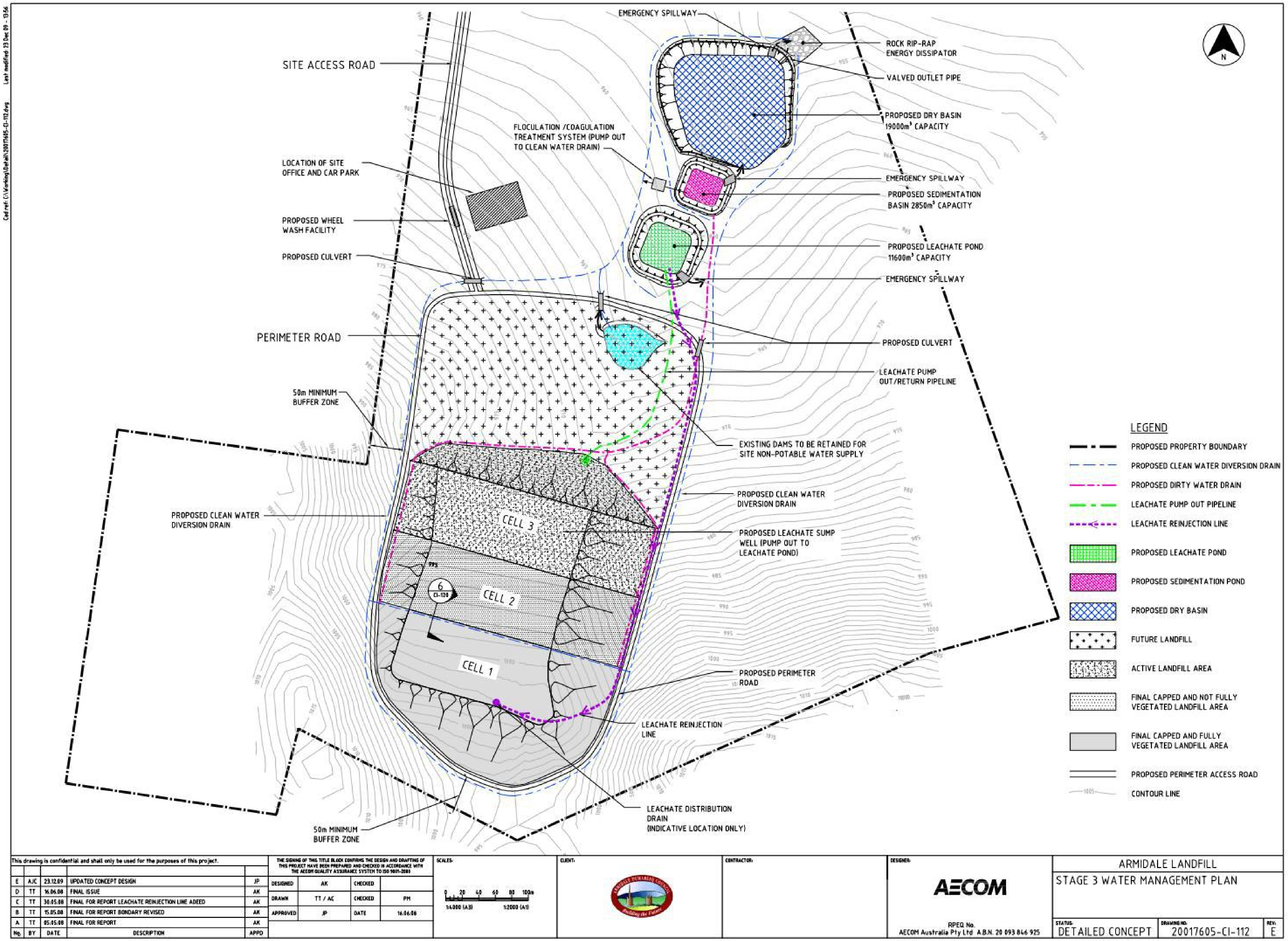
DESIGNED AK CHECKED
DRAWN TT / AC CHECKED PM
APPROVED JP DATE 16.06.08
SCALES:
1:4000 (A3) 1:2000 (A1)
CLIENT:
CONTRACTOR:
DESIGNER:
AECOM
RPEQ No.
AECOM Australia Pty Ltd A.B.N. 20 093 846 925
ARMIDALE LANDFILL
STAGE 2 WATER MANAGEMENT PLAN
STATUS: DETAILED CONCEPT
DRAWING NO: 20017605-CI-111
REV: E


EMERGENCY SPILLWAY
ROCK RIP-RAP ENERGY DISSIPATOR
VALVED OUTLET PIPE
SITE ACCESS ROAD
PROPOSED DRY BASIN 19000m³ CAPACITY
FLOCULATION /COAGULATION TREATMENT SYSTEM (PUMP OUT TO CLEAN WATER DRAIN)
LOCATION OF SITE OFFICE AND CAR PARK
EMERGENCY SPILLWAY
PROPOSED SEDIMENTATION BASIN 2850m³ CAPACITY
PROPOSED WHEEL WASH FACILITY
PROPOSED LEACHATE POND 11600m³ CAPACITY
PROPOSED CULVERT
EMERGENCY SPILLWAY
PERIMETER ROAD
PROPOSED CULVERT
LEACHATE PUMP OUT/RETURN PIPELINE
50m MINIMUM BUFFER ZONE
EXISTING DAMS TO BE RETAINED FOR SITE NON-POTABLE WATER SUPPLY
PROPOSED CLEAN WATER DIVERSION DRAIN
PROPOSED CLEAN WATER DIVERSION DRAIN
CELL 3
PROPOSED LEACHATE SUMP WELL (PUMP OUT TO LEACHATE POND)
CELL 2
CELL 1
PROPOSED PERIMETER ROAD
LEACHATE REINJECTION LINE
LEACHATE DISTRIBUTION DRAIN (INDICATIVE LOCATION ONLY)
50m MINIMUM BUFFER ZONE
LEGEND
PROPOSED PROPERTY BOUNDARY
PROPOSED CLEAN WATER DIVERSION DRAIN
PROPOSED DIRTY WATER DRAIN
LEACHATE PUMP OUT PIPELINE
LEACHATE REINJECTION LINE
PROPOSED LEACHATE POND
PROPOSED SEDIMENTATION POND
PROPOSED DRY BASIN
FUTURE LANDFILL
ACTIVE LANDFILL AREA
FINAL CAPPED AND NOT FULLY VEGETATED LANDFILL AREA
FINAL CAPPED AND FULLY VEGETATED LANDFILL AREA
PROPOSED PERIMETER ACCESS ROAD
CONTOUR LINE
This drawing is confidential and shall only be used for the purposes of this project.
E AJC 23.12.09 UPDATED CONCEPT DESIGN JP
D TT 16.06.08 FINAL ISSUE AK
C TT 30.05.08 FINAL FOR REPORT LEACHATE REINJECTION LINE ADEED AK
B TT 15.05.08 FINAL FOR REPORT BONDARY REVISED AK
A TT 05.05.08 FINAL FOR REPORT AK
No. BY DATE DESCRIPTION APPD
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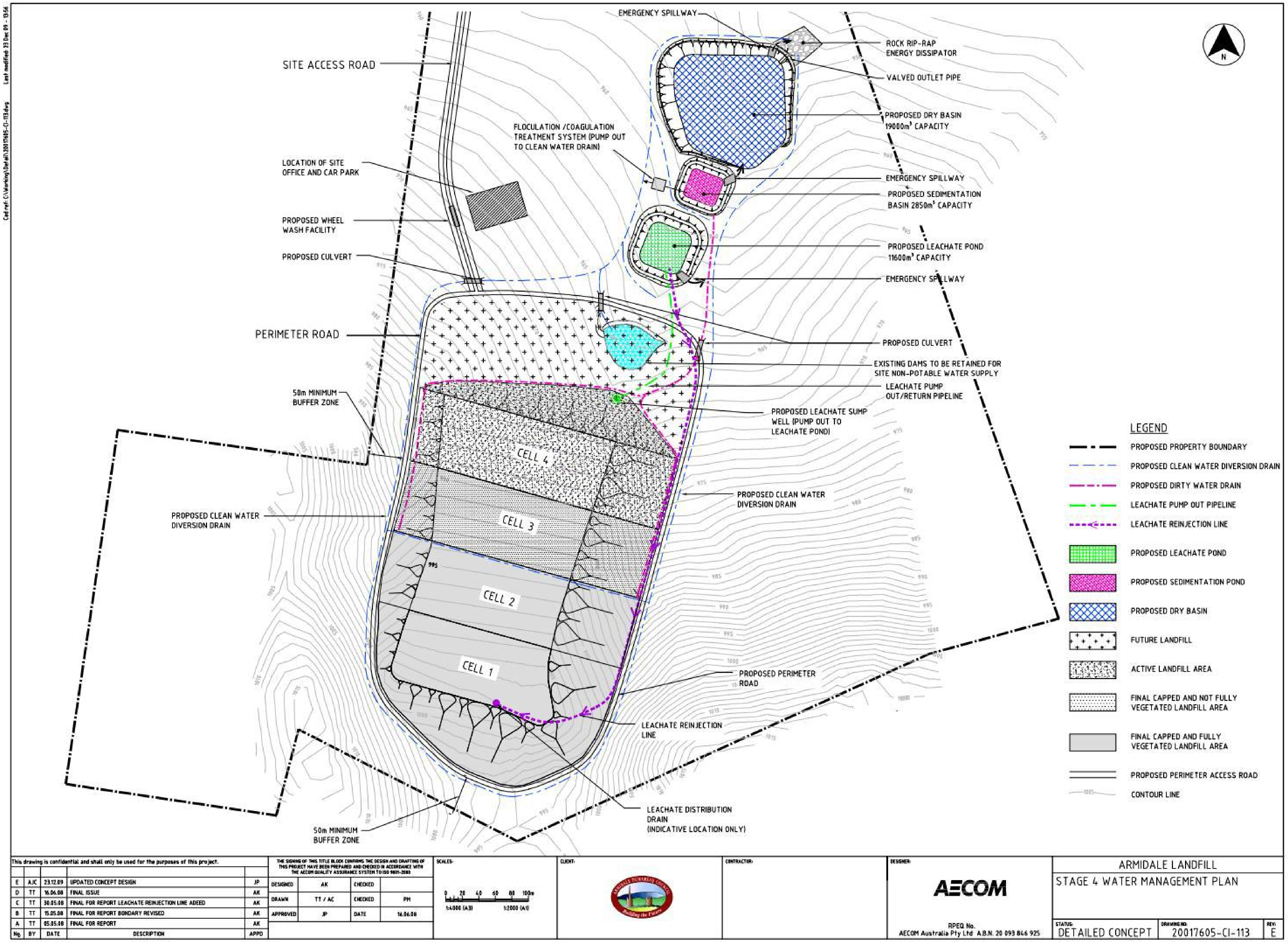
DESIGNED AK CHECKED
DRAWN TT / AC CHECKED PM
APPROVED JP DATE 16.06.08
SCALES:
0 20 40 60 80 100m
1:4000 (A3) 1:2000 (A1)
CLIENT:
CONTRACTOR:
DESIGNER:
AECOM
RPEQ No.
AECOM Australia Pty Ltd A.B.N. 20 093 846 925
ARMIDALE LANDFILL
STAGE 3 WATER MANAGEMENT PLAN
STATUS: DETAILED CONCEPT
DRAWING NO: 20017605-CI-112
REV: E


EMERGENCY SPILLWAY
ROCK RIP-RAP ENERGY DISSIPATOR
VALVED OUTLET PIPE
SITE ACCESS ROAD
PROPOSED DRY BASIN 19000m³ CAPACITY
FLOCULATION /COAGULATION TREATMENT SYSTEM (PUMP OUT TO CLEAN WATER DRAIN)
LOCATION OF SITE OFFICE AND CAR PARK
EMERGENCY SPILLWAY
PROPOSED SEDIMENTATION BASIN 2850m³ CAPACITY
PROPOSED WHEEL WASH FACILITY
PROPOSED CULVERT
PROPOSED LEACHATE POND 11600m³ CAPACITY
EMERGENCY SPILLWAY
PERIMETER ROAD
PROPOSED CULVERT
EXISTING DAMS TO BE RETAINED FOR SITE NON-POTABLE WATER SUPPLY
LEACHATE PUMP OUT/RETURN PIPELINE
50m MINIMUM BUFFER ZONE
PROPOSED LEACHATE SUMP WELL (PUMP OUT TO LEACHATE POND)
CELL 4
CELL 3
CELL 2
CELL 1
PROPOSED CLEAN WATER DIVERSION DRAIN
PROPOSED CLEAN WATER DIVERSION DRAIN
PROPOSED PERIMETER ROAD
LEACHATE REINJECTION LINE
LEACHATE DISTRIBUTION DRAIN (INDICATIVE LOCATION ONLY)
50m MINIMUM BUFFER ZONE
N
LEGEND
PROPOSED PROPERTY BOUNDARY
PROPOSED CLEAN WATER DIVERSION DRAIN
PROPOSED DIRTY WATER DRAIN
LEACHATE PUMP OUT PIPELINE
LEACHATE REINJECTION LINE
PROPOSED LEACHATE POND
PROPOSED SEDIMENTATION POND
PROPOSED DRY BASIN
FUTURE LANDFILL
ACTIVE LANDFILL AREA
FINAL CAPPED AND NOT FULLY VEGETATED LANDFILL AREA
FINAL CAPPED AND FULLY VEGETATED LANDFILL AREA
PROPOSED PERIMETER ACCESS ROAD
CONTOUR LINE
This drawing is confidential and shall only be used for the purposes of this project.
E AJC 23.12.09 UPDATED CONCEPT DESIGN JP
D TT 16.06.08 FINAL ISSUE AK
C TT 30.05.08 FINAL FOR REPORT LEACHATE REINJECTION LINE ADEED AK
B TT 15.05.08 FINAL FOR REPORT BONDARY REVISED AK
A TT 05.05.08 FINAL FOR REPORT AK
No. BY DATE DESCRIPTION APPD
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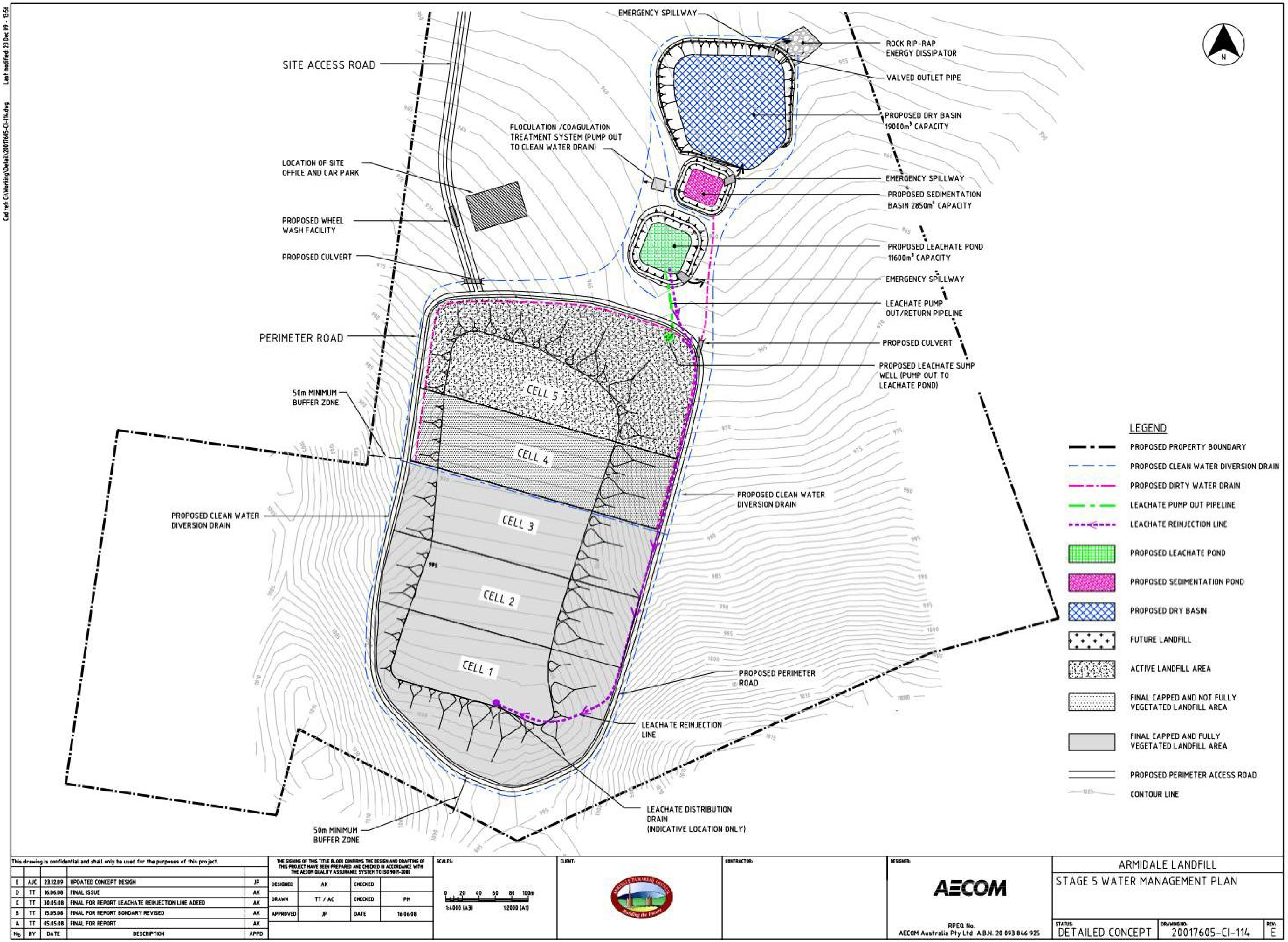
DESIGNED AK CHECKED
DRAWN TT / AC CHECKED PM
APPROVED JP DATE 16.06.08
SCALES:
0 20 40 60 80 100m
1:4000 (A3) 1:2000 (A1)
CLIENT:
CONTRACTOR:
DESIGNER:
AECOM
RPEQ No.
AECOM Australia Pty Ltd A.B.N. 20 093 846 925
ARMIDALE LANDFILL
STAGE 4 WATER MANAGEMENT PLAN
STATUS: DETAILED CONCEPT
DRAWING NO: 20017605-CI-113
REV: E


SITE ACCESS ROAD
EMERGENCY SPILLWAY
ROCK RIP-RAP ENERGY DISSIPATOR
VALVED OUTLET PIPE
PROPOSED DRY BASIN 19000m³ CAPACITY
FLOCULATION /COAGULATION TREATMENT SYSTEM (PUMP OUT TO CLEAN WATER DRAIN)
LOCATION OF SITE OFFICE AND CAR PARK
EMERGENCY SPILLWAY
PROPOSED SEDIMENTATION BASIN 2850m³ CAPACITY
PROPOSED WHEEL WASH FACILITY
PROPOSED LEACHATE POND 11600m³ CAPACITY
PROPOSED CULVERT
EMERGENCY SPILLWAY
LEACHATE PUMP OUT/RETURN PIPELINE
PERIMETER ROAD
PROPOSED CULVERT
PROPOSED LEACHATE SUMP WELL (PUMP OUT TO LEACHATE POND)
50m MINIMUM BUFFER ZONE
CELL 5
CELL 4
CELL 3
CELL 2
CELL 1
PROPOSED CLEAN WATER DIVERSION DRAIN
PROPOSED CLEAN WATER DIVERSION DRAIN
PROPOSED PERIMETER ROAD
LEACHATE REINJECTION LINE
LEACHATE DISTRIBUTION DRAIN (INDICATIVE LOCATION ONLY)
50m MINIMUM BUFFER ZONE
N
LEGEND
PROPOSED PROPERTY BOUNDARY
PROPOSED CLEAN WATER DIVERSION DRAIN
PROPOSED DIRTY WATER DRAIN
LEACHATE PUMP OUT PIPELINE
LEACHATE REINJECTION LINE
PROPOSED LEACHATE POND
PROPOSED SEDIMENTATION POND
PROPOSED DRY BASIN
FUTURE LANDFILL
ACTIVE LANDFILL AREA
FINAL CAPPED AND NOT FULLY VEGETATED LANDFILL AREA
FINAL CAPPED AND FULLY VEGETATED LANDFILL AREA
PROPOSED PERIMETER ACCESS ROAD
CONTOUR LINE
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E AJC 23.12.09 UPDATED CONCEPT DESIGN JP
D TT 16.06.08 FINAL ISSUE AK
C TT 30.05.08 FINAL FOR REPORT LEACHATE REINJECTION LINE ADEED AK
B TT 15.05.08 FINAL FOR REPORT BONDARY REVISED AK
A TT 05.05.08 FINAL FOR REPORT AK
No. BY DATE DESCRIPTION APPD
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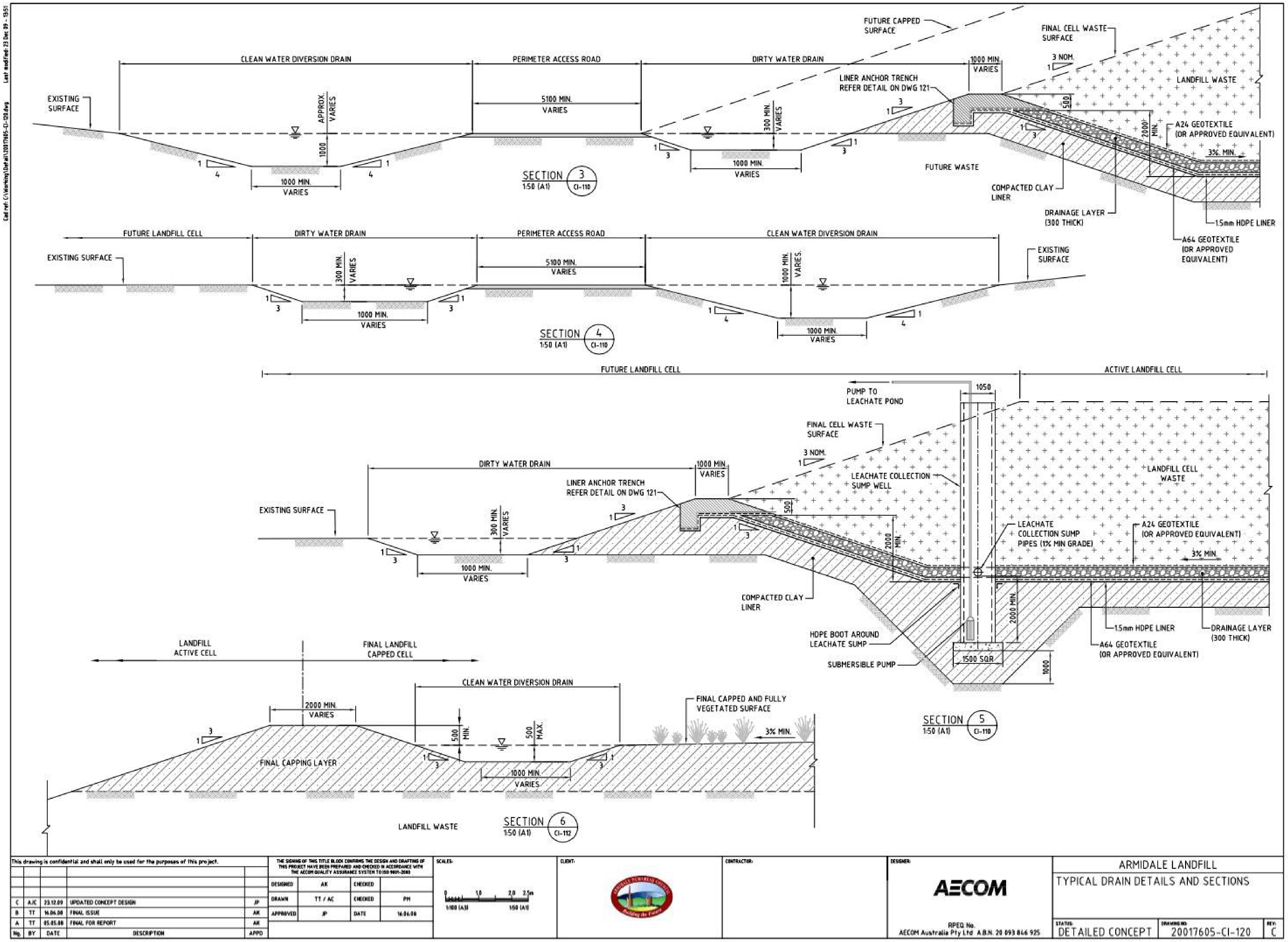
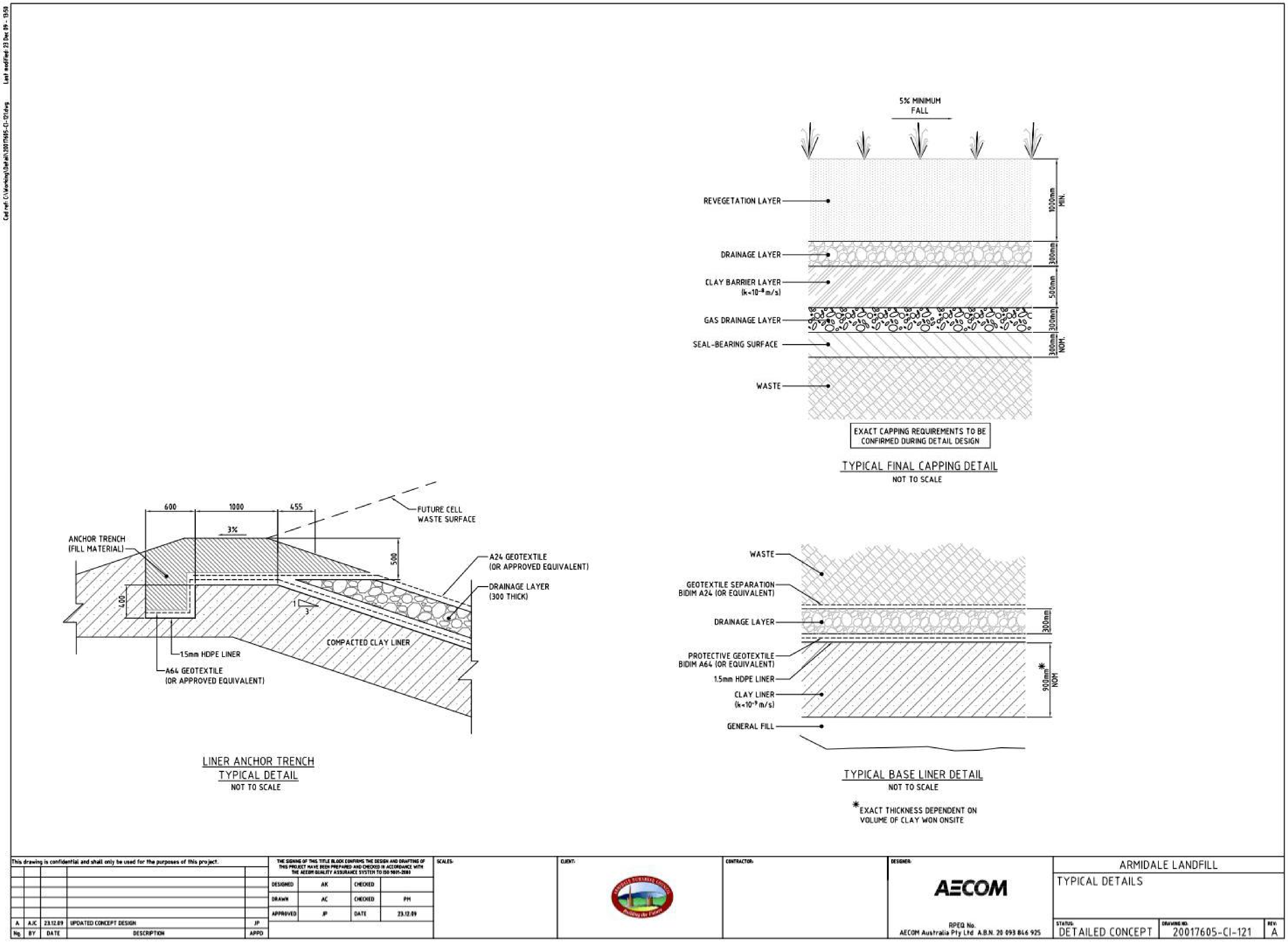
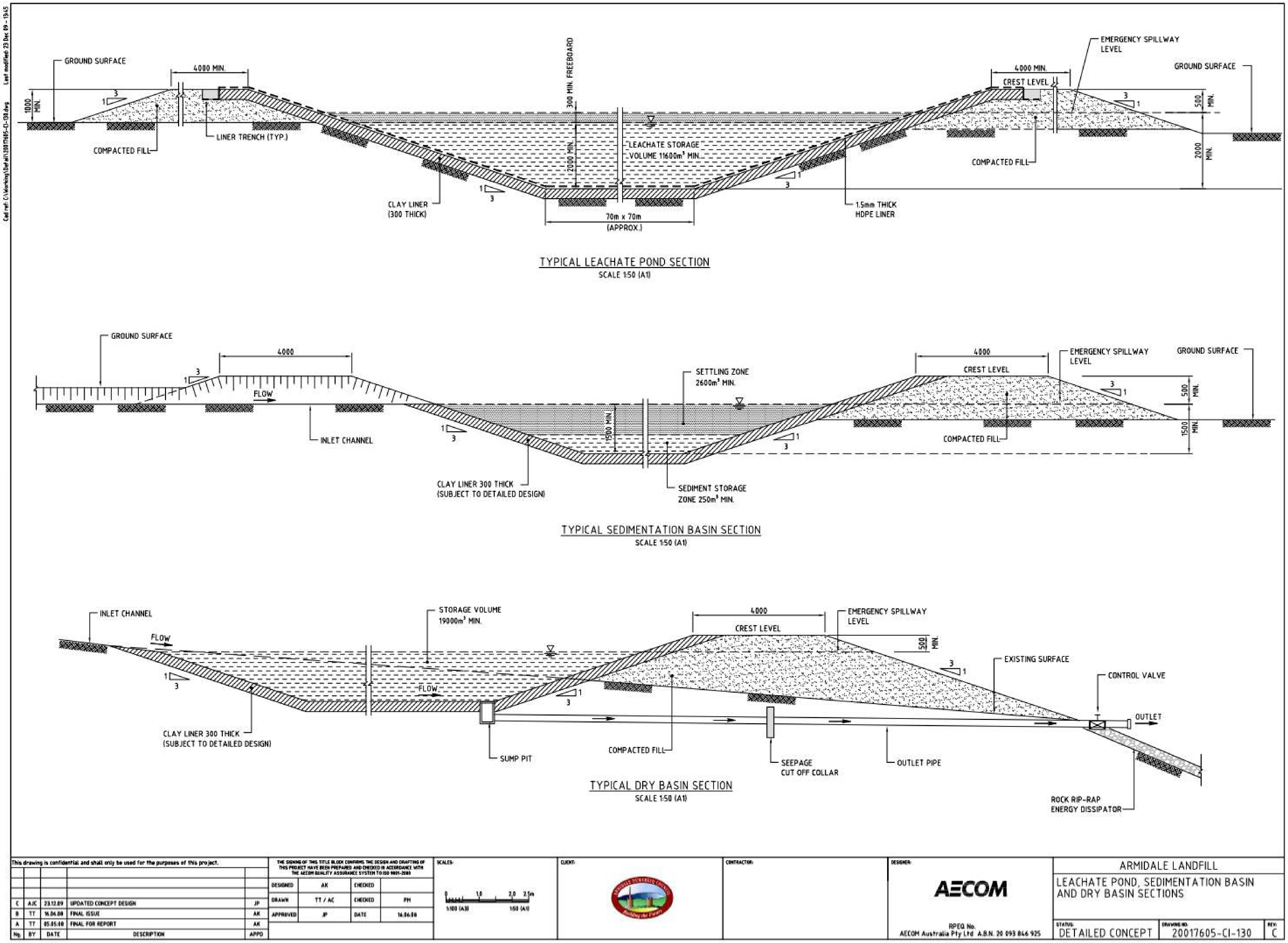
DESIGNED AK CHECKED
DRAWN TT / AC CHECKED PM
APPROVED JP DATE 16.06.08
SCALES:
0 20 40 60 80 100m
1:4000 (A3) 1:2000 (A1)
CLIENT:
CONTRACTOR:
DESIGNER:
AECOM
RPEQ No.
AECOM Australia Pty Ltd A.B.N. 20 093 846 925
ARMIDALE LANDFILL
STAGE 5 WATER MANAGEMENT PLAN
STATUS: DETAILED CONCEPT
DRAWING No: 20017605-CI-114
REV: E


CLEAN WATER DIVERSION DRAIN
PERIMETER ACCESS ROAD
DIRTY WATER DRAIN
FUTURE CAPPED SURFACE
FINAL CELL WASTE SURFACE
LANDFILL WASTE
EXISTING SURFACE
5100 MIN.
VARIES
LINER ANCHOR TRENCH
REFER DETAIL ON DWG 121
A24 GEOTEXTILE
(OR APPROVED EQUIVALENT)
3% MIN.
1000 MIN.
FUTURE WASTE
COMPACTED CLAY LINER
DRAINAGE LAYER
(300 THICK)
1.5mm HDPE LINER
A64 GEOTEXTILE
(OR APPROVED EQUIVALENT)
SECTION 3
1:50 (A1)
CI-110
FUTURE LANDFILL CELL
SECTION 4
1:50 (A1)
CI-110
ACTIVE LANDFILL CELL
PUMP TO LEACHATE POND
1050
LEACHATE COLLECTION SUMP WELL
LANDFILL CELL WASTE
LEACHATE COLLECTION SUMP PIPES (1% MIN GRADE)
HDPE BOOT AROUND LEACHATE SUMP
SUBMERSIBLE PUMP
1500 SQR.
SECTION 5
1:50 (A1)
CI-110
LANDFILL ACTIVE CELL
FINAL LANDFILL CAPPED CELL
2000 MIN.
FINAL CAPPED AND FULLY VEGETATED SURFACE
FINAL CAPPING LAYER
SECTION 6
1:50 (A1)
CI-112
This drawing is confidential and shall only be used for the purposes of this project.
C AJC 23.12.09 UPDATED CONCEPT DESIGN JP
B TT 16.06.08 FINAL ISSUE AK
A TT 05.05.08 FINAL FOR REPORT AK
No. BY DATE DESCRIPTION APPD
DESIGNED AK
DRAWN TT / AC CHECKED PM
APPROVED JP DATE 16.06.08
SCALES:
CLIENT:
CONTRACTOR:
DESIGNER:
AECOM
AECOM Australia Pty Ltd A.B.N. 20 093 846 925
ARMIDALE LANDFILL
TYPICAL DRAIN DETAILS AND SECTIONS
STATUS: DETAILED CONCEPT
DRAWING No: 20017605-CI-120
REV: C


5% MINIMUM FALL
REVEGETATION LAYER
1000mm MIN.
DRAINAGE LAYER
300mm
CLAY BARRIER LAYER (k<10⁻⁸ m/s)
500mm
GAS DRAINAGE LAYER
300mm
SEAL-BEARING SURFACE
300mm NOM.
WASTE
EXACT CAPPING REQUIREMENTS TO BE CONFIRMED DURING DETAIL DESIGN
TYPICAL FINAL CAPPING DETAIL
NOT TO SCALE
600
1000
455
3%
500
400
FUTURE CELL WASTE SURFACE
ANCHOR TRENCH (FILL MATERIAL)
A24 GEOTEXTILE (OR APPROVED EQUIVALENT)
DRAINAGE LAYER (300 THICK)
COMPACTED CLAY LINER
1.5mm HDPE LINER
A64 GEOTEXTILE (OR APPROVED EQUIVALENT)
LINER ANCHOR TRENCH TYPICAL DETAIL
NOT TO SCALE
WASTE
GEOTEXTILE SEPARATION BIDIM A24 (OR EQUIVALENT)
DRAINAGE LAYER
300mm
PROTECTIVE GEOTEXTILE BIDIM A64 (OR EQUIVALENT)
1.5mm HDPE LINER
CLAY LINER (k<10⁻⁹ m/s)
900mm* NOM
GENERAL FILL
TYPICAL BASE LINER DETAIL
NOT TO SCALE
*EXACT THICKNESS DEPENDENT ON VOLUME OF CLAY WON ONSITE
This drawing is confidential and shall only be used for the purposes of this project.
A | AJC | 23.12.09 | UPDATED CONCEPT DESIGN | JP
No. | BY | DATE | DESCRIPTION | APPD
THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001-2000
DESIGNED AK CHECKED
DRAWN AC CHECKED PM
APPROVED JP DATE 23.12.09
SCALES:
CLIENT:
CONTRACTOR:
DESIGNER:
AECOM
RPEQ No.
AECOM Australia Pty Ltd A.B.N. 20 093 846 925
ARMIDALE LANDFILL
TYPICAL DETAILS
STATUS: DETAILED CONCEPT
DRAWING NO: 20017605-CI-121
REV: A


GROUND SURFACE
4000 MIN.
1000 MIN.
LINER TRENCH (TYP.)
COMPACTED FILL
300 MIN. FREEBOARD
2000 MIN.
LEACHATE STORAGE
VOLUME 11600m³ MIN.
CLAY LINER
(300 THICK)
70m x 70m
(APPROX.)
1.5mm THICK
HDPE LINER
EMERGENCY SPILLWAY
LEVEL
CREST LEVEL
500 MIN.
TYPICAL LEACHATE POND SECTION
SCALE 1:50 (A1)
4000
FLOW
INLET CHANNEL
SETTLING ZONE
2600m³ MIN.
1500 MIN.
CLAY LINER 300 THICK
(SUBJECT TO DETAILED DESIGN)
SEDIMENT STORAGE
ZONE 250m³ MIN.
TYPICAL SEDIMENTATION BASIN SECTION
SCALE 1:50 (A1)
STORAGE VOLUME
19000m³ MIN.
EXISTING SURFACE
CONTROL VALVE
OUTLET
SUMP PIT
SEEPAGE
CUT OFF COLLAR
OUTLET PIPE
ROCK RIP-RAP
ENERGY DISSIPATOR
TYPICAL DRY BASIN SECTION
SCALE 1:50 (A1)
This drawing is confidential and shall only be used for the purposes of this project.
C AJC 23.12.09 UPDATED CONCEPT DESIGN JP
B TT 16.06.08 FINAL ISSUE AK
A TT 05.05.08 FINAL FOR REPORT AK
No. BY DATE DESCRIPTION APPD
THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001-2000
DESIGNED AK CHECKED
DRAWN TT / AC CHECKED PH
APPROVED JP DATE 16.06.08
SCALES:
1:100 (A3) 1:50 (A1)
CLIENT:
CONTRACTOR:
DESIGNER:
AECOM
RPEQ No.
AECOM Australia Pty Ltd A.B.N. 20 093 846 925
ARMIDALE LANDFILL
LEACHATE POND, SEDIMENTATION BASIN AND DRY BASIN SECTIONS
STATUS: DETAILED CONCEPT
DRAWING NO: 20017605-CI-130
REV: C

Worldwide Locations

Australia	+61-2-8484-8999
Azerbaijan	+994 12 4975881
Belgium	+32-3-540-95-86
Bolivia	+591-3-354-8564
Brazil	+55-21-3526-8160
China	+86-20-8130-3737
England	+44 1928-726006
France	+33(0)1 48 42 59 53
Germany	+49-631-341-13-62
Ireland	+353 1631 9356
Italy	+39-02-3180 77 1
Japan	+813-3541 5926
Malaysia	+603-7725-0380
Netherlands	+31 10 2120 744
Philippines	+632 910 6226
Scotland	+44 (0) 1224-624624
Singapore	+65 6295 5752
Thailand	+662 642 6161
Turkey	+90-312-428-3667
United States	+1 978-589-3200
Venezuela	+58-212-762-63 39

Australian Locations

Adelaide
Brisbane
Canberra
Darwin
Melbourne
Newcastle
Perth
Sydney
Singleton

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