



Appendix F

| *Encapsulation
cell design report*

REPORT

Encapsulation Cell - Reference Design Report

Woodlawn Advanced Energy Recovery Centre

Submitted to:

Veolia Environmental Services

Submitted by:

Golder Associates Pty Ltd

Level 8, 40 Mount Street, North Sydney, New South Wales 2060, Australia

+61 2 9478 3900

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1.0 INTRODUCTION

Veolia Environmental Services (Veolia) has engaged Golder to prepare a reference design for an Encapsulation Cell for residual waste generated by the proposed Advanced Energy Recovery Centre (ARC) at its Woodlawn Eco-Precinct in NSW. The Encapsulation Cell will be used for disposal of stabilised air pollution control residue (APCr) material from the ARC.

Residual wastes will be generated during ARC operation from waste combustion and flue gas treatment processes. These residual wastes are categorised as incinerator bottom ash (IBA) and air pollution control residue (APCr). Anticipated generation rates of residual wastes as adopted for development of the reference design are provided in Table 1.

Table 1: Anticipated annual waste flows and residue outputs (reference: Ash Management Study, WSP (2022))

	Waste Input		Waste Generation	
	Waste (MSW)	Waste (C&I)	IBA	APCr
Annual Mass (t)	304,000 t (80% of waste feedstock)	76,000 t (20% of waste feedstock)	76,000 t (20% of waste feedstock)	15,200 t (4% of waste feedstock)

We understood that the APCr, after treatment/stabilisation, will be classified as restricted solid waste (RSW) under the NSW EPA waste classification guidelines and is proposed to be disposed of in a RSW landfill (monocell) constructed as part of the proposed ARC, referred to herein as the Encapsulation Cell. The Encapsulation Cell is required to satisfy the requirements of the NSW EPA's Environmental Guidelines: Solid Waste Landfills (EPA, 2016) (the Landfill Guidelines) for RSW landfills and be licenced by NSW EPA under the NSW POEO Regulation.

This report presents the basis of design and reference design details for the Encapsulation Cell. We consider that the report addresses the project SEARs requirement to provide a detailed encapsulation cell design that demonstrates the contaminants can be adequately managed.

Further site characterisation and design development will be required to advance the Encapsulation Cell design for subsequent project stages and to consider commercial risks and constraints for cell construction and operation.

The previous revision of this report, Rev 1, provided additional information for technical specifications for Encapsulation Cell construction materials and for leachate evaporation pond arrangement and operation. The additional information is provided primarily in Sections 4.9.3, 4.9.4, and 0.

The current revision of this report, Rev 2, includes additional information on future water storage levels within site Evaporation Dam 1 (ED1) as presented in Section 2.8. The relevance of these water levels to the Encapsulation Cell design is addressed throughout the document.

2.0 SITE CHARACTERISTICS

2.1 Location

The proposed Encapsulation Cell location is indicated in Reference Design Drawing sheet 1 of 9 and sheet 2 of 9, provided in Appendix A.

The proposed Encapsulation Cell is wholly within the Woodlawn Eco-Precinct, near the southwest corner of an existing evaporation dam at the Eco Precinct, Evaporation Dam 1 (ED1). The distance from the

Encapsulation Cell to a residential zone or dwelling, school or hospital far exceeds the minimum value of 250 m identified in the Landfill Guidelines.

The Encapsulation Cell is located approximately 1.8 km west-northwest of the ARC main facility.

2.2 Topography

Recent site survey provided by Veolia indicates that the elevation of the existing ground surface in the proposed location of the Encapsulation Cell is generally between approximate RL 785 m to 790 m. This elevation range reflects base and side walls of the existing ED1 evaporation pond. Existing ground surface levels are not available for the full extent of the Encapsulation Cell footprint because some areas were inundated by the waters of ED1 at approximately RL 786 m at the time of survey. There are no floodways present at, or in the near vicinity of, the proposed Encapsulation Cell location.

ED1 is near the head of Crisps Creek, which drains east away from the site into Wollondilly River Catchment. Wollondilly River Catchment forms part of Sydney's Drinking Water Catchment.

2.3 Regional and Local Geology

Published geologic maps indicates that the Woodlawn Eco-Precinct site is situated within the Lachlan Fold Belt on the Great Dividing Range (Geoscience NSW, Canberra 1:250,000 Metallogenic Map Sheet S1 55-16). The bedrock in the vicinity of the site consists of complex sequences of volcanic and low-grade metamorphic rocks of Ordovician and Silurian-Devonian age. The rock types anticipated to be encountered on site include:

- Long Flat Volcanics (quartz feldspar porphyry, rhyolite, toscanite and tuff) of the Captains Flat Trough.
- Basalt, pillow lavas and dolerite dykes of the Captains Flat Trough.
- Undifferentiated greywacke, sandstone, slate, chert, limestone and quartzite of the Monaro Slope and Basin.
- Ellenden Granite of the Orogenic Granites group.
- Intrusive porphyries.
- Intrusive dolerite sills and dykes.

Additionally, the Canberra 1:250,000 Metallogenic Map Sheet S1 55-16 shows a series of inferred faults running north-south is located approximately 10 km to the east and west of the site.

The site is not located in a karst region.

2.4 Geotechnical Conditions

AECOM 2017 reports that 'previous investigations of the site indicate the general geology in the vicinity of ED1 and Evaporation Dam 2 (ED2) to comprise alluvial clays, with traces of fine sand and gravel, sandy clays and gravelly clays of medium to high plasticity underlain by residual soils comprising sandy clay to clay, medium to high plasticity, yellow-brown, light grey and orange, which in turn overlie weathered bedrock (considered representative of the Lower Devonian rocks).' AECOM 2017 further noted that the site soils contain naturally high metal concentrations (Pb, Cu and Zn) and are generally highly erodible.

Borehole information in the general vicinity of the proposed Encapsulation Cell location is available from 1996 and 2016 site investigations as reported by AECOM and from 2017-2018 investigations by Earth2Water (Earth2Water, 2018), however no borehole locations are within 300 m. Based on available information, the following soil conditions are anticipated at the proposed Encapsulation Cell location.

- Loose surficial soils and/or sediments – variable thickness; arising from ED1 evaporation pond operations

- Alluvial soil – natural; primarily clays with occasional sand/gravel layers; reported clay consistency firm to stiff, occasionally soft; thickness variable with maximum potential thickness in the order of 10-15 m
- Residual soils – natural; expected stiff consistency
- Weathered bedrock - range of rock types.
- Shallow groundwater level within 0-2 m of ground surface - arising from ED1 evaporation pond operations (refer Section 2.5)

Primary geotechnical issues to be considered for Encapsulation Cell reference design, as related to existing site conditions, are differential settlement of the base liner system and global slope stability of the final landform. With regard to these issues:

- foundation preparation, including removal of loose surface soils and sediments, to be completed prior to subgrade fill placement;
- differential settlement of the base liner system is likely to be constrained to manageable magnitudes due to foundation preparation, the low reported prevalence of soft alluvial clay, and the expected maximum thickness of alluvial clay limited to 10 to 15 m; and
- landform slope stability is likely to be acceptable due to foundation preparation, low likelihood that thick, soft clay layers are present, and relatively flat proposed final landform slopes (i.e., average 4.25:1V or flatter) (refer Section 4.8.1).

In summary, existing subsurface conditions at the proposed Encapsulation Cell location have not yet been investigated in detail, however, the available information is sufficient for reference design. Existing conditions will need to be assessed through detailed site investigations for consideration in ongoing design development. Investigation should include contamination status of soils and shallow groundwater that may be encountered during construction works.

2.5 Hydrogeology

2.5.1 Overview

The groundwater regimes can be broadly divided into basement Ordovician and Silurian-Devonian aged volcanics and intrusive sedimentary rocks forming a regional fractured rock groundwater system, and overlying fluvial and hill wash sequences with minor alluvium forming a local, shallow groundwater system. However, local groundwater quality and flow direction can also be influenced by man-made structures, including the evaporation ponds and bioreactor mine void.

Local shallow groundwater mapping is included in AECOM (2017), with the mapping indicating existing groundwater flow directions predominantly to the north and north east from the ED1 area. The maximum groundwater level is approximately RL 786 m within the ED1 area. This level is inferred to have been affected by ongoing artificial groundwater recharge from ponded water within ED1 and recharge to the shallow aquifer is generally expected to decrease in areas where ED1 will be reclaimed.

Within the proposed Encapsulation Cell footprint, the inferred shallow groundwater flow direction is predominantly to the north and north east. Under gaining conditions shallow groundwater could contribute baseflow to Crisps Creek, however we understand that this is not routinely observed. The inferred groundwater flow direction in the fractured rock groundwater system, however, is to the south-south west, towards the former open pit mine void (Woodlawn bioreactor landfill).

2.5.2 Existing Groundwater Contamination in ED1

Assessment of seepage from the ED1 evaporation pond has previously been undertaken as reported in AECOM (2017). The AECOM report identifies that seepage from ED1 pond has impacted underlying groundwater (e.g., pH sulphate impacts), with migration up to 450 m to the north of ED1. The AECOM report recommended that an ecological risk assessment be undertaken to assess for seepage control. Ecological Risk assessment was completed in 2018 by Niche Environment and Heritage (Niche, 2018).

The Niche 2018 assessment concluded that:

- “In general the groundwater ecology was in moderate risk, the surface water of Crisp Creek low risk...”
- “The groundwater environment was considered moderate risk as it had limited ecological value in the area and any contamination was reduced to background levels within 500-900 m of the dams.”
- “Crisp Creek was identified as low risk as the exposure to contaminants was assessed as low and consisted of resilient fauna which are adapted to chemical and physical stressors in low flow environments.”
- “Long term mitigation measures such as such as maintaining an effective dam liner as recommended by AECOM (2017) would reduce risks to low. Further water quality monitoring is recommended as well as consideration of developing site specific trigger levels. Ecological monitoring should also be continued to monitor for any potential future impacts and any amelioration efforts.”

Additional characterisation of groundwater contamination status should be considered in the ongoing design development of the Encapsulation Cell.

2.6 Climate

Review of climate conditions at the site relevant to Encapsulation Cell reference design is provided in the water balance report included as Appendix B.

2.7 Future Subsurface Mining

Subsurface mining is approved beneath portions of the southeast corner of ED1. A 2016 mining feasibility report (SRK, 2016) includes figures showing locations and depths of the planned workings.

Comparison of the proposed location of the Encapsulation Cell to the planned subsurface mine workings indicates that the closest approach of the planned workings is approximately 150 m laterally offset from the Encapsulation Cell and at a depth below ground surface in the order of 500 m. Based on the magnitude of these horizontal and vertical offsets from the Encapsulation Cell, it is considered highly unlikely that the planned mining would affect cell integrity or performance through mining-induced subsidence or other mechanisms. Further, we note that mining project approval (no. 07 0143) includes a performance measure requirement that “no measurable subsidence” is permitted beneath evaporation dams.

Potential effects of future subsurface mining on the Encapsulation Cell and any requirements for design features to mitigate mining effects should be addressed during ongoing design development.

2.8 Future water levels in ED1

The reference design has been developed on the basis that use of ED1 for Woodlawn site water management will continue throughout construction, operation, and closure of the Encapsulation Cell. Current operating water levels for ED1 are presented in the table below.

Table 2: Current ED1 Water Storage Operating Levels (EMM, 2022)

Terminology	RL (m AHD)	Relates to
Spillway crest	788.8	The spillway crest level. It is noted that the existing spillway crest level may be revised prior to the construction of the Encapsulation Cell and Leachate Evaporation Pond to meet dam safety obligations.
Full Supply Level (FSL)	788.3	The maximum operating level (i.e., the maximum level that the dam can be filled to). It is noted that this level may change if the spillway crest level changes.
Maximum Water Level (MWL)	789.3	The probable maximum water level that can occur in the dam. For example, if an extreme rainfall event occurs when the dam is at FSL. It is noted that this level may change if the spillway crest level changes.
Predicted maximum operating level: future scenario	787.6	The maximum operating level predicted by the ED1 water balance for the proposed project scenario. Refer to the Surface Water Assessment (EMM, 2022) for more information on the water balance.

The Encapsulation Cell and Leachate Evaporation Pond will be designed for the ED1 Maximum Water Level (MWL). This is considered a conservative approach with respect to cell containment integrity and flood protection, noting that the predicted future maximum operating level is 1.7 m below the current MWL.

We understand that ED1 operating levels may be revised prior to Encapsulation Cell construction. Any revisions to the MWL should be adopted in the ongoing design development of the Encapsulation Cell and Leachate Evaporation Pond.

3.0 BASIS OF DESIGN

3.1 Design Objective

The primary objective of the Encapsulation Cell is to provide for long-term disposal of stabilised APCr generated at the ARC.

The Encapsulation Cell reference design is based on a 25-year operational life and assumes that the maximum throughput of the ARC of 380,000 tonnes per year is achieved every year. Lower annual throughputs would mean the encapsulation cell would provide storage capacity for stabilised APCr for more than 25 years.

Volumetric airspace requirements, based on anticipated APCr tonnages, are discussed in Section 3.3.

3.2 Design Requirements

Key Design Guidelines for the Encapsulation Cell include:

- NSW EPA's Landfill Guidelines (EPA, 2016)
- Planning Secretary's Environmental Assessment Requirement (SEARs) (Application Number SSD-21184278 dated 2 July 2021) - the SEARs require that the EIS includes a "detailed encapsulation cell design that demonstrates the contaminants can be adequately managed".

3.2.1 NSW Landfill Guidelines

The Landfill Guidelines include minimum standards that apply to the design, construction and operation of landfills in NSW. The Landfill Guidelines include a number of Siting Requirements and Required Outcomes for

issues relevant to the Encapsulation Cell design. These items are presented in the following sub sections. Subsequent chapters of this report discuss more detailed portions of the Landfill Guidelines, namely acceptable designs, methods and operating practices relevant to the design. A Landfill Guidelines compliance summary for Encapsulation Cell reference design features is provided in Sections 4.7.4 , 4.8.4 and 4.9.4.

3.2.1.1 Landfill Siting Requirements

The Landfill Guidelines include landfill siting requirements as presented in the Table below. The proposed Encapsulation Cell is considered to comply with these requirements as discussed in the sections of the report identified in the Table.

Table 3: NSW Landfill Guidelines - Siting Requirements

Siting Requirement	Compliance of Proposed Encapsulation Cell Location	Relevant section in this report
Be at least 15m from site boundary	Yes	4.6
Not be located in or within 40 metres of a permanent or intermittent water body	Yes	3.4.2
Not be located in an area overlying an aquifer that contains drinking water quality groundwater that is vulnerable to pollution	Yes	2.5.2
Not be located within a floodway that may be subject to washout during a major flood event (a 1-in-100- year event)	Yes	2.2
For restricted solid waste cells, be wholly above the highest historically recorded groundwater table at all times	Yes	3.4.4
Not be within 250 metres of a residential zone or dwelling, school or hospital not associated with the facility	Yes	2.1
Not be within a karst region or with substrata that are prone to land slip or subsidence	Yes	2.3, 2.7
Not be within 250 metres of an area of significant environmental or conservation value	EMM Consulting has advised that environmental studies for the EIS demonstrate compliance	
Not be located on land identified in an environmental planning instrument as being of high Aboriginal cultural significance or high biodiversity significance	EMM Consulting has advised that environmental studies for the EIS demonstrate compliance	

3.2.1.2 Leachate Barrier Requirements

The Landfill Guidelines provide the following Required Outcomes for landfill leachate barrier systems:

- *The landfill must have a leachate barrier system to contain leachate and prevent the contamination of surface water and groundwater over the life of the landfill.*
- *Pollutants with the potential to degrade the quality of groundwater must not migrate through the strata to any point beyond the boundary of the premises or beyond 150 metres from the landfill footprint, whichever is smaller. If this occurs, additional engineered controls may be required to prevent further pollutant migration. It may also be necessary to remediate the existing pollution*

The design should be generally compliant with the Landfill Guidelines acceptable designs, specifications and operating practices for Restricted Solid Waste Landfills. See discussion in subsequent chapters of this report.

3.2.1.3 Leachate Storage and Disposal

The Landfill Guidelines provide the following Required Outcomes for leachate storage and disposal:

- *Collected leachate must be stored in appropriately sized dams or tanks and disposed of so as not to cause environmental harm.*
- *There must be sufficient leachate disposal capacity to prevent the build-up of leachate and an increase in the risks of water pollution and offensive odours.*
- *Untreated leachate must not be disposed of to off-site water or land, used for dust suppression, or used to supply the water needs of any process conducted at the landfill, such as composting.*

Given the high evaporation at the site compared to rainfall, disposal of leachate by evaporation in an evaporation dam is feasible and is proposed as the primary leachate disposal approach for the Encapsulation Cell. Leachate evaporation dams should be designed considering water balance completed in accordance with the Landfill Guidelines. See discussion in subsequent chapters of this report.

3.2.1.4 Final Capping

The Landfill Guidelines provide the following Required Outcomes for Final Capping:

All completed landfill cells must be capped and revegetated as soon as practicable after the final delivery of waste to the cell. The final capping must:

- *reduce rainwater infiltration into the waste and thus minimise the generation of leachate (infiltration from the base of the final cap should be less than 5% of the annual rainfall)*
- *stabilise the surface of the completed part of the landfill*
- *reduce suspended sediment and contaminated runoff*
- *minimise the escape of untreated landfill gas*
- *minimise odour emissions, dust, litter, the presence of scavengers and vermin, and the risk of fire*
- *prepare the site for its future use; this includes protecting people, fauna and flora on or near the site from exposure to pollutants still contained in, or escaping from, the landfill*

See discussion in subsequent chapters of this report.

3.2.1.5 Stormwater Management

The Landfill Guidelines provide the following Required Outcome for stormwater management:

Controls must be implemented to minimise erosion and reduce the sediment load (suspended solids) of stormwater discharged from the site.

The Landfill Guidelines provide guidance acceptable measures for erosion and sediment control and refer to Managing Urban Stormwater: Soils and Construction Volume 2B Waste Landfills (NSW DECC, 2008).

See discussion in subsequent chapters of this report.

3.2.1.6 Amenity Issues

The Landfill Guidelines provide the following Required Outcomes for Amenity Issues:

The landfill must not adversely affect amenity in the locality, in particular:

- *offensive odour impacts must not occur at off-site locations*

- *emission of nuisance dust and other particulate matter beyond the landfill boundaries must be minimised*
- *excessive noise must not be generated by activities at the site*
- *local amenity must not be degraded by litter from the landfill or by mud or litter attached to vehicles leaving the landfill*
- *the risk of fire at the site must be minimised and the site must be adequately prepared in the event of fire.*

3.2.1.7 Landfill Gas Management

Gas management is not considered relevant for the Encapsulation Cell design because stabilised APCr is essentially a pre-combusted inorganic material and published literature generally indicates that stabilised APCr is not gas generating. Gas generation potential and the need for gas drainage within the Encapsulation Cell final capping system should be further assessed in ongoing design development.

3.2.2 SEARs

The SEARs issued for the project include requirements for waste management. With respect to the Encapsulation Cell, the SEARs require that the EIS must address the Key issue of Waste Management including 'a detailed encapsulation cell design that demonstrates the contaminants can be adequately managed.'

The design presented in this Reference Design Report and the appended Reference Design Drawings addresses this requirement.

Other key issues identified in the SEARs, and other aspects of waste management that are not related to the Encapsulation Cell design, are not directly addressed by this Reference Design Report.

3.2.3 Environmental Protection Licence

It is anticipated that the Encapsulation Cell will be Licenced by NSW EPA under the POEO regulation prior to commencement of operation. It is assumed that while there are several EPL licences held by Veolia for the site, the Encapsulation Cell will be included on a new licence.

Details of EPL requirements are currently unknown. The final design and operational practices of the Encapsulation Cell should consider relevant requirements of the EPL.

3.2.4 Dam Safety

Evaporation dams ED1 and ED2 are prescribed under the Dams Safety Act and have been subject of formal surveillance reporting since 1997. (Heron Resources Woodlawn Mine, Mine Operations Plan, August 2015 Section 2.3.6). It is understood that these dams are to be retained and operation of these dams continued. The Encapsulation Cell is located within ED1, with the existing embankment wall separating ED1 and ED2 forming the western cell edge and a portion of the southern embankment wall of ED1 forming the southern cell edge.

Construction of the Encapsulation Cell and leachate evaporation pond will reduce the storage capacity of ED1. A sitewide surface water assessment has been conducted by EMM Consulting to assess the effect of cell and pond construction, and other site changes associated with the proposed ARC project, on ED1 water levels and storage over a 10-year simulation period (EMM, 2022). The surface water assessment indicates that the reduced storage capacity of ED1 due to Encapsulation Cell and leachate evaporation pond construction will be offset by other beneficial site changes and that ED1 will retain sufficient storage capacity. Specifically, the study indicates that predicted water levels for future worst-case scenarios are lower than for existing scenarios during most of the simulation period. This indicates that dam safety risks for ED1 will generally be reduced by the ARC project.

Further assessment of potential impacts to the ED1 pond embankments and notifications to Dams Safety NSW (if required) should be made during ongoing design development.

Discussion of the risk of flooding of the Encapsulation Cell is provided in Section 4.10.4 below.

3.3 Ash Types and Quantities

Review of generation of residual wastes from the ARC is provided in the Ash Management Study (WSP, 2022). The Ash Management Study identifies that residual solids from the ARC comprise incinerator bottom ash (IBA), fly ash (FA), and air pollution control residues (APCr).

The Ash Management Study indicates that FA and APCr materials will comprise a mixed waste stream with respect to treatment and management. These materials are referred to herein as APCr, reflecting that the mass of the FA component will be minor compared to the mass of the APCr component. Production of APCr is anticipated to be 4% of total waste input tonnage. Based on 380,000 t annual waste input, annual APCr material tonnage of 15,200 t is therefore anticipated. The APCr will be treated/stabilised and disposed by landfilling within the Encapsulation Cell.

The Ash Management Study provides a review of APCr composition and indicates that:

- a conservative waste classification of the APCr material that is likely to be generated at Woodlawn ARC, based on reference data, is Hazardous Waste;
- treatment/stabilisation of the APCr will therefore be required in order to reduce the classification to Restricted Solid Waste and allow disposal with the Encapsulation Cell;
- the most suitable stabilisation approach is considered to be mixing of Portland cement with APCr at a nominal 2:5 (cement:APCr) dry weight ratio;
- the post-treatment density of the treated APCr is uncertain, with a plausible value of 0.7 t/m³ and a potential range of 0.4 to 1.5 t/m³.
- future stabilisation trials would assess reagent types, reagent mixing ratios, mixing methods, mix water requirements and post-treatment density.

For Encapsulation Cell design, we understand that the post-treatment density values of APCr that are presented in the Ash Management Study reflect dry density after treatment and after placement/compaction/curing in the Encapsulation Cell.

In addition to stabilised APCr, daily and Intermediate cover will be required in the Encapsulation Cell and will consume airspace. Veolia have advised that they anticipate that daily and Intermediate cover will comprise between 10% to 15% of waste airspace usage - the upper end of this range has been conservatively used herein for daily/intermediate cover volume calculation. In addition, daily and intermediate cover is assumed to have nominal in-place density of 1.5 t/m³.

Annual and total operational life airspace required for the Encapsulation Cell have been calculated for the range of treated APCr density given in the Ash Management Report and are presented in Table 4 and Table 5. For Encapsulation Cell reference design, it is considered prudent to adopt the highest calculated airspace value of 1.5 million cubic metres, corresponding to lowest APCr density. Please note that discussion of contingency for higher values of APCr density is provided in Section 4.1.2.

Table 4 : Treated APCr airspace calculation for range of potential density

Component	Annual Tonnage (dry weight)	Annual Volume
Treated APCr Components-		
APCr	15,200 t	-
Stabilising Reagents: 40 kg of Portland Cement per 100 kg APCr plus mixing water	6,080 t	-
Total	21,280 t	-
Scenario A: 1.5 t/m³ treated APCr dry density after compaction and curing		
Stabilised APCr	21,280 t	14,200 m ³
Daily and Intermediate Cover (15% of treated APCr volume)	3,190 t	2,130 m ³
Total	24,470 t	16,330 m ³
Scenario B: 0.7 t/m³ treated, compacted APCr dry density after compaction and curing		
Stabilised APCr	21,280 t	30,400 m ³
Daily and Intermediate Cover (15% of treated APCr volume)	6,840 t	4,560 m ³
Total	28,120 t	34,960 m ³
Scenario C: 0.4 t/m³ treated APCr dry density after compaction and curing		
Stabilised APCr	21,280 t	53,200 m ³
Daily and Intermediate Cover (15% of treated APCr volume)	11,970 t	7,980 m ³
Total	33,250 t	61,180 m ³

Table 5: Airspace Usage Calculation over 25 Years Operation (excluding final cap and base liner material volumes)

Scenario	Assumed Treated APCr Dry Density (t/m ³)	Annual Airspace Usage (m ³)	25-year Airspace Usage (m ³)
A	1.5	16,330	0.4 M
B	0.7	34,960	0.9 M
C	0.4	61,180	1.5 M

3.4 Geometric Constraints

3.4.1 Footprint Area Constraints

The development footprint identified in Reference Design Drawing sheet 2 of 9 and sheet 3 of 9 was considered during development of the Reference Design for the Encapsulation Cell and its ancillary infrastructure. The proposed Encapsulation Cell location is at the southern end of the development footprint based on Veolia's preference to locate the cell as far from Collector Road as possible.

Southern and Western Edges: The existing ED1 and ED2 pond embankments will be retained to form the southern and western edges of the Encapsulation Cell and used as perimeter bunds and to provide perimeter surface water separation and drainage along these edges. Some shaping (local regrading) and overfilling of the existing pond embankments will be required. Due to the narrow width of the ED1-ED2 pond embankment crest along the western perimeter of the Encapsulation Cell, more substantial filling is expected to be required to retain the existing access road in this area while providing sufficient space for Encapsulation Cell surface water drainage and final cap material placement.

Northern and Eastern Edges: The reference design includes construction of a significant perimeter bund to form the northern and eastern edges of the Encapsulation Cell. The perimeter bund is approximately 700 m long with a base width in the order of 40 m. The perimeter bund is generally 5 to 6 m high, with the top of the bund matching the level of the top of existing southern and western embankments. The purpose of the perimeter bund is to provide a surface to support and anchor the edges of the Encapsulation Cell lining and capping system and to provide physical separation between the Encapsulation Cell and the remainder of the ED1 footprint.

The reference design arrangement along the perimeter of the Encapsulation Cell is illustrated in Reference Design Drawing sheet 7 of 9 and sheet 9 of 9.

3.4.2 Proximity to Existing Evaporation Dams

ED1 Evaporation Dam: The proposed Encapsulation Cell occupies the southwest corner of the existing ED1 Evaporation Pond footprint. The reference design assumes that the ED1 footprint outside of the Encapsulation Cell and leachate evaporation pond footprints will continue to be used to retain Woodlawn site water for evaporation. Although construction of the cell and pond will reduce the storage capacity of ED1, a sitewide surface water assessment (EMM, 2022) indicates this will be offset by beneficial site changes associated with the ARC project and that ED1 will retain sufficient storage capacity (refer Section 3.2.4). In addition, future ponding of ED1 water close to or against the Encapsulation Cell footprint is discussed in Section 4.10.4.

Regarding the siting requirement in the Landfill Guidelines for minimum 40 m separation from a permanent or intermittent water body, we consider that the proposed Encapsulation Cell location within ED1 complies with the intent of this requirement based on the factors given below.

- While ED1 could potentially be considered an intermittent water body, it is not a natural water body because its level can be influenced by Veolia's site operations, specifically through operation of mechanical evaporators and control of pumping into ED1 from other site water storages. The ability to influence the water level in ED1 significantly reduces the risk of high water affecting Encapsulation Cell integrity or performance in comparison to natural and less-controlled water bodies.
- The Encapsulation Cell reference design includes a substantial perimeter bund along the eastern and northern perimeter (the areas where potential contact with water retained in ED1 could occur over the long term). The bund has a base width of approximately 40 m and rises generally 5 to 6 m above ground level.
 - The perimeter bund width provides robust resistance to outward seepage of Encapsulation Cell leachate. Similarly, it will provide robust resistance to inward seepage of ED1 water. Ongoing design development should consider the need to add seepage resisting components within the bund, such as a low permeability soil core keyed into foundation materials.
 - The outer surface of the perimeter bund will require design treatment to protect against potential surface deterioration or wave action erosion by ED1 water. This will be specified during ongoing design development.

- The substantial perimeter bund design width provides robust protection of the Encapsulation Cell lining system in the case that erosion protection materials are compromised.
- The perimeter bund height provides robust resistance against overtopping of ED1 waters into the Encapsulation Cell footprint. Bund height requirements will be further assessed during ongoing design development, with consideration to provide adequate freeboard above the ED1 Maximum Water Level (MWL)(refer Section 2.8).
- During staged Encapsulation Cell filling with stabilised APCr, the eastern portion of the perimeter bund will be constructed along the full length of the filling footprint. The northern (leading) edge of the filling footprint will be protected from ED1 water, at MWL, by temporary separation bunds that would be adjusted in height and alignment during the course of Encapsulation Cell filling (refer Section 4.10.4).
- The Encapsulation Cell reference design includes a double-composite base liner and side slope liner. This provides enhanced isolation of the Encapsulation Cell waste from external standing water compared to single-lined landfills that are subject to the same 40 m separation distance.

ED2 Evaporation Dam: The proposed Encapsulation Cell footprint is located to the immediate east of the existing ED2 Evaporation Pond footprint. It is understood that ED2 will continue to operate during the Encapsulation Cell lifetime. Aerial photographs indicate that ED2 has recently been subdivided and fully geomembrane lined.

Regarding the Landfill Guidelines siting requirement for minimum 40 m separation from a permanent or intermittent water body, we consider that the proposed Encapsulation Cell location adjacent to ED2 complies with the intent of this requirement because ED2 is a fully geomembrane lined water storage facility and not a water body.

ED3N4 Evaporation Dam: The westernmost pond of the ED3 group (ED3N4) is also relatively close to the southeast corner of the proposed Encapsulation Cell. However, it is separated from the Encapsulation Cell by the existing embankment and is more than 40 m away.

Area to South: Veolia site personnel advise that rainfall runoff results in intermittent ponding in the area to the south of the existing embankment at the southeast corner of the proposed Encapsulation Cell. Ponded water in this area is not used for any operational purpose and is currently allowed to naturally evaporate. Aerial photographs indicate that outlet flow to the west will occur prior to ponding levels rising significantly against the existing embankment. Based on this information, this area is not considered an evaporation dam or water body and no enhanced cell design features are considered necessary for reference design. During ongoing design development, assessment of embankment stability and seepage control for the Encapsulation Cell should consider this local area and, if needed, establish a recommended maximum ponding level.

3.4.3 Ground Level below ED1

Encapsulation Cell reference design is based on existing ground levels from the recent site survey provided by Veolia. It is noted, however, that existing ground surface levels are not available for the full extent of the proposed Encapsulation Cell footprint because some areas were inundated by the waters of Evaporation Dam 1 (ED1) at approximately RL 786 m at the time of survey (refer Section 2.2). Where present, the surveyed water level is used to represent existing ground level in the Reference Design Drawings because the discrepancy is generally expected to be minor and acceptable for reference design.

Accurate quantification of cut and fill volumes or optimisation of landfill cell geometry considering existing ground topography should be examined during ongoing design development when a full existing ground survey of the Encapsulation Cell footprint is available.

3.4.4 Encapsulation Cell Floor Elevation

The elevation of the Encapsulation Cell floor for the reference design is established wholly above the highest historically recorded groundwater level to reduce risk of potential landfill leakage causing impact to groundwater. The Landfill Guidelines identify this as an acceptable approach for RSW landfills.

As indicated above in Section 2.5, the maximum current groundwater level for the shallow groundwater system within the ED1 area is at approximate elevation RL 786 m. This is considered to represent a maximum credible groundwater level, because it is at or just below the reported ground surface level across most of the Encapsulation Cell footprint, and is inferred to be the result of ongoing artificial groundwater recharge from ponded water within ED1.

Therefore, the lowest elevation in the reference design cell floor levels has been set at RL 786 m (refer Reference Design Drawing sheet 4 of 9, provided in Appendix A).

3.4.5 Cut Fill Balance

Cut/Fill balance is not a geometric constraint for the Encapsulation Cell reference design because there will be a large excess of filling required to achieve subgrade levels above the groundwater levels and to enable formation of the cell floor to the required geometry (refer Section 4.7.1).

The design includes minor cutting on the existing embankments forming the southern edge of the cell and minor cutting along the western edge of the cell floor, however the cut volume is not significant. The minor volume of excavated materials would be used as fill for cell subgrade construction if geotechnically and chemically suitable.

General fill materials, compliant with future technical specification requirements will be imported from offsite sources as required to make up any deficit of available onsite fill materials.

Consideration should be given by Veolia to potential applicability of NSW waste levy to imported fill materials and to management of potential contamination in existing soils.

3.4.6 Encapsulation Cell Cover Materials

Suitable daily and intermediate cover soil materials will be required for operation of the Encapsulation Cell. The reference design assumes that the total placed volume of these cover materials within the Encapsulation Cell will be equal to 15% of the in-place volume of treated APCr. The calculated total annual, volume/tonnage of daily and intermediate cover soil materials for the selected Encapsulation Cell design scenario C is approximately 8,000 m³ / 12,000 t per annum (refer Section 3.3).

Daily and intermediate cover materials will be imported from offsite sources as required to make up any deficit of suitable onsite materials. Veolia may seek approval in the future for use of Alternate Daily Cover materials for Encapsulation Cell operation, potentially including IBA (after maturation treatment).

Consideration should be given by Veolia to potential applicability of NSW waste levy to imported cover materials.

3.4.7 Sensitive areas

EMM Consulting has advised that environmental studies for the EIS demonstrate that the proposed Encapsulation Cell and ancillary infrastructure is:

- not within 250 m of an area of significant environmental or conservation value; and
- not located on land of high Aboriginal cultural significance or high biodiversity significance.

3.4.8 Underground Services

Details of the location of underground service within the footprint of the Encapsulation Cell should be assessed during ongoing design development. If services are present, they should be protected or removed and relocated prior to construction.

4.0 ENCAPSULATION CELL REFERENCE DESIGN

4.1 Airspace and Volumes

4.1.1 Overall Geometry

The Encapsulation Cell reference design provides a total filling airspace for treated APCr and daily/intermediate cover materials of 1.50M m³. This is consistent with the required airspace calculation in Section 3.3. The gross airspace for the design is 1.72M m³, which includes airspace occupied by the materials for construction of final capping, liner, and leachate collection systems.

The Encapsulation Cell footprint, comprising the final cap area but excluding additional footprint occupied by perimeter bunds, covers an area of 11.9 ha.

The reference design includes general earthworks filling of approximately 290,000 m³ to form the Encapsulation Cell Floor (subgrade) and Bunds. This fill volume is based on the assumed existing ground level and the design subgrade Level. There is, however, uncertainty in the existing ground level below the Encapsulation Cell and the filling volumes are likely to change during ongoing design development (see discussion in 3.4.3). The design includes minor cutting on the existing embankments forming the southern edge of the cell, however the cut volume is not significant.

Reference Design Drawings are included in Appendix A.

4.1.2 Contingency for Higher APCr Density

The required Encapsulation Cell airspace for reference design is based on an in-place density of 0.4 t/m³ for treated APCr material. This density value reflects the low end of the potential density range and has been adopted for reference design as a prudent approach that results in a larger airspace requirement. Review of potential APCr density and impact on required airspace is provided in Section 3.3.

In the case that a higher waste density is achieved during operation and a lower Encapsulation Cell airspace is required, the footprint area of the Encapsulation Cell would be reduced by shifting the northern extent of the Encapsulation Cell to reduce the North-South extent of the cell. The key features of the reference design final landform as presented in 4.8.1 would be retained. A lower maximum landform height may also be adopted.

4.2 Cells and Subcells

The Encapsulation Cell reference design is subdivided into four filling stages (1 through 4) of approximately equal airspace. The Encapsulation Cell base liner area associated with each filling stage is identified as Cells 1 to 4, with each comprising two sub cells (A and B). The location of the cells and subcells is shown in Reference Design Drawing sheet 4 of 9.

The landfill cells will be progressively constructed and filled over the life of the Encapsulation Cell. Further discussion on progressive filling and lining is provided in Section 4.4.

Ongoing design development may result in a change in number and orientation of cells and subcells. Such change would not affect the environmental containment capability of the design.

4.3 Design Approach

The key design items given below have been used to develop the Encapsulation Cell reference design.

Table 6: Encapsulation Cell – Design Approach Key Items

Stage	Item
Dimensions and Perimeter	Footprint suitable for placement of treated APCr and daily/intermediate cover materials based on a 25-year operational life with the assumption that the maximum throughput of the ARC of 380,000 tonnes per year is achieved every year. Lower annual throughputs would mean the encapsulation cell would provide storage capacity for stabilised APCr for more than 25 years. Required airspace 1.5M m ³
	Perimeter embankments required for: (i) support of cell wall liner; (ii) separation from adjacent existing water ponds; and (iii) prevention of surface water run-on - Existing embankment on south side to be trimmed to create a suitable perimeter - Existing embankment on west side to be supplemented to create a suitable perimeter and provide for stormwater runoff management - Perimeter bund constructed to east and north sides to match level of existing embankments
Floor Levels	Floor located within existing ED1 evaporation pond. Fill above existing levels to achieve suitable floor grading above anticipated maximum groundwater level
	Floor grading consistent with Landfill Guidelines for restricted solid waste landfills
	Floor divided into four major cells
Leachate Management	Engineered leachate barrier and leachate collection systems consistent with Landfill Guidelines for restricted solid waste landfills. Double liner system on floor and walls to provide leachate collection on upper liner and leak detection on lower liner
	Pumped leachate extraction and transfer
	Leachate disposal by evaporation from dedicated evaporation pond. Pond sizing consistent with Landfill Guidelines
Filling and Capping	Filling begins at southwest corner of cell and generally progresses north. Filling in four major stages of similar volume corresponding to the floor cell areas
	Progressive capping construction to reduce leachate generation and potential environmental impacts
	Engineered final capping system consistent with Landfill Guidelines for restricted solid waste landfills.
Final Landform	Landform developed with shallower final slopes on north and east batters to reduce visual impact
	'Plateau' present at top of landform to facilitate operations; plateau slope consistent with Landfill Guidelines
	Stormwater runoff from final landform will discharge to the ED1 floor area. Ongoing design development to address need for channels, ponds or level spreaders for integration with ED1 stormwater infrastructure

4.4 Progressive Construction and APCr Filling

The Encapsulation Cell will be filled in a general south to north progression over the life of the landfill cell. The Encapsulation Cell floor is divided into four cells, identified as Cell1 to Cell 4, with each having two sub cells, identified as A and B. Sub cell boundaries are shown in Reference Design Drawing sheet 4 of 9.

Each cell will be constructed prior to completion of filling in the proceeding cell to allow for continuous APCr placement. Construction of each cell or sub cell will include: (i) foundation preparation; (ii) fill placement for supporting perimeter bunds/embankments, (iii) construction of temporary separation bund on north end, (iv) fill placement for cell floor subgrade; (v) floor and side wall lining systems; (vi) leachate collection system; and (vii) other required infrastructure.

The general cell construction, filling and final capping sequence will be as indicated in the table below. The term “landfilling” in the table refers to placement and compaction of treated APCr along with placement of daily and intermediate cover.

Table 7: General Sequence for Encapsulation Cell Construction and Filling

Stage	Step	Item
Stage 1	1	Construction Cell 1A
	2	Commence landfilling Cell 1A, starting in the initial placement area
	3	Construction Cell 1B
	4	Commence landfilling Cell 1B, combine with landfilling of Cell 1A
Stage 2	5	Construction Cell 2A
	6	Complete landfilling in Cells 1A and 1B
	7	Commence landfilling Cell 2A
	8	Construction Cell 2B
	9	Commence landfilling cell 2B combine with landfilling of Cell 2A
	10	Construct Final Capping in Areas of Cell 1A and 1B that are at final level
Stage 3	11	Construction Cell 3A
	12	Complete landfilling in Cells 2A and 2B
	13	Commence landfilling Cell 3A
	14	Construction Cell 3B
	15	Commence landfilling cell 3B combine with landfilling of Cell 3A
	16	Construct Final Capping in Areas of Cell 2A and 2B that are at final level
Stage 4	17	Construction Cell 4A
	18	Complete landfilling in Cells 3A and 3B
	19	Commence landfilling Cell 4A
	20	Construction Cell 4B
	21	Commence landfilling cell 4B combine with landfilling of Cell 4A
	22	Construct Final Capping in Areas of Cell 3A and 3B that are at final level
	23	Complete Landfilling in Cells 4A and 4B
	24	Construct Final Capping of all remaining areas

A conceptual arrangement of the progressive filling across the four stages is provided in Figure 1 through Figure 4 below, annotated from Reference Design Drawing sheet 6 of 9.

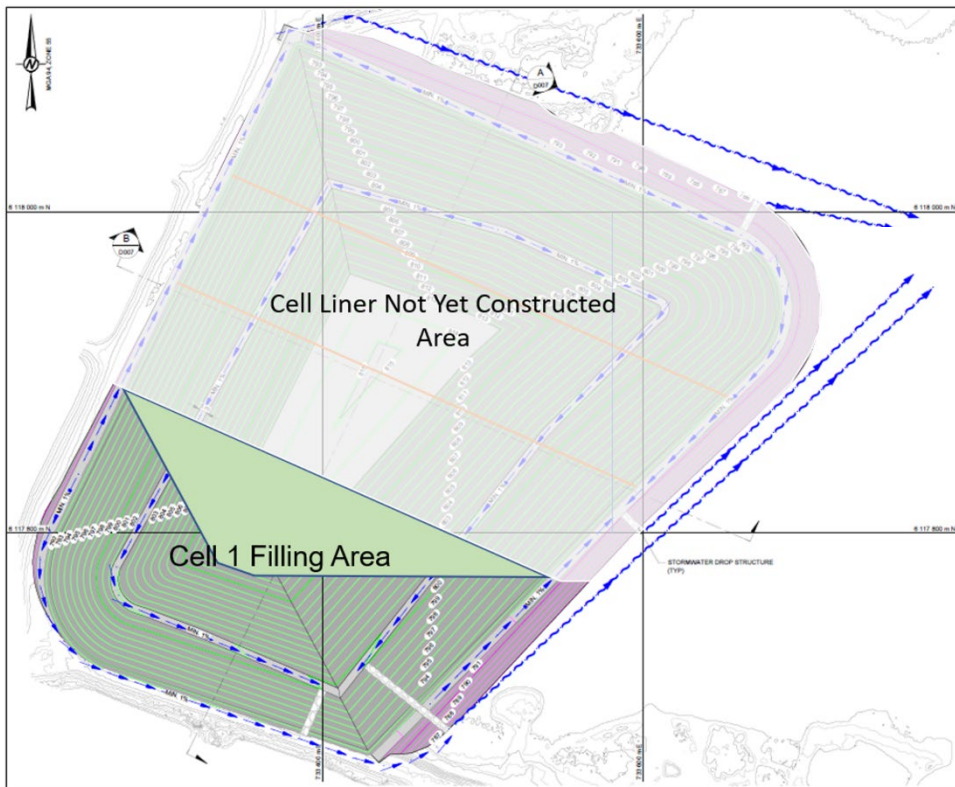


Figure 1: Stage 1 Filling (Markup of Reference Design Drawing sheet 6 of 9)

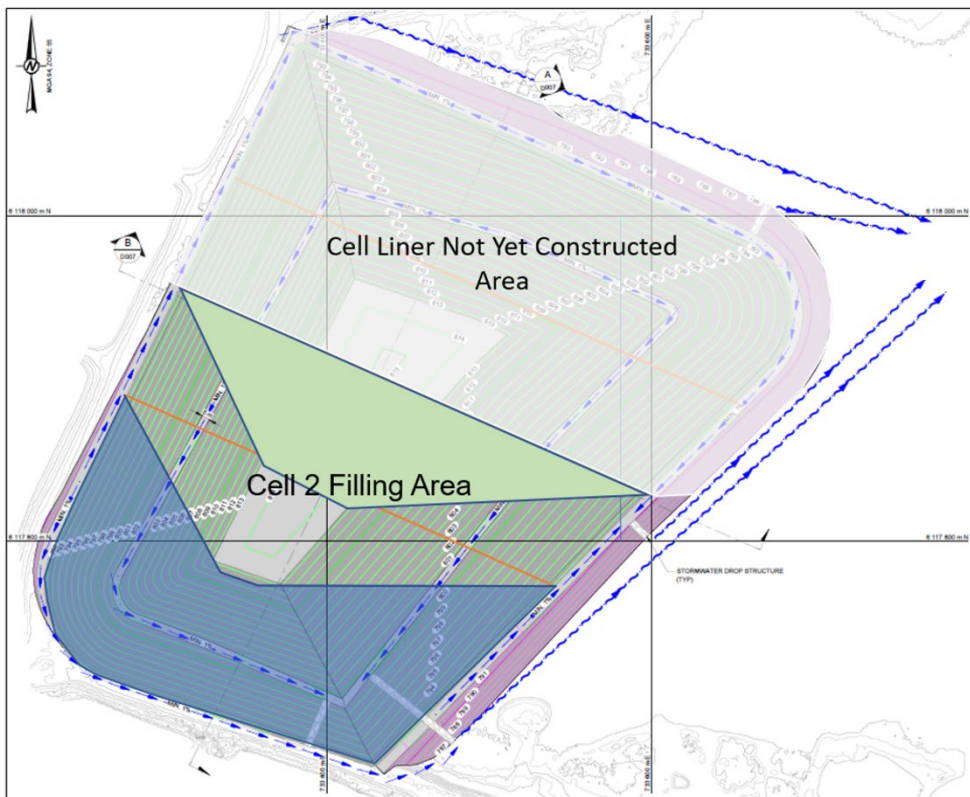


Figure 2: Stage 2 Filling (Markup of Reference Design Drawing sheet 6 of 9)

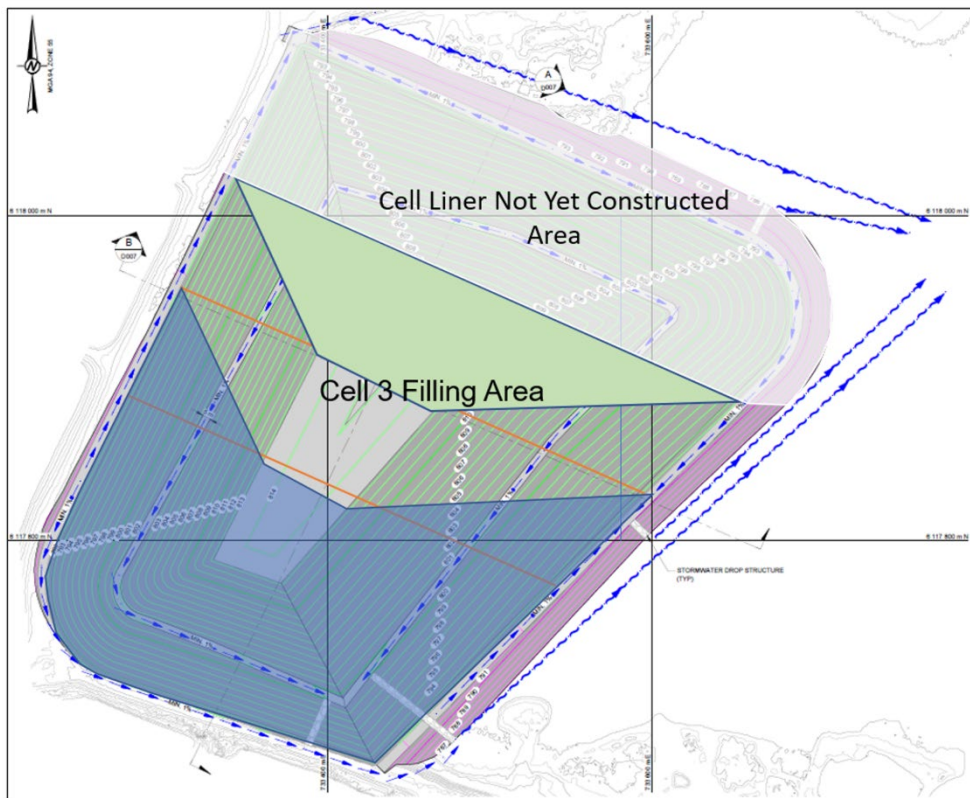


Figure 3: Stage 3 Filling (Markup of Reference Design Drawing sheet 6 of 9)

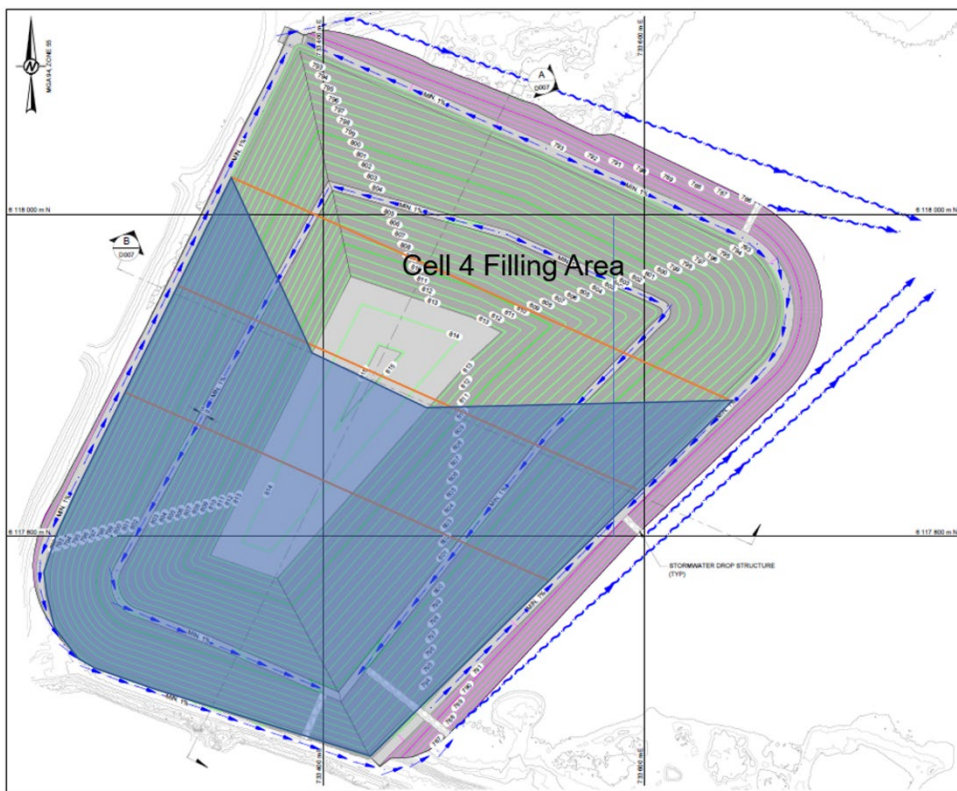


Figure 4: Stage 4 Filling (Markup of Reference Design Drawing sheet 6 of 9)

4.5 Encapsulation Cell Operation

Operation of the Encapsulation Cell and leachate evaporation pond should consider the major items presented below. In addition, any requirements of EPL license(s) and approval conditions must be addressed.

A Landfill Environmental Management Plan (LEMP) should be developed for the Encapsulation Cell and leachate pond operation that considers all operational requirements, controls, verifications and contingencies.

Table 8: Encapsulation Cell – Major Operational Considerations

Stage	Item
General Management	Management of Safety and Environmental Risks
	Amenity Control: Amenity control should be implemented through the construction and operation of the Encapsulation Cell, considering litter, dust, noise and fire control. Amenity Control implemented for the Encapsulation Cell shall comply with the Acceptable control measures included in the Landfill Guidelines and ensure that the Landfill Guidelines amenity control required outcomes are achieved as summarised in Section 3.2.1.6. It is anticipated that litter control and fire control will not be of concern given the nature of the APCr material.
	Transport and unloading of treated APCr: Vehicles used for haulage of stabilised APCr from the ARC to the Encapsulation Cell will use internal Veolia haul roads only and will not utilise public roads. Issues of tyre tracking of waste or soils is therefore not considered a significant issue.
	Environmental monitoring program
	Implementation of corrective actions to rectify unacceptable environmental impacts
	Operational requirements of the Landfill Guidelines for Restricted Solid Waste landfills and as required by project licenses and approvals
APCr Placement	Compaction of wastes to achieve efficient use of airspace and ensure suitable waste stability
	Initial placement area in first cell prior to APCr treatment confirmation
	Filling in accordance with filling plan and verification of conformance
	Daily and intermediate cover placement
	Tracking of waste and cover material tonnage and airspace usage in accordance with NSW EPA requirements
	Filling in staged manner that allows for progressive final capping of the Encapsulation Cell
	Dust management
Leachate Management	Implementation of suitable cover material placement and surface grades to minimise leachate generation
	Implementation of systems to reduce potential volumes of rainwater that are collected as leachate during initial cell filling (e.g., rainflap systems as described in Section 4.9.1)
	Monitoring of leachate generation rates and evaporation pond performance
	Maintain and control leachate pumping systems
	Management of Surface water run-off to ED1

Stage	Item
Stormwater Management	Perimeter stormwater run-on controls, including temporary separation bunds at the northern edge of active Encapsulation Cell filling for ED1 waters

4.6 Interaction with Surrounding Land Use

4.6.1 General

The proposed Encapsulation Cell location is surrounded by the wider Woodlawn Eco Precinct, providing a buffer between operational areas and surrounding properties. The land use zoning of the Eco Precinct under the Goulburn Mulwaree Local Environment Plan is predominantly IN3 Heavy Industrial, which includes the majority of the waste management, energy generation and mining activities, with the balance zoned RU2 Rural Landscape. Land immediately to the north and south is zoned RU2 Rural Landscape, land to the west is zoned RU1 Primary Production, and land to east, which incorporates the village of Tarago (approximately 8 km east of the proposed Encapsulation Cell), is zoned a combination of RU5 Village, RU6 Transitional, RU1 Primary Production and E3 Environmental Management.

The northern extent of the Encapsulation Cell and the leachate evaporation pond is located approximately 100 m from Collector Road. Further, no disturbance is planned within the triangle-shaped land area between the leachate evaporation pond and Collector Road. Land to the north beyond Collector Road is owned by Veolia and also forms part of the Eco Precinct's agricultural operations. The offset of the Encapsulation Cell from the site boundary (assumed to be Collector Road for this purpose) exceeds the minimum requirement of the Landfill Guidelines that requires new landfill cells should be set back at least 15 m from the boundary.

4.6.2 Groundwater Drainage Management

The Encapsulation Cell reference design sets the subgrade level of the cell liner system above the shallow groundwater table based on the groundwater level information provided in AECOM (2017) (refer Section 3.4.4). Groundwater drainage or dewatering is therefore not anticipated to be required for the construction of the Encapsulation Cell.

The Encapsulation Cell reference design does not include a groundwater drainage layer beneath the base liner system, referred to in the Landfill Guidelines as a groundwater "relief layer," because the liner subgrade design is above the groundwater level (as above) and because current information on site conditions indicates no need for such a layer.

During ongoing Encapsulation Cell design, when additional subsurface information has been obtained, the need for a groundwater drainage layer should be further assessed. In this regard, the assessment should consider the potential for: (i) seepage from adjacent ponds to flow towards and under the Encapsulation Cell; and (ii) the potential for loading from construction and filling of the Encapsulation Cell to cause consolidation settlement and water expulsion from underlying alluvial clay soils. The assessment should also balance the benefits of a groundwater drainage layer against the potential to create preferential flow pathways beneath the Encapsulation Cell. If implemented in ongoing design development, disposal of any waters collected in a groundwater drainage layer should also be addressed.

4.7 Leachate Barrier and Leachate Collection

4.7.1 Leachate Barrier System

A dual barrier lining system is proposed for the cell floor and cell walls. The cell floor liner surface is to slope of 2% in the longitudinal direction and greater than 3% in transverse direction. This approach is consistent with requirements for restricted solid waste landfills given in the Landfill Guidelines.

The leachate barrier system includes the components given below, listed top to bottom. Note that the leachate collection system is described in subsection 4.7.2 immediately below.

- Cushion Geotextile on cell floor; note: replaced by Geocomposite Drainage Net for leachate collection on cell walls.
- Primary Composite Liner System
 - Geomembrane
 - Geosynthetic Clay Liner (GCL)
- Leak Detection Geocomposite Drainage Net
- Secondary Composite Liner System
 - Geomembrane
 - GCL
 - Note: Landfill Guidelines indicate that a 1.0 m thick compacted clay liner may be used in place of the secondary geomembrane/GCL liner. This option to be assessed in ongoing design development.
- Bearing Layer

For the cell wall liner system, there is potential for a relatively long period to elapse between liner construction and covering with treated APCr. Therefore, the design includes a sacrificial geotextile layer (referred to in the Reference Design Drawings as “protection geotextile”) above the cell wall leachate collection Geocomposite Drainage Net. This sacrificial geotextile is intended to provide protection to the Geocomposite Drainage Net from environmental degradation, particularly from UV exposure. The sacrificial geotextile would be progressively removed during APCr filling.

Cell floor and cell wall liner profile details are included in the Reference Design Drawing sheet 8 of 9.

Key liner material specifications are provided in Section 4.11.1.

4.7.2 Leachate Collection System

The Encapsulation Cell reference design includes a Primary leachate collection layer and a Secondary leachate collection (Leak Detection) layer. This design approach is consistent with requirements for restricted solid waste landfills given in the Landfill Guidelines

Primary System- Leachate Collection

The cell floor primary leachate collection layer consists of a 300 mm (minimum) thick drainage aggregate layer overlain by a suitable filter geotextile. The filter geotextile is to be selected during detailed considering the particle size distribution of the treated APCr. The cell floor leachate collection drainage aggregate layer is to be a high durability and high porosity natural gravel with 20-40 mm particle size range and very low percentage of fine-grained particles. This material can provide a drainage layer with suitable durability and clogging resistance without being excessively aggressive to the underlying geomembrane.

The cell floor primary leachate collection layer will contain perforated high-density polyethylene (HDPE) leachate collection pipes. Layout and spacing of the lateral leachate collection pipes will be confirmed in ongoing design development based on maximum allowable leachate head of 300 mm above the floor liner for severe-case design conditions. The spacing will not exceed 25 m to be consistent with the Landfill Guidelines.

Pipe diameters and wall thicknesses will be specified to provide suitable resistance to loading from construction and progressive APCr placement.

Cell wall primary leachate collection layer consists of a geocomposite drainage net installed above the primary geomembrane liner. Leachate collection pipes are to be installed at the toe of the cell walls to collect leachate from the cell wall leachate collection layer. Required transmissivity and specifications of the leachate collection geocomposite drainage net is to be determined in ongoing design development in accordance with Landfill Guideline requirements.

The primary leachate collection layer will collect large amounts of rainwater if significant rainfall occurs during periods after layer construction but prior to covering with initial lifts of treated APCr. To prevent collected rainwater from mixing with leachate, and thereby requiring management in the leachate evaporation pond, ongoing design development of the leachate collection system will require features to prevent such mixing of waters. We anticipate that temporary geomembrane partitions (often referred to as “rain flaps”) within the drainage aggregate layer, along with temporary disconnection of longitudinal collection pipes, will be included in ongoing design development for this purpose. Sizing of the leachate collection pond (refer Section 4.9.3) has assumed that such measures would limit the area of leachate collection system that could collect rainwater that mixes with leachate to no greater than 6000 m² at any time during Encapsulation Cell operation.

Secondary System – Leak Detection

The secondary leachate collection (Leak Detection) layer consists of a geocomposite drainage net, installed between the primary and secondary composite liner systems, and across the entire cell floor and cell walls. Consideration should be given in ongoing design development to the potential need for collection pipes to assist with transmission of collected leakage to the leak detection sumps.

4.7.3 Leachate and Leak Collection Sumps

The reference design includes Leachate Collection sumps and Leak Detection sumps that will operate independently, but be co-located at the low point of each of the subcells. Eight dual-purpose sumps are therefore included in the reference design. As noted in Section 4.2, ongoing design development may result in a change in the number and location of cells and subcells, and therefore change in the number of sumps.

The dual-purpose sumps will comprise a drainage aggregate-filled low point in the lining system. The top of liner level within the sumps will be nominally 1 m below the level of the surrounding lining system. Sump details are to be confirmed during ongoing design development.

Leachate extraction from the sumps will be by pumping through inclined riser pipes that extend down the side wall of the cell and into the sumps. The leachate extraction Side Wall Riser pipes are to connect to the longitudinal leachate collection pipes to provide clean out access to the centre of each cell. A schematic cross section of a dual Leachate Collection and Leak Detection sump is provided in Figure 5. As indicated in the figure, the reference design includes two riser pipes for the leachate collection layer to provide redundancy for leachate extraction, and as required by the Landfill Guidelines for RSW cells of the size present in the Encapsulation Cell.

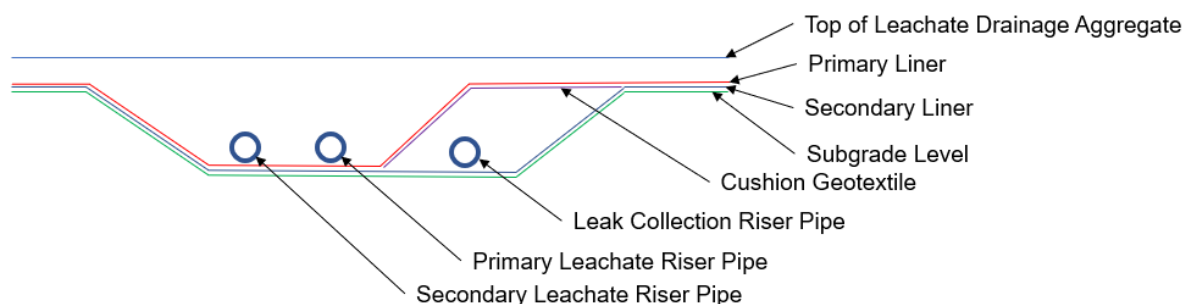


Figure 5: Transverse Section of Combined Leachate and Leak Detection Sump. Not to Scale.

Due to higher leachate head that may potentially develop within the leachate and leak detection sumps, as compared to other portions of the floor liner, ongoing design development will consider installation of an enhanced liner beneath the sumps. For example, an additional compacted clay layer or GCL layer could be included.

4.7.4 Leachate Barrier and Collection Compliance with Landfill Guidelines

NSW EPA Landfill Guidelines identify acceptable design specifications and operating practices. For restricted solid waste landfills the following acceptable design aspects are provided in the guidelines.

Table 9 provides review of the leachate barrier and leachate collection reference design against the acceptable design of the Landfill Guidelines

Table 9 : Landfill Guidelines Acceptable Design Requirements for Leachate Barrier and Leachate Collection

Design Aspect	NSW EPA Acceptable Design	Encapsulation Cell Reference Design	Comment
Lining System Type	Dual barrier system consisting of a primary barrier and a secondary barrier. The secondary barrier is installed below or outside the primary barrier.	Encapsulation Cell liner on cell floor and cell walls with Primary and Secondary composite GCL-Geomembrane liner. Details of Geomembrane and GCL materials to be assessed during ongoing design development.	Design concept compliant with NSW EPA Acceptable Design.
Primary Barrier	Composite liner, comprising a lower geosynthetic clay liner and an upper geomembrane liner.	Primary barrier to be geomembrane/geosynthetic clay liner.	Design concept compliant with NSW EPA Acceptable Design.
Secondary Barrier	Either a composite geomembrane/geosynthetic clay liner; or a single compacted clay liner 1000 mm thick with a saturated hydraulic	Secondary barrier to be geomembrane/geosynthetic clay liner.	Design concept compliant with NSW EPA Acceptable Design.

Design Aspect	NSW EPA Acceptable Design	Encapsulation Cell Reference Design	Comment
	conductivity less than 1×10^{-9} m/s.		
Leachate Barrier Material properties and specifications	Requirements as per General Solid Waste landfills materials should be used that will not be compromised by chemicals in the leachate	Details of Geomembrane and GCL materials to be assessed during ongoing design development. Ongoing design development to include demonstration of material compatibility with leachates anticipated to be generated in the Encapsulation Cell.	Design concept compliant with NSW EPA Acceptable Design.
Primary leachate collection layer	Purpose: Primary Leachate Collection above the primary Containment barrier. Type: 300 mm thick Drainage aggregate layer with collection pipe network. Geocomposite may be used as alternative to drainage aggregate on cell walls.	Primary leachate collection layer to be 300 mm drainage aggregate with leachate collection pipes on cell floor. Aggregate to be overlaid with filter geotextile. Primary leachate collection layer to be Geocomposite Drainage Net to be on cell walls.	Design concept compliant with NSW EPA Acceptable Design.
Secondary leachate collection layer (Leak Detection)	Secondary leachate collection layer should be a gravel drainage layer or a drainage geocomposite with a minimum hydraulic transmissivity of 0.3×10^{-3} square metres/second.	Design to be compliant with NSW EPA Acceptable Design. Geocomposite Drainage Net proposed for Leak Detection Layer. Need for Leak Detection collection pipes to be considered in Ongoing design development.	Design concept compliant with NSW EPA Acceptable Design.
Leakage rate through the dual barrier system	Less than 1 litre/hectare/day of leachate for a maximum level of leachate of 300 millimetres over the upper liner.	Dual composite liner system anticipated to control leakage to acceptable levels.	Design leakage rate to be determined in ongoing design development. Lining system design to achieve design leakage of not more than 1 litre/hectare/day assuming 300 mm leachate head development on primary liner

Design Aspect	NSW EPA Acceptable Design	Encapsulation Cell Reference Design	Comment
Cell Base slopes	Base gradient of greater than 2% in the longitudinal direction and greater than 3% in transverse directions.	Reference Design includes cell floor liner slope of 2% in the longitudinal direction and greater than 3% in transverse direction	Design concept compliant with NSW EPA Acceptable Design.
Cell base elevation	Wholly above the highest historically recorded groundwater table at all times.	Base of lowest point of cell floor liner (in leachate collection Sumps) to be above highest historically recorded groundwater table. Required levels to be further assessed in ongoing design development.	Design concept compliant with NSW EPA Acceptable Design.
leachate extraction and level control system	Include a collection sump and leachate riser(s) to facilitate extraction of leachate from the cell. A leachate extraction and level control system is to be installed in all cells. The system is to be able to keep the leachate level no greater than 300 millimetres above the upper surface of the base liner and be able to continue to function effectively until the landfill is considered stable.	Each Sub cell includes independent leachate collection sump. Longitudinal leachate collection pipework to drain to sumps and connect leachate riser pipe. Leachate level control to be via pumping from leachate extraction risers.	Design concept compliant with NSW EPA Acceptable Design. Details of leachate extraction and control system to be developed during ongoing design development.
Primary Leachate Collection Riser	For cells with a capacity of greater than 50,000 m ³ of waste, two leachate risers are required connected to the primary leachate collection layer	Dual primary leachate risers are required installed in each sump as each sub cell within the Encapsulation Cell has more than 50,000 m ³ of waste capacity. Side wall risers are to be used for primary and secondary leachate risers. Riser pipes to be of suitable size for installation of pumps and to facilitate collection pipe cleanout activities.	Design concept compliant with NSW EPA Acceptable Design.
Secondary Leachate Collection Riser (leak Collection Riser)	Required connected to the secondary leachate collection system.	Side wall risers are to be used for primary and secondary leachate risers. Riser pipes to be of suitable size for installation of	Design concept compliant with NSW EPA Acceptable Design.

Design Aspect	NSW EPA Acceptable Design	Encapsulation Cell Reference Design	Comment
		pumps and to facilitate collection pipe cleanout activities.	
leachate extraction and level-control system	Control system type: automated and telemetered including: - Alarm System that is activated if the leachate level within the cell rises to more than 300 mm above the lowest point on the cell's floor or some other level justified by the design. - interlocks or water level sensors to prevent leachate from being pumped out of the cell when the freeboard of any receiving dam is exceeded - have an alarm system and pump interlocks on the leachate transfer pipework to prevent the pumping of leachate should the pipework rupture - have a leachate riser connected to both the primary and secondary leachate collection layer	Leachate Extraction and Level control system to be included for each landfill cell per Landfill Guideline requirements.	Design concept compliant with NSW EPA Acceptable Design. Details of leachate extraction and control system to be developed during ongoing design development.

4.8 Capping and Closure Approach

4.8.1 Reference Design Final Landform

The proposed final landform is provided in Reference Design Drawing sheet 5 of 9 with overall cross sections on Reference Design Drawing sheet 7 of 9. The final landform includes the following key features:

- Maximum height RL 815 m
- Maximum batter slope of 5.5H:1V on Northern and Eastern Batters (max average slope 5.75H:1V)
- Maximum batter slope of 4.0H:1V on Southern and Western Batters (max average slope 4.25H:1V)
- Top of landform sloping min 5%
- Single 5 m wide Bench on landform batter for surface water drainage (bench width to be confirmed in ongoing design development). Min 1% fall along bench to drainage drop structures or chutes. Maximum slope distance between bench less than Bench Spacing recommendations of Managing Urban Stormwater: Soils and Construction Volume 2B Waste Landfills (NSW DECC, 2008a) (Blue Book Volume 2B). Surface water drainage further discussed in Section 4.10.
- Final cap landform is contained within the perimeter bunds and the existing ED1 pond embankments.

The maximum average batter slopes of the Southern and Western Batters 4.25H:1V (23.5%) slightly exceeds the 20% slope that is recommended to be avoided by the Landfill Guidelines. It is, however, noted that the 4.25H:1 average slope and the 4.0H:1V (25%) maximum batter slope is within the range of commonly adopted and approved landfill final cap slopes, and it is considered that slope stability and erosion risks can be adequately mitigated through ongoing design development.

4.8.2 Final Capping

The Encapsulation Cell will be progressively filled to final level per the staging described in Section 4.4, with final capping installed progressively as filling stages are completed. The progressive installation of the final capping will reduce leachate generation and potential for environmental impacts.

Final capping of the Encapsulation Cell will be with engineered cap system, compliant with Landfill Guideline requirements. The Final Cap sealing layer is proposed to be a Geomembrane – GCL composite lining system. The capping system cross section is shown in Reference Design Drawing sheet 9 of 9.

The proposed final cap profile includes gas drainage, however, the need for gas drainage should be further assessed in ongoing design development because the stabilised APCr waste may not warrant inclusion of gas drainage.

The reference design for the capping system includes a 1000 mm thick revegetation layer which is adequate for the final capped Encapsulation Cell to support vegetation to provide long term surface stability and erosion control, and to comply with post closure visual impact requirements. Vegetation requirements should be incorporated into Veolia's Landfill Closure and Rehabilitation Management Plan (LCRMP) (Veolia, 2016).

Following implementation of final capping and establishment of vegetation across the landform, surface water drainage from the capped Encapsulation Cell may be considered clean drainage that may potentially be discharged offsite without treatment, subject to assessment at that time.

The proposed final cap profile is included in Reference Design Drawing sheet 9 of 9. Key capping material specifications are provided in Section 4.11.2.

4.8.3 Site Closure

After final capping of the site, ongoing leachate management will be required including ongoing leachate drainage and disposal to maintain leachate levels within the Encapsulation Cell less than 300 mm above the cell floor lining system.

Ongoing leachate and groundwater and surface water monitoring will be required to verify that the Encapsulation Cell is not creating unacceptable environmental impacts. In addition, ongoing inspection and maintenance of the landfill cap, including stormwater management features will also be required in the post closure period.

It is assumed that Veolia Environmental Services, or other responsible party, will retain care and control of the site post closure and that the site will not be open to public access.

A final closure plan should be incorporated into Veolia's LCRMP (Veolia, 2016).

4.8.4 Landfill Guideline Requirements for Final Capping

For restricted solid waste landfills, the acceptable final capping design aspects are provided in the Landfill Guidelines. Table 10 below provides review of the leachate barrier and leachate collection reference design against the acceptable design of the Landfill Guidelines.

Table 10: Landfill Guideline Acceptable Design Requirements for Final Capping

Design Aspect	NSW EPA Acceptable Design	Encapsulation Cell Reference Design	Comment
Gas Collection Layer	Include if required by design circumstances.	Included if determined in ongoing design development to be required. If required, layer to comprise a network of gas collection pipes in gas collection trenches excavated into intermediate capping materials below the final cap.	Design concept compliant with NSW EPA Acceptable Design.
Seal Bearing Layer	Engineered layer of material at least 300 millimetres thick to support the sealing layer	Bearing Layer included.	Design concept compliant with NSW EPA Acceptable Design.
Sealing Layer	Composite Compacted Clay-Geomembrane liner. Compacted Clay Liner to comprise min of 600 mm Clay with in situ saturated hydraulic conductivity of less than 1×10^{-9} m/s or a GCL liner.	Geomembrane – GCL composite lining system.	Design concept compliant with NSW EPA Acceptable Design. If suitable onsite clay soil available GCL may be replaced with compacted clay liner.
Infiltration Drainage Layer	Required for Restricted Solid Waste Landfills Either 300mm thick aggregate drainage layer or geocomposite drainage.	Geocomposite drainage Net Infiltration Layer. Drainage collection and outlet pipes to be included	Design concept compliant with NSW EPA Acceptable Design.
Revegetation Layer	Minimum 1.0 m Revegetation Layer thickness	1.0 m Revegetation Layer	Design concept compliant with NSW EPA Acceptable Design.
Final Cap Slopes	<u>Max slope</u> To reduce the risk of erosion Steep caps (greater than 20%, (5H:1V) "should be avoided". <u>Min slope</u> The cap should have a gradient of greater	Minimum slope on landform crest min slope 5%. Refer discussion under 4.8.1 regarding batter slopes. Drainage from cap is directed along defined drainage pathways on cap benches to drop structures.	Design concept compliant with NSW EPA Acceptable Design. Slopes on south and west batters are slightly steeper than noted to be avoided by Landfill Guidelines. Proposed slopes are considered suitable for site-specific conditions and guidelines do not prohibit

Design Aspect	NSW EPA Acceptable Design	Encapsulation Cell Reference Design	Comment
	than 5% to defined drainage points.		the proposed slope gradients. Final Cap Erosion control measures to be included in ongoing design development of final capping system.

4.9 Leachate Generation and Disposal

4.9.1 Leachate Drainage

Leachate drainage from the landfill cells and transfer to the leachate evaporation pond will be via pumped drainage from leachate risers (both Leachate and Leak Collection risers) installed within each of the leachate sumps. The use of pumped leachate drainage provides flexibility for the siting of the leachate evaporation pond because gravity drainage is not relied upon.

Pumping will maintain leachate levels within the leachate sumps to levels compliant with the Landfill Guidelines. The allowable maximum level will be confirmed in ongoing design development based on sump and pumping system design.

The volume of drainage pumped from Leak Collection Risers will be measured to monitor primary liner leakage rates.

4.9.2 Leachate Disposal

Leachate evaporation in a dedicated evaporation pond is proposed as the primary leachate disposal method.

Contingency measures should be developed in ongoing design development and/or Encapsulation Cell operating plans for potential occurrence of extended periods of unfavourable climatic conditions to ensure that leachate storage capacity exceedance does not occur. For example, offsite disposal to a licenced liquid waste facility or treatment in the existing on-site leachate treatment plant (pending treatment suitability assessment) could be considered as contingency disposal approaches.

4.9.3 Evaporation Pond

Water balance and leachate evaporation pond sizing calculations for the Encapsulation Cell are presented in Appendix B. Elements of the calculation include the following:

- consideration of leachate generation and runoff for a range of cap/cover types expected during the 25-year Encapsulation Cell operational period, including some areas with no waste or capping present
- an estimated 25-year sequential waste filling and capping timeline for the Encapsulation Cell
- 33-year weather record for the general site location, with adjustments to rainfall and evaporation to reflect available onsite weather measurements made since 2015; unfavourable weather record selected with above average rainfall including 90th percentile rainfall years
- Evaporation pan factor consistent with the Landfill Guidelines and considered conservative for a shallow black geomembrane-lined storage pond at the site.

The reference design calculations indicate that a lined leachate pond with a total base area of approximately 17,500 m² and lined side slopes with height 2.5 m and inclination 3H:1V will be sufficient to provide effective

leachate evaporation and adequate internal freeboard of 0.5 m. This geometry corresponds a total lined pond footprint area of approximately 23,000 m². Please note that the total volume of this pond at maximum operating level is approximately 38,000 m³ which can be considered against the total estimated leachate production of approximately 90,000 m³ over the 33-year water balance period.

Pond Lining

The reference design includes an evaporation pond liner system that is consistent with the Landfill Guidelines requirement for the pond liner system to be designed and constructed to a similar standard to that of the Encapsulation Cell base liner system. The design comprises a double liner system consisting of a primary geomembrane liner overlying a leak detection system, overlying a secondary Geomembrane/Compacted Clay composite liner (subject to design confirmation in ongoing design development). We note that this system is of a similar standard in containment approach and liner materials to the Encapsulation Cell base liner system, however, some components differ due to the distinct differences in loading and environmental exposure for the leachate pond.

This type of pond liner system – two liners sandwiching a leak detection system with the lower liner being a composite liner – provides for a very high level of containment and is suitable for Encapsulation Cell leachate, even if the leachate is concentrated by evaporation.

Key pond liner material specifications are provided in Section 4.11.3.

Further considerations for ongoing development of the leachate pond design are given below.

Pond Geometry

- Base of evaporation pond located above groundwater table. Base graded to sump(s) to allow full pond dewatering/desilting and to provide drainage fall for the leak detection system. The pond base will be constructed generally at the existing surface level.
- Perimeter embankment geometry
 - portion of embankment (western and northern sides) integrated with the existing wall of ED1.
 - embankment crest width suitable for lining anchorage and for operation of small construction and maintenance plant (e.g., for leachate pump out or sediment removal)
 - embankment elevation above surrounding ground to sufficient height to prevent rainfall run on and to prevent spill in of ponded ED1 water at Maximum Water Level (MWL) as described in Section 2.8; with freeboard adequacy to be assessed during ongoing design development.
 - consideration of potential for future embankment raising as contingency to extended periods of adverse weather conditions.
- Internal walls to divide pond into a number of sub-ponds, as needed to facilitate pond operation. Refer to Section 4.9.4 for further discussion.

Pond Features

- Provision for pump out and desilting capability using suction pumps or mechanical removal methods, with suitable liner protection features at removal points
- Evaporation pond positioned within site such that in the event of overflow occurring the spilled leachate would be contained within ED1 prior to a potential offsite discharge occurring. The pond will include an emergency spillway into ED1 at an appropriate location.

- Liner ballasting for wind uplift resistance.
- Pond access and egress features for personnel safety.

Modelling and Calibration

- Water balance model should be updated during ongoing design development based on Encapsulation Cell design, planned Encapsulation Cell operations, candidate cover soil materials, and any additional collected site weather data.
- Revised water balance assessment for leachate evaporation pond design would be required in the event that alternate daily capping is proposed, because runoff from alternate daily cover must be treated as leachate. Additional evaporation pond capacity would be anticipated in this case.

In addition, once constructed, the evaporation pond storage should be monitored for an initial time period to calibrate actual leachate generation rates against HELP model predicted values and the water balance model against actual evaporation pond levels (particularly pan factor).

4.9.4 Evaporation Pond Operation

The concentrations of dissolved contaminants and salts in the liquid held in the evaporation pond will vary over time. While initial concentrations would generally match that of incoming Encapsulation Cell leachate, the concentrations will change due to the combined effects of: (a) evaporation, tending to increase concentrations; and (b) direct rainfall on the pond, tending to decrease concentrations. On average, a trend of increasing concentrations is expected in the evaporation pond which will potentially require ongoing pond design development and operations planning to consider the issues described below.

- *Lining System:* The reference design for the evaporation pond lining system considers the potential for increased concentration leachate through the use of a double liner system with leak detection layers (refer Sections 4.9.3 and 4.11.3) and through liner compatibility testing (refer Section 4.11.4). These measures will provide effective containment of highly concentrated leachate.
- *Salinity and Sub-Ponds:* Although the salinity, meaning the concentration of soluble salts, of Encapsulation Cell leachate is uncertain and will depend on specific APCr treatment processes adopted (refer Section 3.3), there is potential for high salinity to develop in the pond over time. High salinity is known to significantly reduce the rate of evaporation and therefore reduce overall evaporation pond performance. While the potential for high salinity has been indirectly considered in the selection of pan evaporation factor for the leachate evaporation pond water balance calculations (refer Appendix B), it may be necessary to divide the pond area into sub-ponds and regulate transfer of water between sub-ponds such that high salinity is present in one or two sub-ponds only. This approach is used in many evaporation pond brine operations and has the advantage that only a small portion of the total pond surface experiences a reduced evaporation rate from very high salinity.
- *Removal of Contaminants/Salts:* Increasing concentrations of dissolved contaminants and salts in the evaporation pond over time, and the potential use of sub-ponds to further concentrate the water in one or two sub-ponds, is likely to lead to the need for occasional removal of dissolved contaminants and salts when extremely high concentrations are reached through evaporation or stratification. This could be achieved through pump-out, chemical precipitation with desilting/desludging, or by mechanical removal after complete evaporation to a near-solid state. The need for ongoing pond design development to consider pump-out and desilting capability was identified in Section 4.9.3 above.

- **Management of Removed Contaminants/Salts:** All contaminants and salts removed from the pond would generally be managed like any other waste, i.e., sampled, characterised, dewatered/treated as needed, and disposed of to an appropriate facility.
 - Given its origin as Encapsulation Cell leachate, it is considered likely that removed materials could be successfully managed and demonstrated to be suitable for placement into the Encapsulation Cell.
 - For reference, if the incoming Encapsulation Cell leachate is assumed to have a very high concentration of dissolved solids similar to seawater, 35,000 mg/L, and the total incoming leachate flow over the Encapsulation Cell lifetime is 90,000 m³ (refer Section 4.9.3 above), then the total dry weight of leachate contaminants/salts that will enter the pond is approximately 3000 tonnes. This is a relatively small tonnage, in that even if completely removed from the pond it represents less than 1% of the estimated 532,000 tonnes of treated APCr to be placed in the Encapsulation Cell over its lifetime (refer Section 3.3).

In addition to the potential advantages of sub-ponds for desilting and salinity management and removal of contaminants/salts as indicated above, the presence of sub-ponds would allow isolation of areas to allow full dewatering if needed for pond liner inspection and maintenance. Ongoing design development should consider sub-pond need and sizing as well as interconnections, such as stoplog weirs, between sub-ponds.

4.9.5 Landfill Guideline Requirements for Leachate Evaporation Dam

The Landfill Guidelines provides designs specifications and operating practices that are considered acceptable to NSW EPA for leachate storage dams as included in Table 11.

Table 11 : Landfill Guideline Acceptable Design Requirements for Leachate Dams

Design Aspect	NSW EPA Acceptable Design	Encapsulation Cell Reference Design	Comments
Dam Sizing	Leachate storage volume to be determined by Water Balance. Minimum requirements for water balance are provided in Section 2.3 of the Landfill Guidelines.	Evaporation Dam footprint area calculated based on compliant water balance	Design concept compliant with NSW EPA Acceptable Design
Dam Freeboard	freeboard that can accept rainfall directly on the dam from a 24- hour rainfall event with a 1-in-25-year average recurrence interval without overflowing	Direct rainfall considered. See Appendix B	Design concept compliant with NSW EPA Acceptable Design
Dam liner system	Design and Construction of similar standard to the Landfill cell liner.	Double liner system with leak detection layer	Design concept compliant with NSW EPA Acceptable Design
Dam siting	As per landfill siting requirements Additionally, leachate dams should generally not be located on landfilled areas.	Addressed for evaporation pond as per siting requirement described in Section 3.2.1.1	Design concept compliant with NSW EPA Acceptable Design

4.10 Stormwater Management

4.10.1 Approach for Reference Design

The approach for stormwater management for the Encapsulation Cell reference design is summarised in the points given below.

Cover Materials and Runoff Types

- Rainfall that comes into contact with treated APCr should be considered to be leachate and collected and disposed of as leachate and not permitted to enter the surface water drainage system.
- Cover materials are to be placed during the operation of the Encapsulation Cell. Runoff from areas of daily or intermediate cover will be classified as 'dirty stormwater' (i.e., potentially sediment laden) and directed to appropriate management areas. However, if alternate daily capping is proposed for use in the future, runoff from the alternate daily capping should be considered as leachate.
- Runoff from areas of the Encapsulation Cell that have been final capped and stabilised can be managed as 'clean stormwater' and therefore managed separately to 'dirty stormwater' from the other areas of the Encapsulation Cell.

ED1 Evaporation Dam

- All 'dirty stormwater' runoff from the Encapsulation Cell will be discharged to the ED1 Dam floor near the northeast corner of the Encapsulation Cell. 'Clean stormwater' will also be discharged to the ED1 Dam, but potentially at different locations if appropriate for integration with ED1 operation.

Flood protection

- Surface water diversions will be included in the Encapsulation Cell design and operations to prevent surface water run-on to the Encapsulation Cell. The surface water diversions will include permanent perimeter bunds (progressively constructed) with temporary separation berms at the perimeter of the Encapsulation Cell where needed to provide separation between surface water and leachate (refer Section 4.10.4).

4.10.2 Design Elements

Stormwater management for Encapsulation Cell reference design comprises the elements given below.

Drainage Arrangement

The overall drainage arrangement is depicted in Reference Design Drawing sheet 6 of 9. This includes

- Perimeter drainage at the toe of the final capping slopes to prevent Encapsulation Cell runoff from leaving the ED1 footprint. All runoff is directed to the northeast corner of the Encapsulation Cell into the ED1 Dam as indicated above. Ongoing design development for discharge to ED1 may require channels, bunds, or level spreaders for integration with ED1 stormwater infrastructure.
- A mid-slope bench on the final landform batter that drains to the southeast corner of the Encapsulation Cell before dropdown to the perimeter drainage. This southward drainage direction on the bench is intended to prevent runoff toward the north-facing leading edge of the interim landform during staged filling.

The drainage arrangement for staged interim landforms is similar to that for the final landform as evident in the figures given in Section 4.4.

Drop Structures and Benches

As a means of reducing erosion and sediment migration, a series of benches and drop structures have been included in the final landform design to control and reduce the velocity of overland flow down the surface of the landfill formation. This is shown in Reference Design Drawing sheet 6 of 9.

- The benches are designed as 5 m wide with a cross fall of 5%. A 500 mm high bund will be constructed on the outer edge of the bench for vehicle safety, and this will also act as a channel for surface water runoff. The benches should be designed as long-term stormwater structure to convey up to a 1:100 AEP storm event. The width of benches and the drainage channel sizing should be established in ongoing design development.
- A number of drop structures convey surface water runoff from the bench structures to the perimeter drainage at the toe of the landfill formation and also from the perimeter bund crest to the surrounding existing ground level within ED1. Additional Drop Structures, in addition to those included in the Reference Design should be implemented, if required, to efficiently manage stormwater drainage from the Encapsulation Cell final landform. Like the bench construction, the drop structures should be designed during ongoing design development as long-term stormwater structures to convey and provide erosion protection for up to a 1:100 AEP storm event.
- Perimeter drainage channels are shown in Reference Design Drawing sheet 9 of 9 along the western edge and for the perimeter bund on the northern and eastern edges. In particular, the dimensions of fill placement along the western edge were selected primarily to provide space to establish the western edge drainage channel. The perimeter channels should be designed as long-term stormwater structure to convey up to a 1:100 AEP storm event. Drainage channel sizing should be established in ongoing design development.

4.10.3 Drainage Design Criteria - Ongoing Design

Stormwater structures required for the Encapsulation Cell design should be categorised into one of the by the following three categories:

- Temporary - Temporary features refers to structures with either; an expected short design life (typically 1 to 3 years), an expectation to be modified or removed within this time frame or have a low consequence should their design capacity be exceeded due to a small receiving catchment. These features should have a design criterion of 1:10 AEP;
- Removed in future stages - Features that are to be removed in future stages, as filling progresses or that have a short design life but higher consequence of failure, should have a design criteria of 1:20 AEP or greater; and
- Long term - Long-term features are typically designed and built for the planned closure condition of the site for the major (1:100 AEP) storms.

Relevant Guidelines and Legislative Requirements include the following:

Landcom Blue Book: Managing urban stormwater: soils and construction. This publication provides erosion and sediment control (ESC) guidance during construction and other land disturbance activities. Collectively, the guidelines are known as the Blue Book. Volume 1 (Landcom, 2004) is mainly focused on erosion and sediment control during the construction-phase of urban development. Volume 2B (Landcom, 2008) provides additional ESC guidance aimed specifically at waste landfill sites.

Australian Rainfall Runoff. The Australian Rainfall and Runoff (ARR) (Ball et al, 2019) is a national guideline document, data and software suite that can be used for the estimation of design flood characteristics in Australia. The most recent release is the ARR 4th edition. It is noted that ARR provides updated guidance on

the assessment of effects of climate change on rainfall depth and intensity. This should be included in design of long-term drainage infrastructure.

4.10.4 Flood Protection

Separation of stored water within ED1 and treated APCr within the Encapsulation Cell at all stages of cell life will be achieved with a combination of a permanent perimeter bund and temporary separation berms. For example, for Stage 1 filling as shown in Figure 1 in Section 4.4 above, separation from ED1 water will involve: (i) the perimeter bund constructed along the eastern edge of the Cell 1 filling area; and (ii) a temporary separation berm along the entire northern side of the Cell 1 filling area, extending between the perimeter bund and the western embankment. The required height of these elements is relevant to future ED1 operating water levels as summarised below.

As discussed in Section 2.8, the Encapsulation Cell and Leachate Evaporation Pond will be designed for the ED1 Maximum Water Level (MWL).

Perimeter Bund: As shown in Reference Design Drawing sheet 4 of 9 in Appendix A, the perimeter bund is a substantial earthwork structure, with height of 4 to 7 m above existing surface levels and crest elevation between and 790 and 793 m. Bund height requirements will be further assessed during ongoing design development, with consideration for adequate freeboard above the ED1 Maximum Water Level (MWL) to provide a suitably low long-term risk of ED1 water overtopping into the APCr area footprint.

Temporary Separation Berms: Temporary separation berms would be formed either by: (a) the internal bunds between cells; or (b) separate adjacent earthworks. The use of (a) or (b) would be determined during ongoing design development. The required height of these berms will be assessed during ongoing design development to provide a suitably low short-to-medium term risk of ED1 water, at MWL, overtopping into the APCr area footprint. Further, it is noted that changes in ED1 water level will not occur quickly such that raising of the temporary separation berm could be achieved if an unexpected rising water level trend were to occur.

4.11 Key Material Specifications

This section presents specifications for key materials that will perform or support barrier functions in the Encapsulation Cell lining and capping system and the leachate evaporation pond lining system. These specifications have been developed to be consistent with the relevant requirements and guidance in the Landfill Guidelines for restricted solid waste and with international good practice for containment of landfill contaminants.

This section also presents the approach for demonstration of material compatibility with leachates from the Encapsulation Cell.

Ongoing design development of the Encapsulation Cell will include preparing: (a) construction method and procedure specifications; and (b) detailed requirements for construction quality assurance (CQA) consistent with the Landfill Guidelines.

4.11.1 Encapsulation Cell Base Liner - Key Material Properties

The reference design for the base liner system of the Encapsulation Cell is presented in Section 4.7.1 and shown on Reference Design Drawing sheet 8 of 9.

Material properties for the base liner system materials relevant to a barrier function are provided in the following sub sections.

Shear strength and interface shear strength requirements, required to ensure short- and long-term stability of the Encapsulation Cell base liner system have not been assessed and are not included herein. Material shear

strength and interface shear strength requirements will be established in ongoing design development to ensure suitable stability factors of safety are achieved considering range of potential loadings that may occur.

4.11.1.1 Cushion Geotextile

Cushion Geotextile shall be a non-woven, needle-punched polyester, polypropylene or polyethylene geotextile material. The Cushion geotextile shall be certified by the manufacturer to be free of needles. The material shall be rejected if needles are identified.

The grade (mass, strength, thickness) of the cushion geotextile shall be justified by the results of site-specific testing incorporate the proposed geosynthetic materials and adjacent layers under the estimated confining pressures that will be experienced in service as a result of the overlying waste and equipment loadings.

Testing should be undertaken per methods identified in the NSW Landfill Guidelines assessment of expected performance of cushion geotextiles protection for geomembrane liners under gravel aggregate.

Cushion Geotextile should, however, at a minimum also comply with current revision of GRI GT12(a) Standard Specification and meet the minimum property requirements presented in Table 12.

Table 12: Minimum Required properties for Cushion Geotextile

Property	Units	Value	Test method
Thickness (Typical)	mm	> 4	AS 3706.1
Mass	g/m ²	≥ 812	ASTM D5261
Grab Tensile Strength	N	≥ 2000	ASTM D4632
Grab Tensile Elongation	%	≥ 50	ASTM D4632
Trapezoidal Tear Strength (both MD and CMD)	N	≥ 890	ASTM D4533
CBR Burst Strength	N	≥ 4,900	ASTM D6241
UV Resistance (Typical)	%	≥ 70	ASTM 7238

4.11.1.2 Primary Geomembrane

The Primary Geomembrane shall be compliant with NSW Landfill guideline requirements. Geomembrane type (i.e. HDPE or other) is to be confirmed during ongoing design development considering compatibility with encapsulation cell leachate (refer Section 4.11.4).

The need for use of textured geomembrane shall be assessed in ongoing design development.

While suitability of HDPE geomembrane is yet to be assessed, it is considered the primary geomembrane should provide containment performance and durability at least equivalent to nominal 2.0 mm HDPE Geomembrane complying with current revision of GRI GM13 Standard Specification and required properties as provided in Table 13.

Subject to the outcome of liner compatibility assessment, an alternate geomembrane material may be used provided it is demonstrated to offer equivalent performance, strength and durability to 2.0 mm HDPE Geomembrane.

Table 13: Required properties for HDPE Geomembrane

Property	Units	Value	Test Method
Nominal Thickness	mm	2.0	ASTM D 5994/ ASTM D 5199
Thickness if Textured (Minimum average)	mm	>1.9	ASTM D 5994
Thickness if Textured (Lowest individual for 8 out of 10 values)	mm	>1.8	ASTM D 5994
Thickness if Textured (Lowest individual for and of the 10 values)	mm	>1.7	ASTM D 5994
Thickness if smooth (out of 10 values)	mm	>1.8	ASTM D 5199
Density (MARV)	g/cm ³	> 0.94	ASTM D 1505
Asperity Height (MARV)	mm	0.4	ASTM D7466
Tensile Properties (each direction) (MARV) - Strength at yield - Strength at break (if smooth) - Strength at break (if textured)	kN/m	29 53 21	ASTM D 6693
Tensile Properties (each direction) (MARV) - Elongation at yield Elongation at break(if smooth) - Elongation at break (if textured)	%	12 700 100	ASTM D 6693
Tear Resistance (MARV)	N	249	ASTM D 1004

Property	Units	Value	Test Method
Puncture Resistance (MARV)	N	640 (if smooth) 534 (if textured)	ASTM D 4833
Oxidative Induction Time (OIT) (MARV) - Standard OIT - High Pressure OIT	minutes	100 400	ASTM D 3895 ASTM D 5885
Oven Aging at 85°C for 90 days (MARV) - Standard OIT (retained after 90 days); - High Pressure OIT (retained after 90 days);	%	55 80	ASTM D 5721 ASTM D 3895 ASTM D 5885
Environmental Tensile Load Crack Resistance (Test should be conducted on smooth edges of textured rolls)	Hr	500	ASTM D 5397
Carbon Black - Content range - Dispersion		- 2.0-3.0% - for 10 different views: 9 in Categories 1 or 2 and 1 in Category 3	ASTM D1603 or ASTM D4218 ASTM D5596

4.11.1.3 Primary Geosynthetic Clay Liner (GCL)

The Primary GCL shall be compliant with NSW Landfill guideline requirements and shall be a reinforced multi-layered system comprising at least two layers of geotextile encapsulating a layer of dry, sodium bentonite. The GCL shall be reinforced by needle punching and be completely free of broken needles.

The bentonite layer in the GCL shall be a natural sodium bentonite or shall have >80% (by weight) sodium as activated bentonite.

A non-woven geotextile shall be present on both sides of the GCL.

The primary GCL should comply with current revision of GRI GCL3 Standard Specification and required properties as provided in Table 14.

Table 14: Required properties for GCL

Property	Units	Value (MARV)	Test method
Bentonite Material:			
Swell Index (typical)	cm ³ /2g	≥ 24	ASTM D5890
Fluid Loss (typical)	mL	≤ 18	ASTM D5891
Bentonite particle passing 0.075 mm sieve (powdered)	%	≥ 80	AS 1289.3.6.1
Cation exchange capacity of Bentonite	meq/100g (or cmol/kg)	≥ 70	Methylene Blue Method or ASTM D7503
Montmorillonite Content	% by weight	> 80	X-ray diffraction
Carbonate Content	% (by weight)	≤ 2	X-ray diffraction
GCL Material:			
Mass per unit area of GCL (at 0% moisture content)	g/m ²	≥ 4,100	ASTM D5993
Mass per unit area of bentonite component of GCL (at 0% moisture content)	g/m ²	≥ 3,700	ASTM D5993
Strip Tensile Strength (machine direction)	kN/m	≥ 4	ASTM D6768
Peel Strength (min average)	N/m	≥ 360	ASTM D6496
Permeability (using 100 kPa effective confining stress) Tap water; AND De-ionised water w/ 0.1 M CaCl ₂	m/s m/s	< 5x10 ⁻¹¹ < 5x10 ⁻¹⁰	ASTM D5887
Geotextile components:			
Nonwoven geotextiles - mass/unit area	g/m ²	≥ 200	AS 3706.1

Note (s): 1. N/A – Not applicable
2. MARV – Minimum Average Roll Value

4.11.1.4 Leak Detection Geocomposite Drainage Net

Leak Detection Geocomposite Drainage Net shall be compliant with NSW EPA Landfill Guidelines and shall be a geocomposite material comprising a HDPE geonet core with non-woven, polyester, polypropylene, or polyethylene needle punched, resin or heat bonded geotextiles thermally bonded to both sides of the geonet core.

The material shall be specified to have a compressive strength suitable for the expected loading under waste placement to final design level.

The Geocomposite Drainage Net – Leak Detection should comply with current revision of GRI GN4 Standard Specification and required properties as provided in must meet the minimum property requirements presented in Table 15

Table 15: Required properties for Geocomposite Drainage Net – Leak Detection

Property	Units	Value (MARV)	Test method
Thickness at 20 kPa normal stress	mm	> 5.1	AS 3706.1 / ISO 9863 / ASTM D-5199-01 / EN 964-1
Tensile Strength	kN/m	>7.9	ASTM D7179
Transmissivity • 500 kPa stress	m ² /s	To be confirmed in ongoing design development	AS 3706.10 / ASTM D-4716-01 / ISO-12958
Ply Adhesion	g/cm	>170	ASTM D7005
Compressive strength	kPa	> 1300	ASTM D6364
Geotextile Mass per Unit area	g/m ²	> 250	AS 3706.1 / ISO 9864 / ASTM D-5261-92
Geotextile Equivalent Opening size	µm	< 90	AS 3706.7 / D-4751-95 / ISO 12956

4.11.1.5 Secondary Geomembrane

The secondary geomembrane shall be compliant with NSW EPA Landfill Guidelines and shall be of equivalent performance, strength and durability to the primary geomembrane.

4.11.1.6 Secondary GCL

The secondary GCL shall be compliant with NSW EPA Landfill Guidelines and shall be of equivalent performance, strength and durability to the primary GCL.

The secondary GCL may be replaced by a compacted clay liner of minimum 1.0 m thickness with an in situ hydraulic conductivity of less than 1×10^{-9} m/s.

4.11.1.7 Clay

Clay, if required, shall be a clayey soil, free of organic matter, capable of being compacted to a dense condition. The material shall have the properties as provided in Table 16 below.

Table 16: Required properties for Clay

Description	Minimum Value	Maximum Value	Test Method
Particle Size Distribution Maximum particle size Passing 0.075 mm Sieve	- 50%	13.2 100%	AS 1289.3.6.1
Plasticity Index	20	40	AS 1289.3.2.1
Liquid limit	40	60	AS 1289.3.2.1
Emerson Class	4	-	AS 1289.3.8.1
Re-moulded Permeability @ 95% of Standard Maximum Dry Density at Standard OMC	-	1 x 10 ⁻⁹ m/s	AS1289.6.7.3

4.11.1.8 Leachate Collection Geocomposite Drainage Net

Leachate Collection Geocomposite Drainage Net shall be a geocomposite material comprising a HDPE geonet core with non-woven, polyester, polypropylene, or polyethylene needle punched, resin or heat bonded geotextiles thermally bonded to both sides of the geonet core.

The material shall be specified to have a compressive strength suitable for the expected loading under waste placement to final design level.

The Geocomposite Drainage Net – Leak Detection should comply with current revision of GRI GN4 Standard Specification and should meet the minimum property requirements presented in Table 17.

Table 17: Required properties for Leachate Collection Geocomposite Drainage Net

Property	Units	Value (MARV)	Test method
Thickness at 20 kPa normal stress	mm	> 7.6	AS 3706.1 / ISO 9863 / ASTM D-5199-01 / EN 964-1
Tensile Strength	kN/m	>13.1	ASTM D7179
Transmissivity • 10 kPa stress • 500 kPa stress	m ² /s	To be confirmed in ongoing design development	AS 3706.10 / ASTM D-4716-01 / ISO-12958
Ply Adhesion	g/cm	>170	ASTM D7005
Compressive strength	kPa	> 830	ASTM D6364
Geotextile Mass per Unit area	g/m ²	> 250	AS 3706.1 / ISO 9864 / ASTM D-5261-92

Property	Units	Value (MARV)	Test method
Geotextile Equivalent Opening size	µm	TBC in ongoing design development considering properties of overlying materials.	AS 3706.7 / D-4751-95 / ISO 12956

4.11.2 Encapsulation Cell Final Cap - Key Material Properties

The reference design for the final capping system of the Encapsulation Cell is presented in Section 4.8.2 and shown on Reference Design Drawing sheet 9 of 9.

Specifications for the final capping system materials relevant to a barrier function are provided in the following sub sections.

Shear strength and interface shear strength requirements, required to ensure short- and long-term stability of the Encapsulation Cell final capping system have not been assessed and are not included herein. Material shear strength and interface shear strength requirements will be established in ongoing design development to ensure suitable slope stability factors of safety are achieved considering range of potential loadings that may occur

4.11.2.1 Geomembrane (Cap Sealing layer)

The Geomembrane used in the Cap Sealing Layer shall be compliant with NSW Landfill guideline requirements and shall be Linear Low Density Polyethylene (LLDPE) Geomembrane with a nominal thickness of 2.0 mm.

The geomembrane shall be manufactured from a virgin premium-quality polyethylene resin and shall be designed and manufactured specifically for use in geomembrane. The geomembrane shall contain a maximum of 1% by weight of additives, fillers or extenders (not including carbon black).

Geomembrane shall be textured and shall comply with current revision of GRI GM17 Standard Specification and the properties as summarised in Table 18:

Table 18: Required properties for LLDPE Geomembrane

Property	Units	Value	Test Method
Melt flow index	g/10 min	< 1.0	ASTM D1238
Thickness (minimum average)	mm	≥ 2.00	ASTM D5994
Minimum (lowest individual for any of the 10 values)	mm	≥ 1.70	ASTM D5994
Asperity Height	mm	≥ 0.40	ASTM D7466

Property	Units	Value	Test Method
Tensile Properties (each direction): Strength at break Elongation at break	N/mm %	≥ 21 ≥ 250	ASTM D6693
Density	g/ml	≤ 0.939	ASTM D1505 / D792
Tear Resistance	N	≥ 200	ASTM D1004
Puncture Resistance	N	≥ 400	ASTM D4833
Carbon Black Content	%	2 to 3	ASTM D1603
Carbon Black Dispersion	Rating	90% in Cat 1 and Cat 2 for 10 different views: 9 in Categories 1 or 2 and 1 in Category 3	ASTM D5596
2% Modulus	N/mm	≤ 840	ASTM D5323
Axi-symmetric break strain	%	> 30	ASTM D5617
Oxidative Induction Time (OIT) Standard OIT; OR High Pressure OIT	Minutes Minutes	> 100 > 400	ASTM D8117 ASTM D5885
Oven Aging at 85°C High Pressure OIT (retained after 90 days); OR Standard OIT (retained after 90 days)	% %	≥ 60 ≥ 35	ASTM D5721 ASTM D5885 ASTM D5721 ASTM D8117
UV Resistance; high pressure OIT – % retained after 1,600 hours	%	> 35	ASTM D7238 ASTM D5885

4.11.2.2 Geosynthetic Clay Liner (Cap Sealing layer)

The Geosynthetic Clay Liner (Cap Sealing layer) shall be compliant with NSW Landfill guideline requirements and shall have properties equivalent to that proposed for Base cell GCL in section 4.11.1.3.

4.11.2.3 Geocomposite Drainage Net (Cap Subsoil Drainage)

Geocomposite Drainage Net (Cap Subsoil Drainage) shall be compliant with NSW Landfill guideline requirements and shall be a geocomposite material comprising a HDPE geonet core with non-woven, polyester, polypropylene, or polyethylene needle punched, resin or heat bonded geotextiles thermally bonded to both sides of the geonet core.

The Geocomposite Drainage Net (Cap Subsoil Drainage) shall have the minimum property requirements presented in Table 19.

Table 19: Required properties for Geocomposite Drainage Net (Cap Subsoil Drainage)

Property	Units	Value (MARV)	Test method
Thickness at 20 kPa normal stress	mm	> 7.6	AS 3706.1 / ISO 9863 / ASTM D-5199-01 / EN 964-1
Tensile Strength	kN/m	> 13.1	ASTM D7179
Transmissivity 20 kPa stress 20 kPa stress	m ² /s	To be confirmed in ongoing design development	AS 3706.10 / ASTM D-4716-01 / ISO-12958
Ply Adhesion	g/cm	>170	ASTM D7005
Compressive strength	kPa	> 830	ASTM D6364
Geotextile Mass per Unit area	g/m ²	> 250	AS 3706.1 / ISO 9864 / ASTM D-5261-92
Geotextile Equivalent Opening size	µm	< 90	AS 3706.7 / D-4751-95 / ISO 12956

4.11.3 Leachate Evaporation Pond Key Material Properties

The reference design for the liner system of the leachate evaporation pond is presented in Section 4.9.3.

Material properties for the pond liner system barrier materials are provided in the following sub sections.

4.11.3.1 Evaporation Pond Primary Geomembrane

The Evaporation Pond Primary Geomembrane shall be compliant with NSW Landfill guideline requirements.

Geomembrane type is to be confirmed during ongoing design development considering compatibility with concentrated APCR leachates over the operational life of the encapsulation cell and considering the environmentally exposed application, including anticipated elevated service temperatures and UV exposure.

It is anticipated that the Evaporation Pond Primary Geomembrane may need to be periodically replaced during the operational life of the Encapsulation Cell in response to geomembrane material degradation. A program of geomembrane degradation monitoring should be implemented during operation to enable efficient scheduling of liner material replacement.

While suitability of HDPE geomembrane is yet to be assessed, it is considered the primary geomembrane should provide containment performance and durability at least equivalent to nominal 2.0 mm smooth HDPE Geomembrane complying with current revision of GRI GM13 and properties as presented in Table 20.

The need for use of textured geomembrane shall be assessed (with respect to safety of pond operations personnel) in ongoing design development.

Table 20: Required properties for Evaporation Pond Primary HDPE Geomembrane

Property	Units	Value	Test Method
Thickness (out of 10 values)	mm	>1.8	ASTM D 5199
Density (MARV)	g/cm ³	> 0.94	ASTM D 1505
Tensile Properties (each direction) (MARV) - Strength at yield - Strength at break	kN/m	29 53	ASTM D 6693
Tensile Properties (each direction) (MARV) - Elongation at yield Elongation at break	%	12 700	ASTM D 6693
Tear Resistance (MARV)	N	249	ASTM D 1004
Puncture Resistance (MARV)	N	640	ASTM D 4833
Oxidative Induction Time (OIT) (MARV) - Standard OIT - High Pressure OIT	minutes	100 400	ASTM D 3895 ASTM D 5885
Oven Aging at 85°C for 90 days (MARV) - Standard OIT (retained after 90 days); - High Pressure OIT (retained after 90 days);	%	55 80	ASTM D 5721 ASTM D 3895 ASTM D 5885
UV Resistance - High Pressure OIT (retained after 1600 hrs);	%	50	ASTM D 7238 / ASTM D 5885

Property	Units	Value	Test Method
Environmental Tensile Load Crack Resistance	Hr	500	ASTM D 5397
Carbon Black - Content range - Dispersion		- 2.0-3.0% - for 10 different views: 9 in Categories 1 or 2 and 1 in Category 3	ASTM D1603 or ASTM D4218 ASTM D5596

4.11.3.2 Evaporation Pond Geocomposite Drainage Net

Evaporation Pond Geocomposite Drainage Net shall be compliant with NSW EPA Landfill Guidelines and shall comprise a HDPE Geocomposite Drainage Net.

Evaporation Pond Geocomposite Drainage Net should comply with current revision of GRI GN4 Standard Specification and required properties as provided in must meet the minimum property requirements presented in Table 21.

Table 21: Required properties for Evaporation Pond Geocomposite Drainage Net

Property	Units	Value (MARV)	Test method
Thickness at 20 kPa normal stress	mm	> 5.1	AS 3706.1 / ISO 9863 / ASTM D-5199-01 / EN 964-1
Tensile Strength	kN/m	7.9	ASTM D7179
Transmissivity • 50 kPa stress	m ² /s	To be confirmed in ongoing design development	AS 3706.10 / ASTM D-4716-01 / ISO-12958
Compressive strength	kPa	> 830	ASTM D6364

4.11.3.3 Evaporation Pond Secondary Geomembrane

The evaporation pond secondary geomembrane shall be compliant with NSW EPA Landfill Guidelines and shall be equivalent to the primary geomembrane.

4.11.3.4 Clay

Clay shall be compliant with NSW EPA Landfill Guidelines and shall be clayey soil, free of organic matter, capable of being compacted to a dense condition. The material shall have the properties as provided in Table 22 below.

Table 22: Required properties for Clay

Description	Minimum Value	Maximum Value	Test Method
Particle Size Distribution Maximum particle size Passing 0.075 mm Sieve	- 50%	9.5 100%	AS 1289.3.6.1
Plasticity Index	20	40	AS 1289.3.2.1
Liquid limit	40	60	AS 1289.3.2.1
Emerson Class	4	-	AS 1289.3.8.1
Re-moulded Permeability @ 95% of Standard Maximum Dry Density at Standard OMC	-	1 x 10 ⁻⁹ m/s	AS1289.6.7.3

4.11.4 Liner Material Compatibility Assessment

The leachate barrier components of the Encapsulation Cell and Leachate Evaporation Pond liner systems will be exposed to Stabilised APCR leachate and Concentrated Stabilised APCR Leachate respectively for prolonged periods of time. The chemical characteristics of Stabilised APCR leachate and Concentrated Stabilised APCR leachate are currently unknown and assessment of compatibility of these leachates with liner materials has not been completed as part of this reference design.

Therefore, as part of ongoing design development, an assessment of Encapsulation Cell and Evaporation Pond liner materials compatibility with expected leachates should be undertaken to ensure proposed liner materials are compatible and not likely to be adversely effected or suffer reduced service life. The assessment should include literature review and laboratory compatibility testing.

Laboratory testing should be undertaken with samples of liner materials representative of that proposed to be installed and either a sample of Stabilised APCR leachate from site specific APCR stabilisation trials or a synthetic leachate prepared based on anticipated Stabilised APCR leachate composition.

For the leachate evaporation pond liner, Concentrated APCR Leachates, of approximately 10 to 20 times contaminant concentration of Stabilised APCR leachate and of appropriate pH, is likely suitable for the compatibility testing and a concentrated leachate should be prepared for compatibility testing of Evaporation Pond Liner materials.

Compatibility assessment should be repeated if differing specific products are proposed to be installed (such as in later cell expansions or pond liner replacements) compared to the specific products tested to ensure that installed products are compatible.

4.11.4.1 Encapsulation Cell Geomembrane

Compatibility testing for the Encapsulation Cell Geomembranes (Primary and Secondary) shall involve:

- 1) Testing samples for key properties prior to immersion in APCR leachate; then
- 2) Immersing samples in APCR leachate for 90 days at three different temperatures; then
- 3) Testing samples for key properties following immersion in APCR leachate.

The compatibility testing for the Encapsulation Cell Geomembrane will provide results that can be extrapolated, using polymer science principles, to estimate the potential degradation during the operational life of the encapsulation cell if in continuous contact with the leachate, and based on assumed liner temperature.

Key property testing for HDPE Geomembrane should at a minimum include tensile strength, Oxidation Induction Time and Stress Crack resistance (to failure). Other geomembrane material types, if proposed for use, may need to consider different material properties.

The geomembrane compatibility testing shall confirm that the proposed geomembrane service life is sufficient to maintain performance over the entire life of the landfill (including the operating and post-closure periods).

4.11.4.2 Encapsulation Cell GCL

Compatibility testing for the Encapsulation Cell GCL involves assessing the GCL permeability through:

- Hydrating and consolidating samples in APCR leachate prior to permeating in APCR leachate.
- Hydrating and consolidating the samples in current Site Groundwater or a leachate created by deionised water leaching of representative sample of soil which the GCL is to be placed above prior to permeating in APCR leachate. (applicable to Secondary GCL only)

The compatibility testing for the GCL will allow assessment of whether the leachate contributes to a change in the permeability of the GCL. The use of the different leachate for hydration is intended to provide an indicative range of behaviour for assessment.

An assessment of the GCL leachate permeability results is to be made on the suitability of the resultant double composite liner system performance and compliance with 1 L /Ha/day maximum leakage rate through the dual barrier system under a maximum level of leachate of 300 millimetres over the upper liner, as required by the NSW EPA Landfill Guidelines. This assessment shall consider suitable geomembrane wrinkle size, frequency and length and number of geomembrane holes that may be normally expected.

It is noted that based on the results of the GCL compatibility testing, assessment of need for an additional clean soil layer between the Leak Detection Geocomposite and the Primary GCL (intended to provide a better GCL hydration moisture source compared to Stabilised APCR Leachate) should be undertaken and this layer should be included if maximum leakage rate compliance is not considered likely without the addition of this layer.

4.11.4.3 Evaporation Pond Geomembrane

Compatibility testing for the Evaporation Pond Geomembranes (Primary and Secondary) shall involve:

- 1) Testing samples for key properties prior to immersion in Concentrated APCR leachate; then
- 2) Immersing samples in Concentrated APCR leachate for 90 days at three different temperatures; then
- 3) Testing samples for key properties following immersion in Concentrated APCR leachate.

The compatibility testing for the Encapsulation Cell Geomembrane will provide results that can be extrapolated, using polymer science principles, to estimate the potential degradation during the operational life of the encapsulation cell if in continuous contact with the leachate, and based on assumed nominal primary Geomembrane operating temperature.

Key property testing for HDPE Geomembrane should at a minimum include tensile strength, Oxidation Induction Time and Stress Crack resistance (to failure). Other geomembrane material types, if proposed for use, may need to consider different material properties.

It is noted that service life may be predicted that is less than the operational life of the encapsulation cell, indicating that the pond liner materials may need to be periodically replaced. Evaporation Pond liner replacement schedules should consider the results of the compatibility testing.

5.0 SAFETY IN DESIGN

Key safety in design (SID) considerations identified for the Encapsulation Cell reference design are provided in Table 23 below:

Table 23: Key SID Considerations

Project Phase	Key SID Considerations
Construction	Contamination – potentially exists for presence of contaminated soils, sediments and groundwater during Encapsulation Cell construction
	Flooding – Inundation of the Encapsulation Cell footprint is possible.
	Civil construction hazards
	Geosynthetic lining system installation hazards
	Material Haulage – large quantities of general fill and other materials are anticipated to be imported by road transport to the site.
	Batter slopes – Maximum batter slope of 3H:1V is proposed for fill batters to reduce hazard
	Interface with adjoining APCr waste fill placement and waste filling operations during progressive cell extensions.
Operation	Release of contaminated material (solid, liquid, gas/dust)
	Waste material stability- Detailed filling plan to be developed for waste filling operations.
	Worker exposure to contaminated/hazardous materials
	Construction Plant Hazards
	Progressive capping – interaction of workers with waste filling operations
	Progressive capping – Construction hazards
	Flooding –Inundation of the Encapsulation Cell footprint is possible.
	Drowning risk in Leachate Dams and other water storages.
Closure and Post Closure	Civil construction hazards
	Geosynthetic lining system installation hazards
	Drowning risk in leachate dams and other water storages
	Release of contaminated material (solid, liquid, gas/dust)

Project Phase	Key SID Considerations
	Impact to future site users
	Long term waste landform stability

A SID risk register for the reference Encapsulation Cell design is provided in Appendix C, including design measures implemented to reduce hazards and residual hazards.

SID should be reassessed and discussed at each stage of ongoing design development and the SID risk register updated. The SID risk register should be communicated to all parties involved in the construction, operation closure and post closure of the Encapsulation Cell.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Golder has developed a reference design for a Restricted Solid Waste landfill cell (Encapsulation Cell) for landfill disposal of Air Pollution Control residue from the the Advanced Energy Recovery Centre (ARC) at Veolia's Woodlawn Eco-Precinct in NSW.

The Encapsulation Cell reference design has a footprint area of 11.9 ha and contains approximately 1.5 million m³ of airspace for waste and cover materials. This provides sufficient volume to receive waste from the ARC for 25 years of operation. The reference design has been developed to be compliant with the Landfill Guideline minimum standards, including a double composite geomembrane-GCL lining system with a leak detection system.

Reference Design Drawings for the Encapsulation Cell are provided in Appendix A.

Primary Leachate Drainage from the Encapsulation Cell will be through a leachate collection system installed above the primary lining system which includes a drainage aggregate blanket with perforated leachate collection pipes draining to a sump constructed at the low point of each sub cell. Leachate will be extracted from the sumps through side wall risers via pumping. The extracted leachate will be pumped to a leachate evaporation pond for disposal by evaporation.

Substantial volumes of fill may be required for construction, application of daily and intermediate cover, and final capping of the Encapsulation Cell. It is understood that fill materials will be imported to site from offsite sources as required to make up any deficit of available onsite fill materials. Consideration should be given by Veolia to potential applicability of waste levy to imported fill materials used in construction, operation and capping as the potential waste levy payable on imported materials may be sizeable.

There is currently limited information regarding site conditions and existing ground levels within the footprint of the Encapsulation Cell. Additional site investigations and assessments will be required to inform ongoing design development of the Encapsulation Cell.

Key safety in design considerations have been identified in the Reference Design and these issues should be considered in ongoing design development and safety in design risks should be further assessed at each design stage.

The project SEARs require that the EIS include details of Encapsulation Cell design that demonstrate that the contaminants can be adequately managed. We consider that the Reference Design demonstrates that the Encapsulation Cell can adequately manage contaminants from placement of treated APCr material.

This Reference Design should form the basis for ongoing design development.

7.0 REFERENCES

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Signature Page

Golder Associates Pty Ltd



Gary Schmertmann
Principal Geotechnical Engineer

AM/GS/ds

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[https://golderassociates.sharepoint.com/sites/142538/project files/6 deliverables/21455895-007-r-apcr encapsulation cell concept report/rev2/21455895-007-r-rev2-encapsulation cell design report.docx](https://golderassociates.sharepoint.com/sites/142538/project%20files/6%20deliverables/21455895-007-r-apcr%20encapsulation%20cell%20concept%20report/rev2/21455895-007-r-rev2-encapsulation%20cell%20design%20report.docx)

APPENDIX A

Encapsulation Cell Reference Design Drawings

VEOLIA ENVIRONMENTAL SERVICES WOODLAWN ENCAPSULATION CELL REFERENCE DESIGN



SITE LOCATION PLAN
SCALE 1:25,000 m

DRAWING INDEX	
DRG. NO.	DRAWING TITLE
00288-Z-03-D00-0001	COVER SHEET
00288-Z-03-D01-0001	LOCALITY PLAN
00288-Z-03-D02-0001	GENERAL ARRANGEMENT
00288-C-03-D01-0002	BASE LINER & LEACHATE COLLECTION PLAN
00288-C-03-D01-0003	FINAL LANDFORM
00288-C-03-D01-0004	SURFACE WATER
00288-C-03-D08-0002	CROSS SECTIONS
00288-C-03-D03-0001	DETAILS - SHEET 1 OF 2
00288-C-03-D03-0002	DETAILS - SHEET 2 OF 2

NOTE(S)

- THESE NOTES APPLY TO ALL PROJECT DRAWINGS IN THE SET UNLESS NOTED OTHERWISE.
- ALL LEVELS ARE IN METRES TO AUSTRALIAN HEIGHT DATUM (AHD).
- ALL CO-ORDINATES ARE IN METRES TO MAP GRID AUSTRALIA (MGA, ZONE 55).
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- LOCATION AND DEPTH OF ALL SERVICES TO BE VERIFIED BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF WORKS.
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REFERENCE(S)

BASE SURVEY FROM INFORMATION PROVIDED FILE: ed-1-area-surface-tin.dxf, DATED 2021-06-21

LOCALITY PLAN AERIAL IMAGE DATED 04 APRIL 2021 SOURCED WITH PERMISSION FROM www.nearmap.com.au

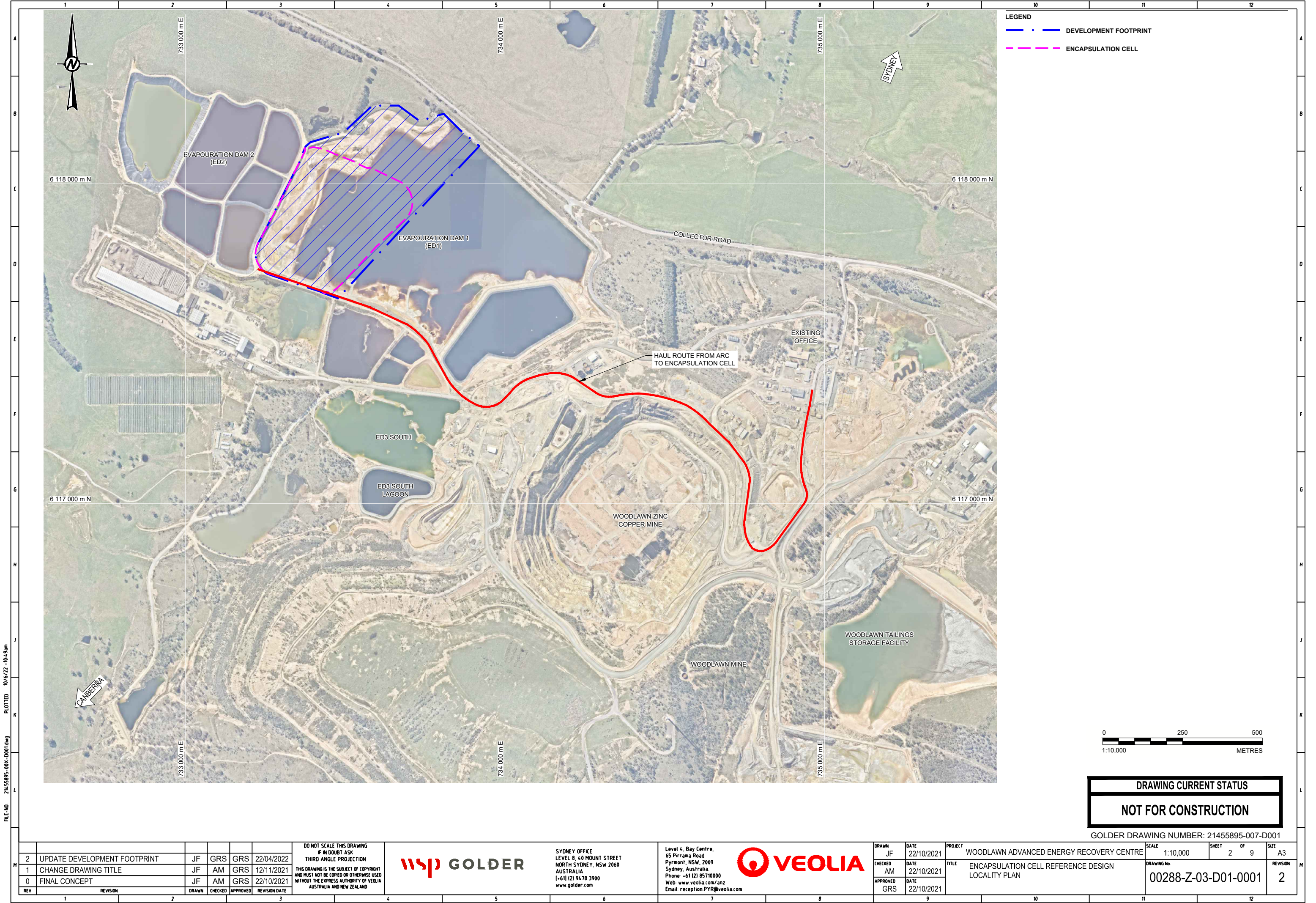


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REV	REVISION					DRAWN					CHECKED	APPROVED	REVISION DATE																	



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APPROVED	GRS	DATE	22/10/2021

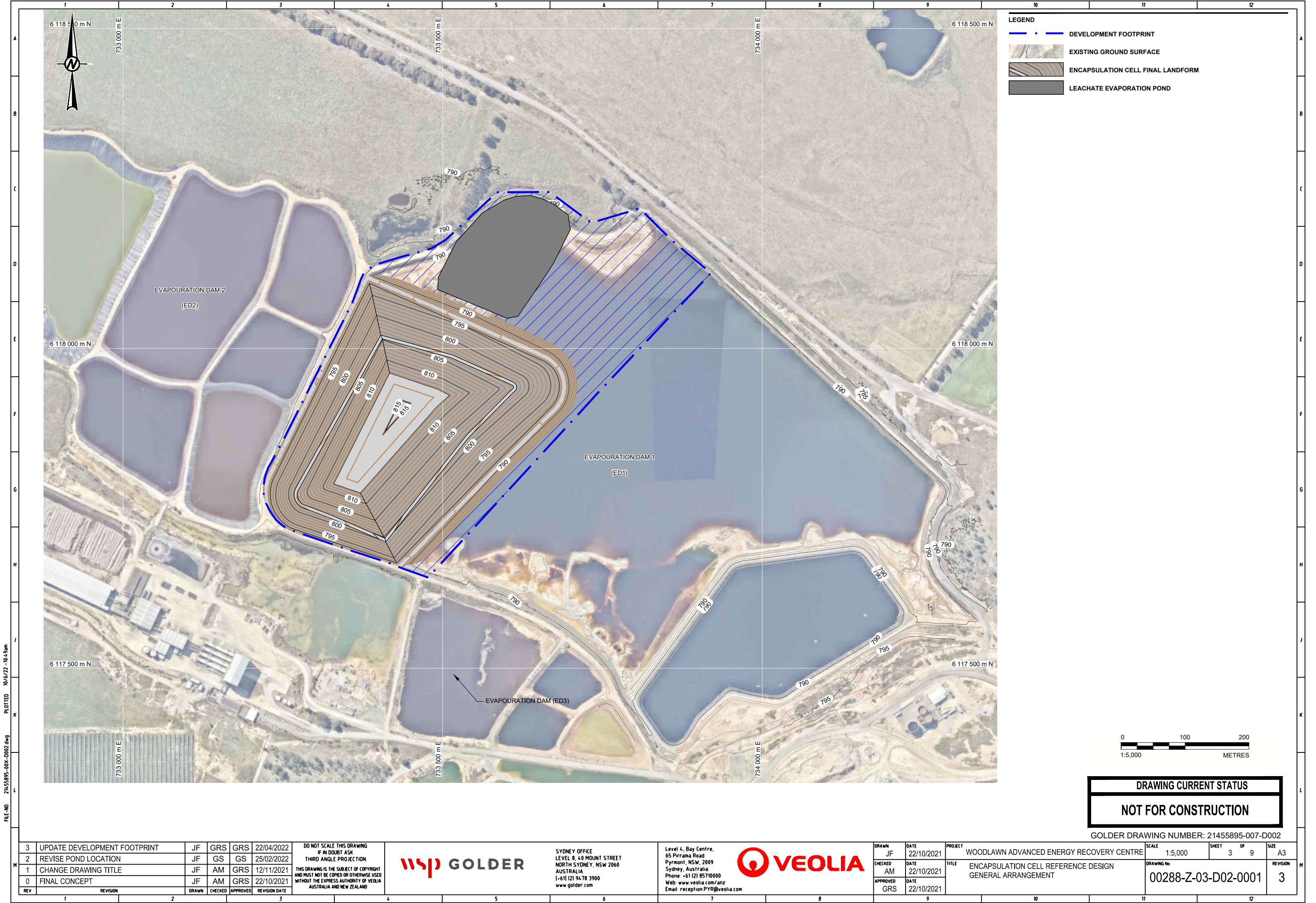
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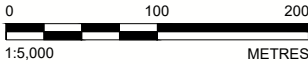
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GOLDER DRAWING NUMBER: 21455895-007-D001



LEGEND

- DEVELOPMENT FOOTPRINT
- EXISTING GROUND SURFACE
- ENCAPSULATION CELL FINAL LANDFORM
- LEACHATE EVAPORATION POND



DRAWING CURRENT STATUS

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GOLDER DRAWING NUMBER: 21455895-007-D002

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REV	REVISION	DRAWN	CHECKED	APPROVED	REVISION DATE

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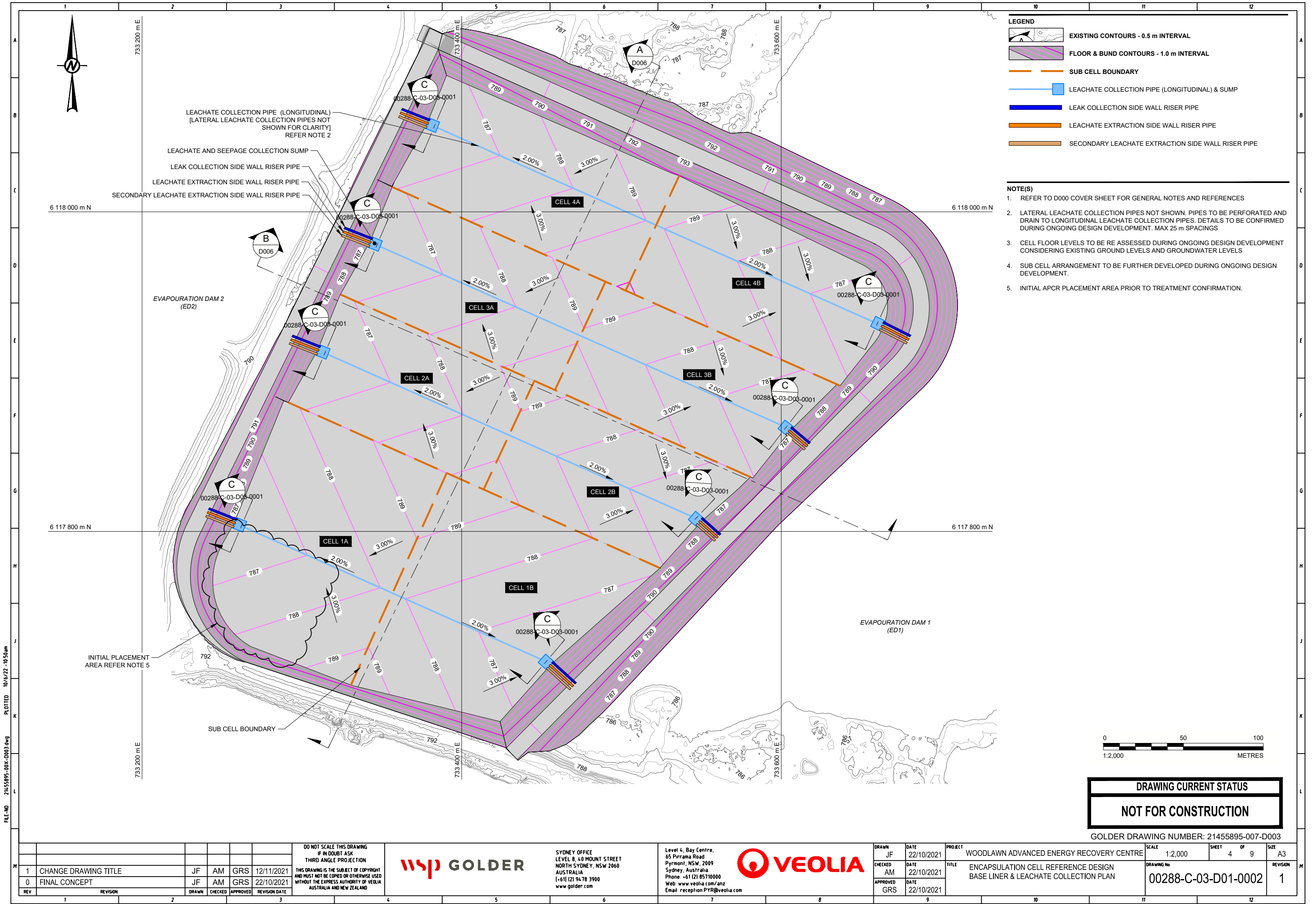
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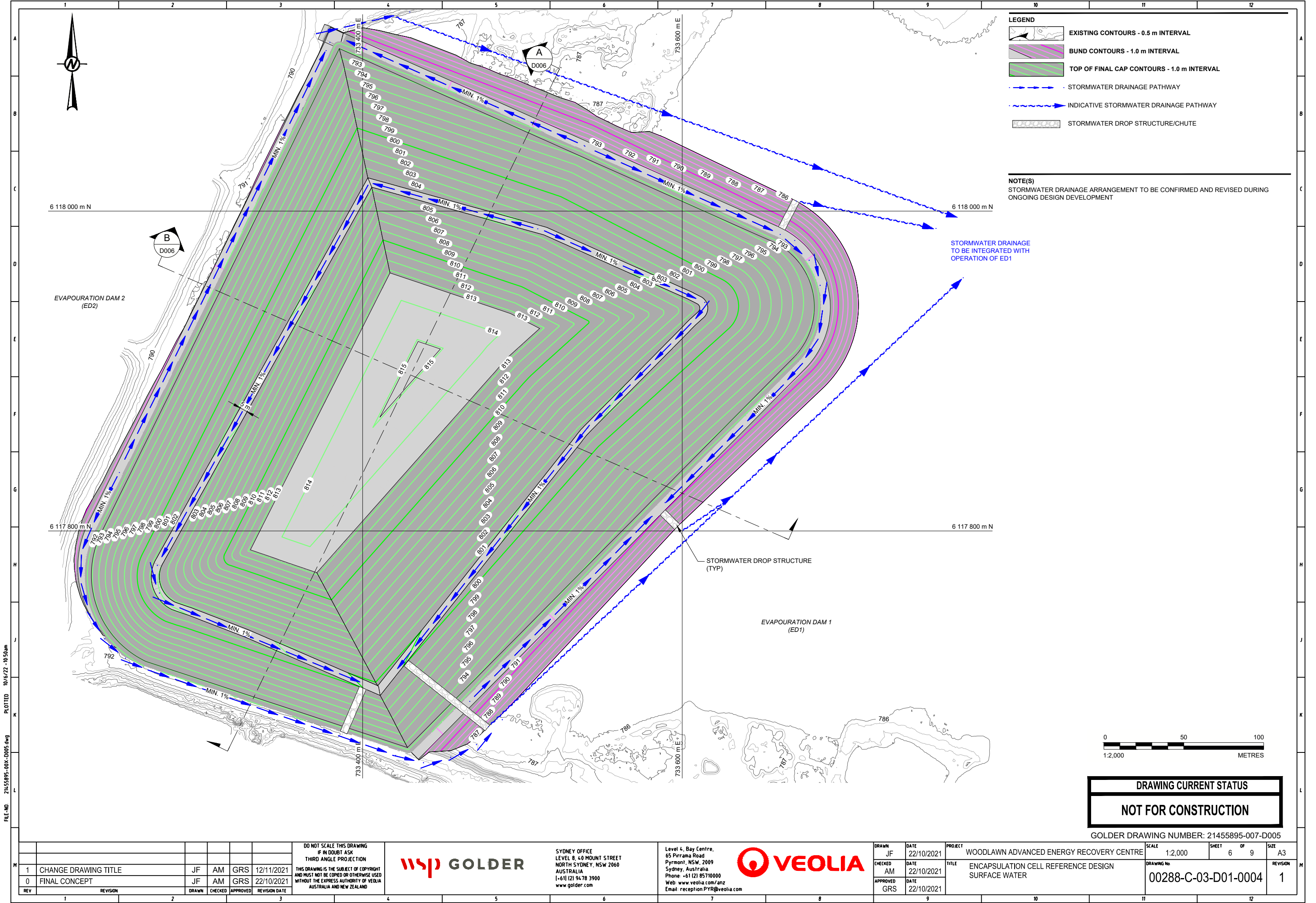
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TITLE	ENCAPSULATION CELL REFERENCE DESIGN GENERAL ARRANGEMENT

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DRAWING No						REVISION	
00288-Z-03-D02-0001						3	



FILE-NO. 21455895-007-D003.dwg PLOTTED 10/6/22 - 10:50am



LEGEND

- EXISTING CONTOURS - 0.5 m INTERVAL
- BUND CONTOURS - 1.0 m INTERVAL
- TOP OF FINAL CAP CONTOURS - 1.0 m INTERVAL
- STORMWATER DRAINAGE PATHWAY
- INDICATIVE STORMWATER DRAINAGE PATHWAY
- STORMWATER DROP STRUCTURE/CHUTE

NOTE(S)

STORMWATER DRAINAGE ARRANGEMENT TO BE CONFIRMED AND REVISED DURING ONGOING DESIGN DEVELOPMENT



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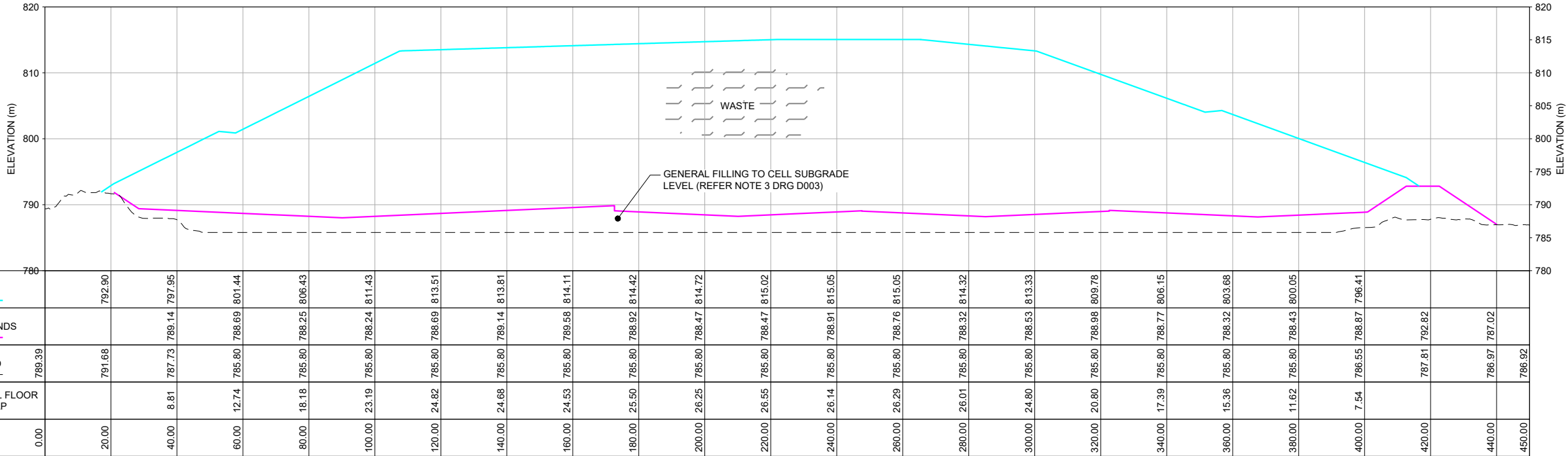
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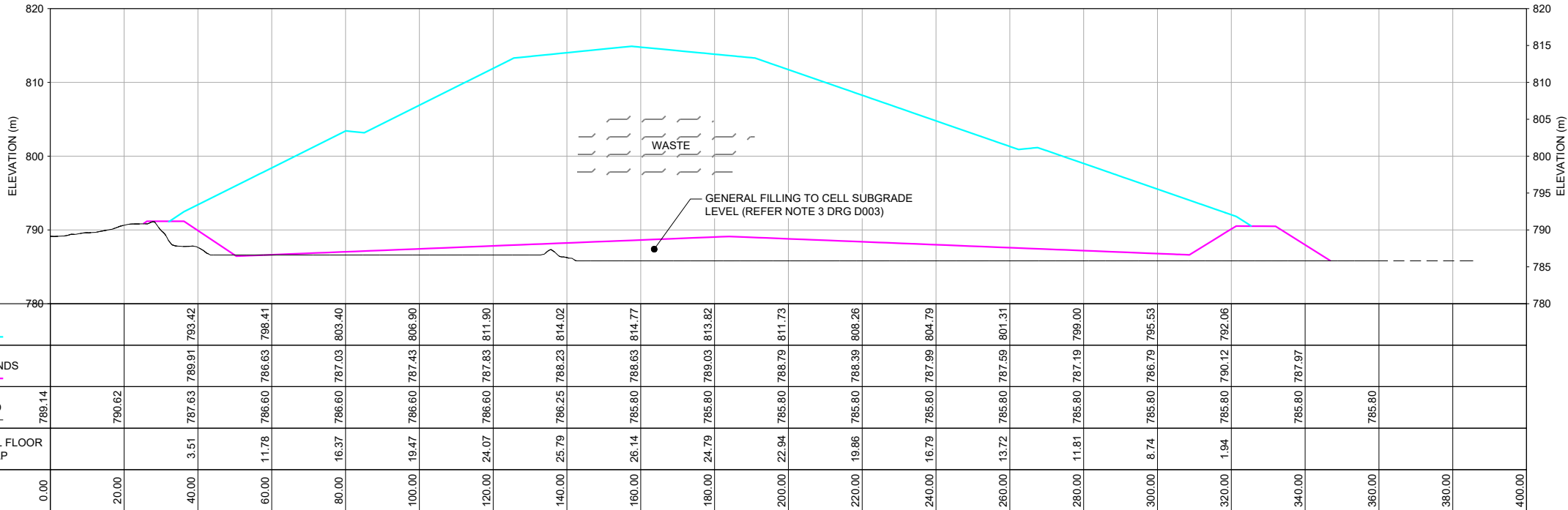
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	REV	REVISION	DRAWN	CHECKED	APPROVED	REVISION DATE	22/10/2021					00288-C-03-D01-0004	1						
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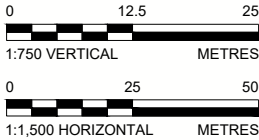
NOTE(S)
EXISTING GROUND LEVEL IN SOME AREAS REFLECTS WATER LEVEL IN ED1 POND RATHER THAN GROUND LEVEL. DESIGN TO BE UPDATED ONCE EXISTING GROUND LEVELS ARE KNOWN.



SCALE 1:1,500 m
VERT. SCALE 1:750 m
TYPICAL CROSS-SECTION
D003 D004



SCALE 1:1,500 m
VERT. SCALE 1:750 m
TYPICAL CROSS-SECTION
D003 D004



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APPROVED	GRS

DATE	22/10/2021
DATE	22/10/2021
DATE	22/10/2021

PROJECT WOODLAWN ADVANCED ENERGY RECOVERY CENTRE
TITLE ENCAPSULATION CELL REFERENCE DESIGN
CROSS SECTIONS

SCALE AS SHOWN

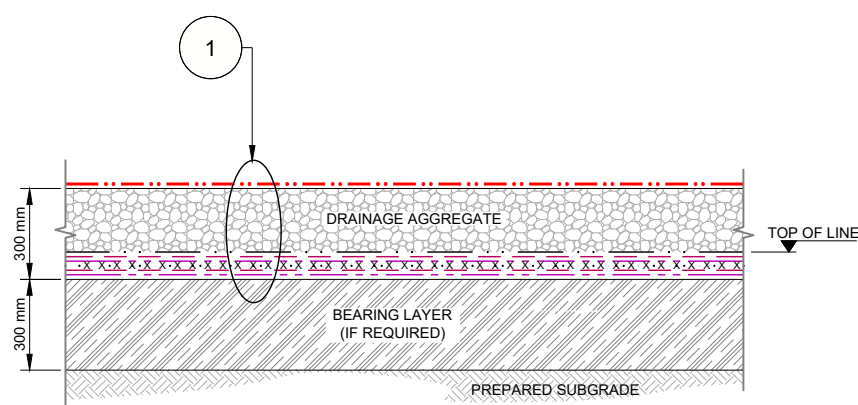
SHEET 7 OF 9

SIZE A3

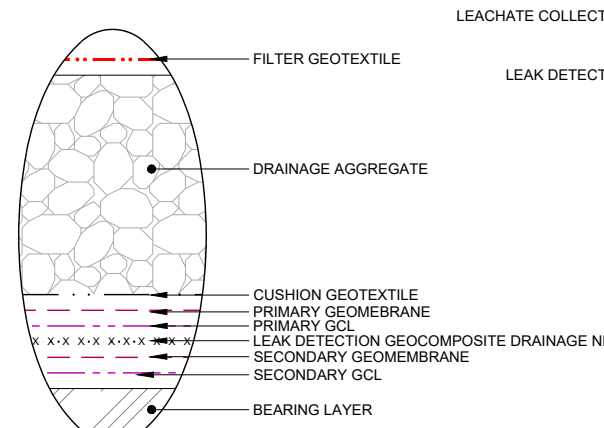
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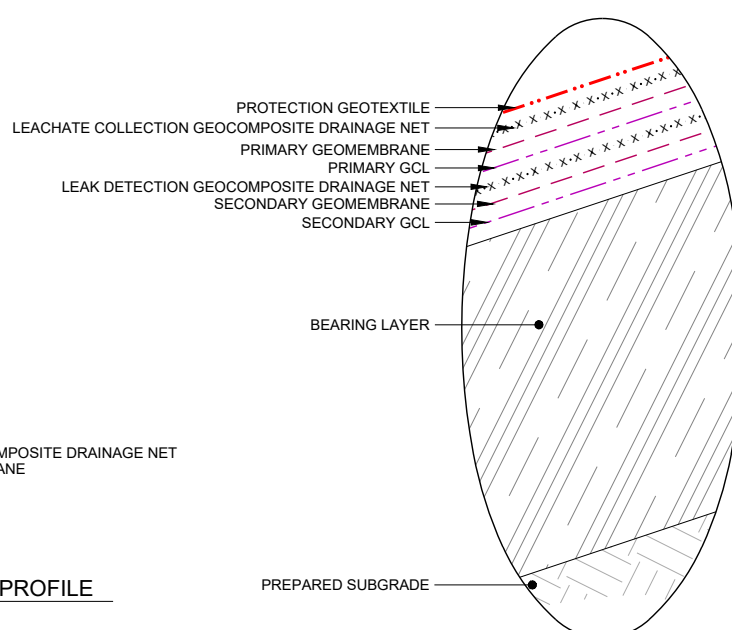
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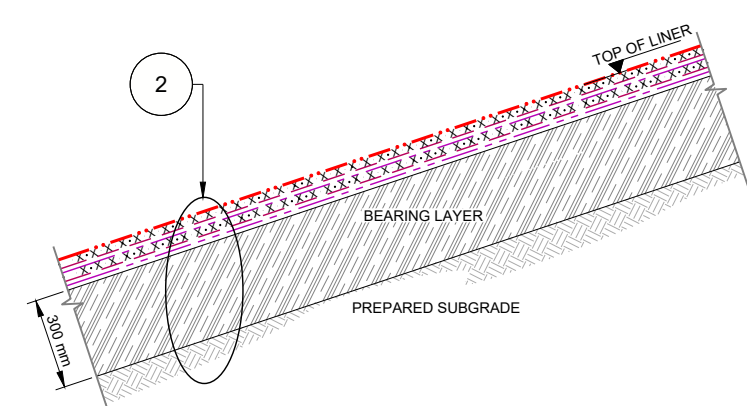
SCALE 1:10 m
D008
3 TYPICAL DETAIL - CELL BASE LINER



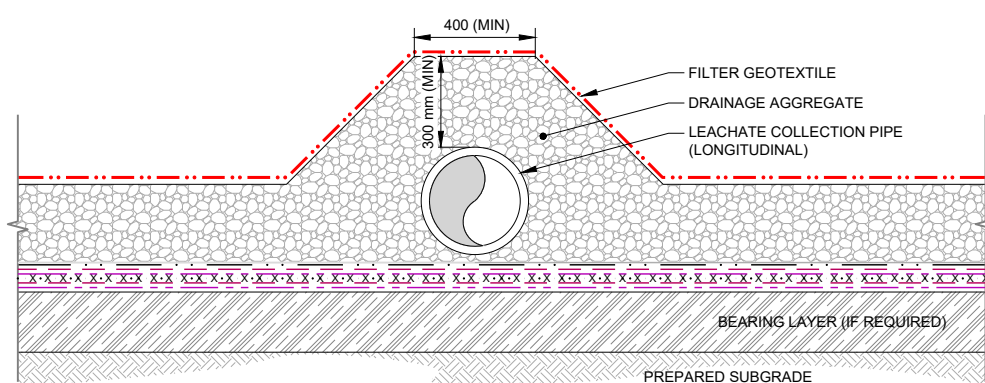
NOT TO SCALE
1 TYPICAL CELL BASE LINER PROFILE



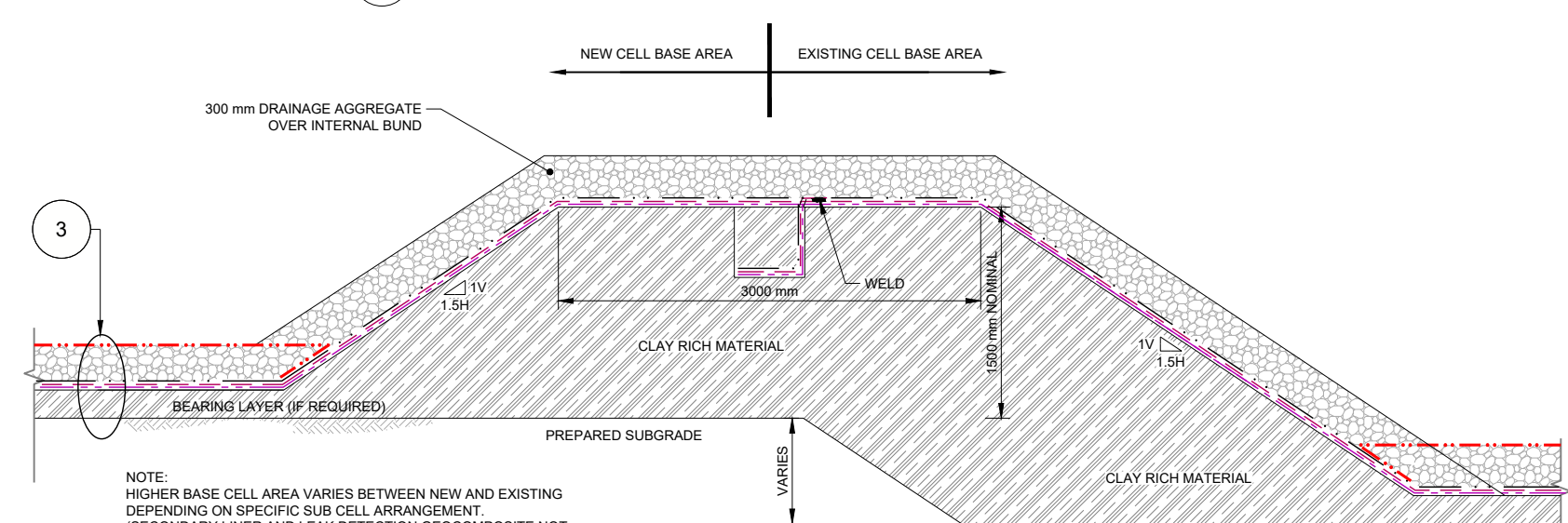
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SCALE 1:10 m
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4 TYPICAL DETAIL - CELL WALL LINER

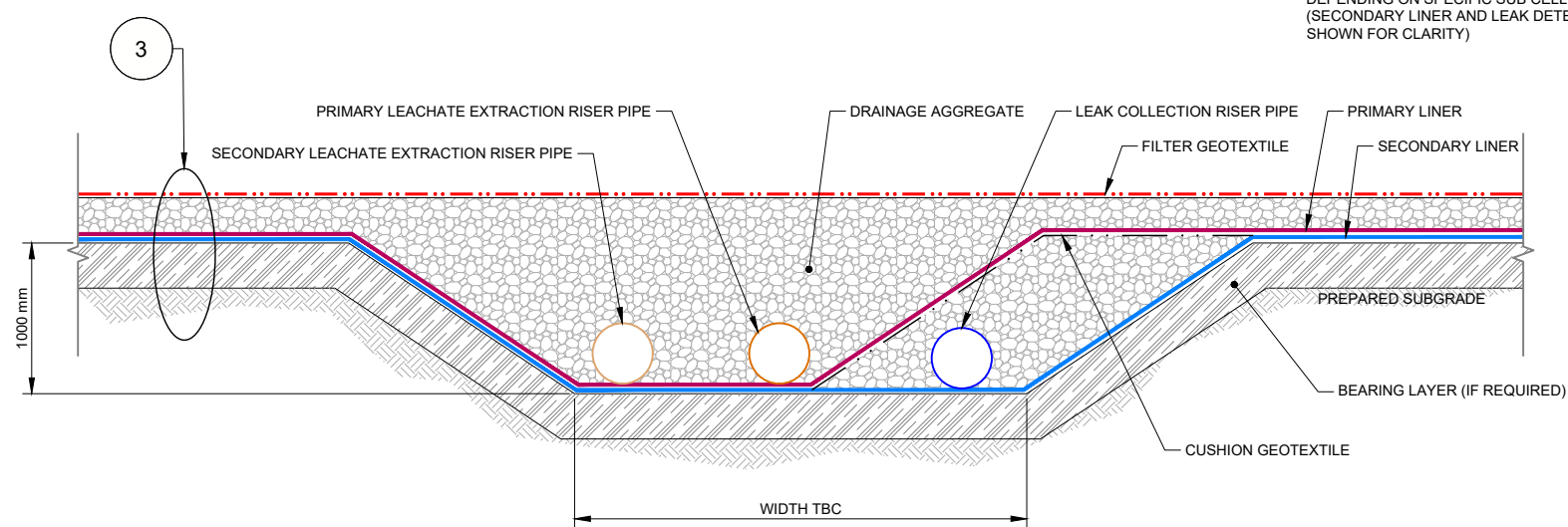


TYPICAL LONGITUDINAL LEACHATE COLLECTION PIPE SECTION
SCALE 1:25

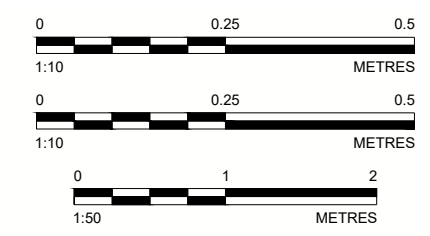


NOTE:
HIGHER BASE CELL AREA VARIES BETWEEN NEW AND EXISTING
DEPENDING ON SPECIFIC SUB CELL ARRANGEMENT.
(SECONDARY LINER AND LEAK DETECTION GEOCOMPOSITE NOT
SHOWN FOR CLARITY)

INTERNAL BUND AND LINER CONNECTION
SCALE 1:50



SCALE 1:50
C
D003
TYPICAL SECTION - SUMP



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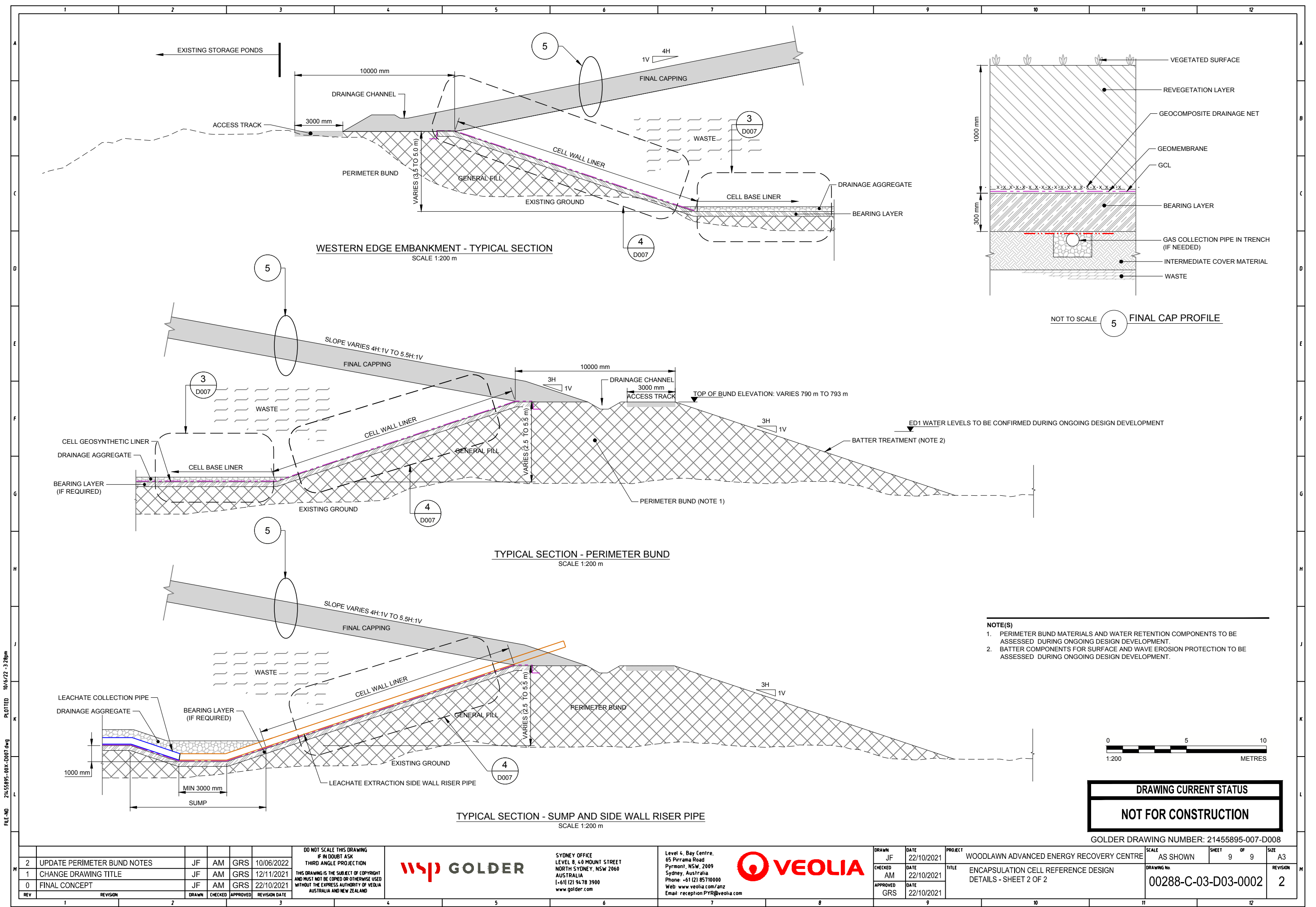
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PROJECT	WOODLAWN ADVANCED ENERGY RECOVERY CENTRE
TITLE	ENCAPSULATION CELL REFERENCE DESIGN DETAILS - SHEET 1 OF 2

SCALE	AS SHOWN	SHEET	8	OF	9	SIZE	A3
DRAWING No	00288-C-03-D03-0001					REVISION	1



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REV	REVISION	DRAWN	CHECKED	APPROVED	REVISION DATE
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APPROVED	GRS	DATE	22/10/2021

PROJECT	WOODLAWN ADVANCED ENERGY RECOVERY CENTRE
TITLE	ENCAPSULATION CELL REFERENCE DESIGN DETAILS - SHEET 2 OF 2

SCALE	AS SHOWN	SHEET	9	OF	9	SIZE	A3
DRAWING No.	00288-C-03-D03-0002					REVISION	2

APPENDIX B

Encapsulation Cell Leachate Water Balance

TECHNICAL MEMORANDUM

DATE 24 February 2022

Reference No. 21455895-009-M-Rev1

TO Promit Biswas, Veolia Environmental Services

CC

FROM Udeshini Pathirage, Gary Schmertmann

EMAIL gschmertmann@golder.com.au

WATER BALANCE ASSESSMENT FOR PROPOSED ENCAPSULATION CELL, FOR THE ADVANCED ENERGY RECOVERY CENTRE (ARC) AT WOODLAWN ECO-PRECINCT IN NSW

1.0 INTRODUCTION

Veolia Environmental Services (Veolia) has engaged Golder to prepare a reference landfill design for an Encapsulation Cell at the Advanced Energy Recovery Centre (ARC) at its Woodlawn Eco-Precinct in NSW that will be used for disposal of stabilised air pollution control residues (APCr) material from the ARC.

As part of the conceptual Encapsulation Cell design, a water balance study has been carried out to assess leachate generation and potential evaporation volumes from the proposed Encapsulation Cell.

2.0 WATER BALANCE MODEL

The water balance model has been prepared to assess the required capacity of a leachate evaporation pond to manage leachate generation from the Encapsulation Cell. The model considers leachate generation from direct rainfall infiltration on the Encapsulation Cell footprint, i.e., the leachate collected from both primary and secondary barrier systems, and direct rainfall and evaporation on the evaporation pond footprint. The water balance model has been developed as a Microsoft Excel spreadsheet using one-month time intervals for a total period of 33 years.

The water balance model does not include leachate generation from landfill areas other than the proposed Encapsulation Cell and assumes that no run-on or overflow of water occurs from adjacent areas into the Encapsulation Cell footprint.

2.1 Leachate generation for Encapsulation Cell

2.1.1 Leachate generation from rainfall infiltration on Encapsulation Cell

Weather data

Woodlawn Site Weather Station: We assessed the available onsite weather data for rainfall, pan evaporation, temperature, humidity and wind data from 2015 to date.

BOM: The closest Bureau of Meteorology (BOM) weather station to the site is Lake Bathurst weather station (BOM station number 70036) which is approximately 9 km away from site. Lake Bathurst weather station has rainfall data from 1935 to date and solar exposure data from 1990 to date, but does not have temperature, pan evaporation, humidity, and wind speed data.

SILO: SILO (Scientific Information for Land Owners) is an Australian climate database hosted by Queensland Government and BOM, and sponsored by the Land and Water Resources Research and Development Corporation. SILO datasets are generated by post-processing raw observational data from BOM weather stations and other providers. These datasets are spatially distributed in a gridded raster that covers large areas of the country, including the Woodlawn vicinity. The closest SILO grid point to the site was selected to extract daily weather data for the period 1950 to 2020.

The SILO dataset and the Woodlawn onsite weather data were compared for the time period where onsite data was available. The comparison indicated that rainfall and pan evaporation data had a very similar trend and differed by only a small regression factor (rainfall SILO/Onsite= 1.025; pan evaporation SILO/Onsite= 0.962). Therefore, the daily SILO rainfall and pan evaporation data was corrected by the factors indicated to reflect onsite weather data and was used for the infiltration and water balance modelling.

Rainfall

NSW EPA Environmental Guidelines for solid waste landfill (2nd Ed. 2016), referred to as the NSW Landfill Guidelines, states the water balance model should use historical wet years similar to the 90th percentile rainfall.

Average annual rainfall extracted from SILO data for 1950-2020 was 729 mm and the 90th percentile rainfall was 976 mm. We have considered two time periods for the water balance calculation as below+

- Rainfall from 1969-2001 (33 years) – a data set with 19 years exceeding the average annual rainfall, 2 years exceeding the 90th percentile rainfall, 7 years exceeding the 80th percentile rainfall, and in which 7 of the first 10 years are above average rainfall years.
- Rainfall from 1988-2020 (33 years) – a more recent data set with 15 years exceeding the average annual rainfall, 4 years exceeding the 80th percentile rainfall, and in which 10 of the first 12 years are above average rainfall years.

These rainfall ranges are selected such that the starting years are above average rainfalls to reflect a high leachate generation before any type of cap is placed. We note from water balance model results that the more severe case scenario from the above two is the rainfall from 1969-2001 and have discussed results for that case in Section 2.4. Use of a long simulation period of 33 years reflected the long duration planned for progressive filling of the Encapsulation Cell (25 years) and also provided a long weather record to reduce the variability in water balance results that can occur over shorter simulation periods.

Infiltration and leachate collection model

The rate of leachate collection at the Encapsulation Cell dual barrier system was estimated using the Hydrologic Evaluation of Landfill Performance (HELP) version 3.95D modelling program. The HELP model requires surface capping system and base liner system details as model input. The range of expected surface capping types and their variation during landfill development is discussed further below.

For weather data, factored daily rainfall, daily temperature, daily solar radiation, average wind speed and quarterly humidity was input to the HELP model. The methodology for the HELP modelling is presented in Attachment A. The HELP model predicts daily values for leachate collection at the primary and secondary barrier systems. For input into the water balance model, monthly values outputted from HELP were used.

Capping types

Leachate generation arising from rainfall infiltration is expected to vary significantly with surface cap/cover type. In order to represent the expected range of surface cap/cover types present during the course of cell filling and operation, we have modelled three cap types (i.e., daily, intermediate and final), an active tipping area, and an area with no waste (i.e., bare leachate collection layer).

The runoff from 'no waste area' and active tipping area were considered as leachate and added to the leachate generation model.

The intermediate and daily cover were modelled as soil layers with thickness of 300 mm and 150 mm, respectively. Permeability values of 8×10^{-8} and 2×10^{-7} m/s, respectively, have been assumed for these soils with the presumption that landfill operations will include that cover areas will be regularly inspected and any cracked or damaged areas will be re-rolled to maintain cover integrity.

We have carried out a sensitivity analysis to check the effect of permeability of daily cover and intermediate cover on the leachate generation volumes and noted that results are sensitive to cover permeability. For instance, if the intermediate cover permeability is increased by 10%, the total leachate generation is increased by 25% which directly influences evaporation pond sizing.

Attachment B provides geotechnical parameters used for all cap types.

Waste filling and capping phases

Waste filling in the Encapsulation Cell is discussed in the Encapsulation Cell Reference Design Report. Waste filling is divided into four cells where sequential waste filling occurs over 25 years and final capping is completed in the 26th year. Summary statements for the prevalence of the different capping types adopted for the water balance model are as outlined below.

- No Waste Area – ranges up to 5,800 m² at the start of filling in each cell; then returns to zero after 3-4 years; then increases at start of filling in subsequent cell; average value is 800 m² over the 25-year Encapsulation Cell operation
- Active Tipping Area – near constant value of 1100 to 1200 m² over the 25-year Encapsulation Cell operation
- Daily Cover Area – reaches near constant value of approximately 6,000 m² soon after the start of filling in each cell; average value is 5,700 m² over the 25-year Encapsulation Cell operation
- Intermediate Cap Area – intermediate cap placement begins approximately 9 months after start of Encapsulation Cell operation; varies from 22,000 to 56,000 m² over years 5 to 25; reduces to zero when final capping is completed
- Final Capping Area – final capping placement begins approximately 12 years after the start of Encapsulation Cell operation; increases to 115,000 m² at the end of Encapsulation Cell operation (i.e., entire Encapsulation Cell has final capping)

2.2 Rainfall and evaporation on pond footprint

Pond rainfall and evaporation depends on pond geometry. For the water balance we have assumed a single pond with an approximately square bottom and 1V:3H side slopes with 2.5 m height, noting that a rectangular pond would give very similar performance to a square pond. Evaporation from the pond depends on the leachate surface area, which varies with leachate storage level due to the interior pond slopes and is calculated at every monthly time step.

In this water balance model, we considered a maximum allowable leachate ponding height to be 2 m (to provide a freeboard of 0.5 m) and determined that a pond base footprint area of 17,500 m² can satisfy this requirement. Therefore, Section 2.4 discusses leachate generation volumes corresponding to a pond base footprint area of 17,500 m². Please note that we have considered a range of pond footprints, i.e., the bottom area of the pond varying from 8,500 to 23,500 m², to assess sensitivity of footprint area to the maximum leachate height in the pond.

The direct rainfall on the leachate pond and evaporation from the pond was taken from the factored SILO rainfall and pan evaporation data discussed above in Section 2.1.1. Attachment C provides a monthly breakdown of the water balance calculation.

Evaporation pan factor

An evaporation pan factor, or pan factor, is used in the water balance model to adjust the magnitude of pan evaporation measured at a weather station to the magnitude of evaporation from a pond surface. Information relevant to pan factor is given below.

- The NSW Landfill Guidelines recommends a pan factor of 0.7 for leachate water balance calculations.
- Site specific information: A previous site memorandum, Woodlawn Bioreactor Facility Water Balance Performance Review, PS123866-WAT-MEM-Final, dated 9 April 2021 and prepared by WSP, discussed calibrated site pan evaporation values and adopted a pan factor of 1.1 for surface evaporation from the ED1 coffer dam because it has a black geomembrane lining system that promotes evaporation. As per the above report, a pan factor of 1.1 is an average calibrated value of 1.6 for shallow water and 0.6 for deep water in the ED1 cofferdam. We note that the anticipated average water depth in the Encapsulation Cell evaporation pond is relatively shallow, in the order of one metre, as indicated in Figure 1 below.
- Salinity: Evaporation is known to vary inversely with salinity. Salinity of Encapsulation Cell leachate held within the evaporation pond is uncertain and, further, would be expected to vary over time depending on evaporation pond management. In particular, if relatively high salinity is present in incoming leachate, then the pond may be arranged with sub-ponds and managed to develop high salinity in limited sub-pond areas. Overall, the effect of salinity is uncertain but could potentially result in a lower average pan factor being achieved than in the site-specific information noted above.

Based on this information, a pan factor of 0.7 has been used in the water balance calculations (refer Section 2.4) because this value is considered reasonably conservative for the Encapsulation Cell evaporation pond and is consistent with NSW landfill Guidelines.

2.3 1 in 25-year 24-hour duration storm event

As a requirement of the NSW Landfill Guidelines, a leachate collection pond should sufficient freeboard to accept 1 in 25-year 24-hour duration storm event to ensure no overflowing. The volume of water generated by a 1 in 25 year 24-hour duration storm event was calculated to assess the capacity of existing leachate pond using a rainfall intensity of 6 mm/hour from the BOM 2016 Design Rainfall Data System (i.e., 144 mm for 24 hours). The resulting value for a pond base footprint area of 17,500 m² with 2.5 m high, 3H:1V side slopes is 3124 m³ (refer Attachment C). This value is considered in the following section.

2.4 Modelling results

The water balance model was a monthly step model carried out for 33 years. The predicted monthly leachate generation volumes are given in Attachment C. The results discussed herein correspond to a pond base footprint area of 17,500 m², a pan factor of 0.7 and 33 years of simulation, that is from 1969-2001 in the water balance model.

A maximum leachate volume within the pond of 37,800 m³ was predicted corresponding to a maximum leachate height of 1.98 m in the pond. We note that this maximum leachate generation follows 6 consecutive years of above average annual rainfall events and takes place before the final cap of Cell 3 and 4 is placed (Figure 1).

1 in 25 year 24-hour storm event rainfall volume of 3124 m³ on the pond was added to the maximum cumulative leachate volume to account for the additional freeboard. The maximum leachate height in the pond including 1 in 25 year 24-hour storm event rainfall was 2.13 m.

Considering a base area of 17,500 m² with 2.5m high side slopes at 3H:1V, the total lined footprint area of the evaporation pond would be approximately 22,500 m² (approximately 150 m x 150 m).

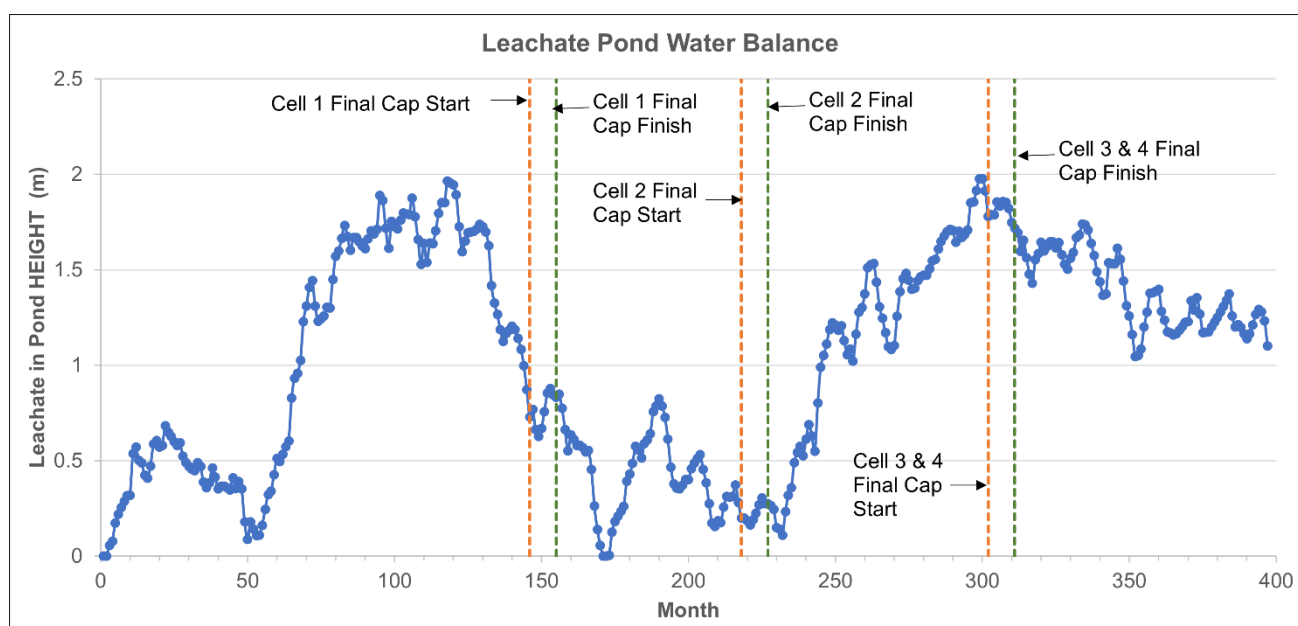


Figure 1: Leachate height in the pond (1969-2001 weather data)

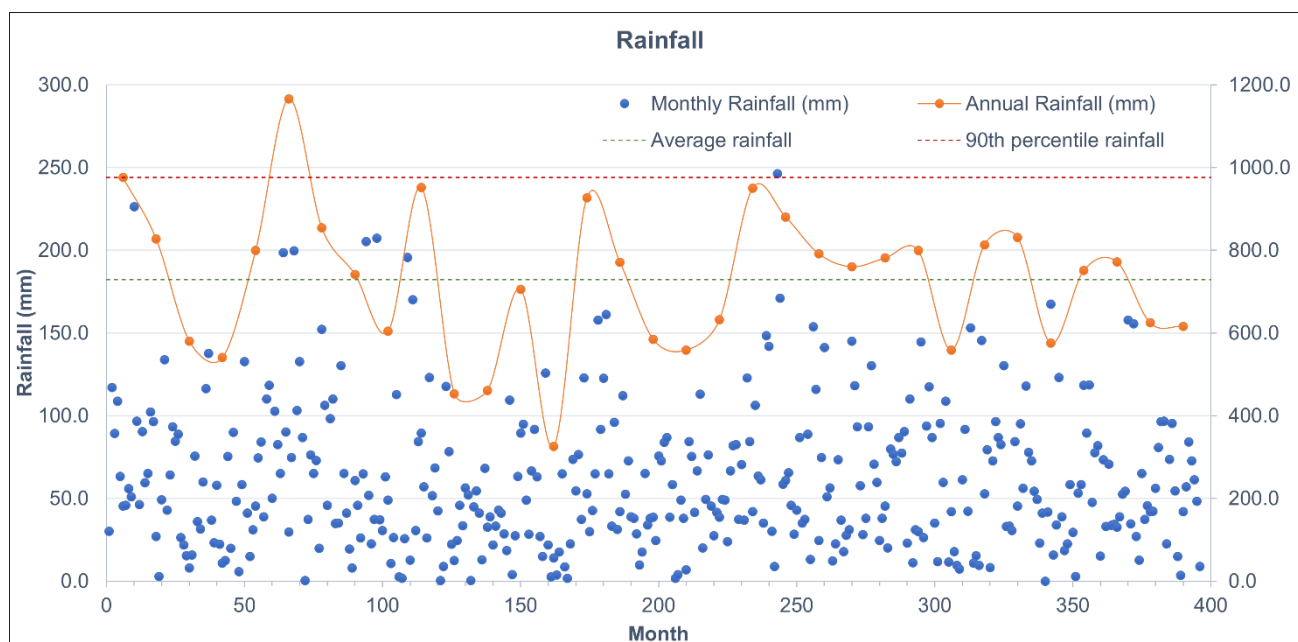


Figure 2: Monthly and annual rainfall used in the water balance model (1969-2001 weather data)

3.0 CONCLUSIONS AND RECOMMENDATIONS

Leachate generation for the proposed Encapsulation Cell was estimated using the HELP model with a 33-year simulation period. Five cap/cover types: 'no waste area', active area, daily cap, intermediate cap and final cap were considered based on a sequential waste filling and capping timeline. A water balance model was developed to assess the evaporation pond size requirement for the leachate generated from the proposed Encapsulation Cell.

For a pond base footprint area of 17,500 m² with 1V:3H side slopes with 2.5 m height and an evaporation pan factor of 0.7, the water balance model predicted a maximum leachate accumulation of 37,800 m³ in the pond storage. From water balance results, a pond storage with total 22,500 m² lined footprint area is sufficient to store leachate with a 0.5 m freeboard.

We confirm that the water balance model is sensitive to following factors:

- rainfall;
- evaporation pan factor; and
- permeability of daily and intermediate soil covers in the Encapsulation Cell.

We recommend that the water balance model should be updated during ongoing design development to consider planned Encapsulation Cell operations, candidate cover soil materials, planned evaporation pond operations and additional weather data. In addition, once constructed, the evaporation pond storage should be carefully monitored for an initial time period to calibrate actual leachate generation rates against HELP model predicted values and the water balance model (particularly pan factor) against actual evaporation pond levels.

GOLDER ASSOCIATES PTY LTD



Udeshini Pathirage
Civil Design Engineer



Gary Schmertmann
Principal Geotechnical Engineer

UP/GRS/hn

Attachments: A – HELP Model
 B – HELP Model Output
 C – Leachate Generation Calculation

[https://golderassociates.sharepoint.com/sites/142538/project files/6 deliverables/21455895-009-r-water balance report/rev1/21455895-009-m-rev1 encapsulation cell leachate water balance.docx](https://golderassociates.sharepoint.com/sites/142538/project%20files/6%20deliverables/21455895-009-r-water%20balance%20report/rev1/21455895-009-m-rev1%20encapsulation%20cell%20leachate%20water%20balance.docx)

ATTACHMENT A

HELP Model

1.0 MODELLING LEACHATE COLLECTION USING HELP MODEL

1.1 Background

The HELP modelling program was used to estimate the infiltration of rainfall into the landfill and collection of leachate at the landfill dual barrier system.

The HELP modelling software (version 3.95D) was developed by the United States EPA as a quasi-two-dimensional hydrological model used for conducting water balance analysis for landfills. The model estimates the amounts of runoff, evapotranspiration, and infiltration through the landfill capping layers and leachate collection at the landfill base.

The HELP model incorporates four primary mechanisms relating to water infiltration including:

- Runoff – rainfall that is captured by surface water management systems before infiltrating
- Evapotranspiration – water that enters the ground but is subsequently removed through evaporation from the ground surface or transpiration from vegetation
- Subsurface Drainage – water that is collected and removed by the subsurface drainage layer within the capping system
- Infiltration – water that seeps downward through the capping system and enters the landfill waste, therefore becoming leachate. The term infiltration rate refers to the percent of incident rainfall that becomes infiltration water/leachate.
- Leachate Collection – waste that seeps downward to the landfill base liner and is collected in the leachate collection layer.

The HELP model has been used to estimate the monthly leachate generation for the final cap, intermediate cap, daily cover, active waste tipping area and area before waste placement referred to as 'no waste area'.

1.2 Climate data

For this water balance assessment, weather data from SILO database was used. The closest grid point to the site was selected to extract weather data and compared against onsite weather data. The rainfall data from SILO and onsite had a similar trend and was different from only a small factor. Therefore, SILO rainfall data was factored to best match onsite rainfall data and was used for HELP model input. In addition to rainfall data, following weather data from SILO database was used as input into the HELP model;

- Temperature
- Solar radiation
- Humidity
- Wind speed.

The HELP model growing season was adjusted to suit the southern hemisphere climate variation for the Australian growing seasons (i.e., July to May).

1.3 HELP model profiles

Leachate collection from different cap/cover types were considered in the water balance model. They are as follows:

- No waste area: exposed leachate collection system before waste placement
- Active area: active tipping face where the waste is exposed

- Daily cover: a temporary soil cover required at the end of each day
- Intermediate cover: a temporary soil cover until the final cap is placed
- Final cap: Multi-layer capping system with low permeability sealing layer/s.

A dual barrier system leachate collection system is modelled as required by the NSW EPA Landfill Guidelines (2016) for restricted solid waste landfills. A surface slope of 2% is assumed for 'no waste area', active area, daily cover and intermediate cover, where a surface slope of 20% is assumed for the final cap.

For the final cap, leaf area index (LAI) corresponding to a good stand of grass (LAI = 3.5) is assumed with an evaporative zone depth of 200 mm. For other cover types, LAI corresponding to bare soil (LAI = 0) is assumed with an evaporative zone depth of 100 mm.

Table 1 summarises the HELP model profiles.

Table 1: Layer properties used for HELP model input

Type	Layers	Thickness (mm)	Saturated Hydraulic Conductivity (K_s) (m/s)
Base liner with dual barrier	Drainage layer ¹ – Gravel	300	3×10^{-3}
	HDPE geomembrane	1	2×10^{-15}
	GCL	6	3×10^{-11}
	Drainage layer ¹ - Geocomposite drainage net	5	1×10^{-1}
	HDPE geomembrane	1	2×10^{-15}
	GCL	6	3×10^{-11}
Active area	Waste – Municipal incinerator fly ash	2500	1×10^{-4}
	Base liner with dual barrier		
Daily cover	Sandy loam	150	2×10^{-7}
	Waste – Municipal incinerator fly ash	2500	1×10^{-4}
	Base liner with dual barrier		
Intermediate cover	Moderately compacted silt loam	300	8×10^{-8}
	Waste – Municipal incinerator fly ash	5000	1×10^{-4}
	Base liner with dual barrier		
Final cap	Topsoil	200	5.2×10^{-6}
	Subsoil	800	5.2×10^{-6}
	Drainage layer ² - Geocomposite drainage net	5	1×10^{-1}
	HDPE geomembrane	1	2×10^{-15}
	GCL	6	3×10^{-11}
	Bearing soil	300	7.8×10^{-9}
	Waste – Municipal incinerator fly ash	10000	1×10^{-4}
	Base liner with dual barrier		

- Notes:
- 1) Drainage layers at the base were modelled with a 3% slope and 25 m drainage length.
 - 2) Drainage layer at the final cap was modelled with a 20% slope and 70 m drainage length.
 - 3) Default K_s values provided in HELP software are used for all the layers except for daily cover and intermediate cover soil types.
 - 4) The presence of a cushion geotextile above the HDPE geomembrane was not modelled as it does not perform a significant hydraulic function.

2.0 HELP MODEL OUTPUT

For daily cover, intermediate cover and final cap, the monthly leachate collected at the primary and secondary drainage collection systems from HELP output were added together and used to estimate leachate generation. For 'no waste area' and active area, runoff is also added to leachate collected at the primary and secondary drainage collection systems for leachate generation calculations. The results are reported in the accompanying memorandum (ref: 21455895-009-M-Rev1). The HELP model outputs are provided in Attachment B and the leachate generation calculation in Attachment C.

ATTACHMENT B

HELP Model Output

```
*****
*****
**
**
**          HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE
**
**          HELP Version 3.95 D          (10 August 2012)
**                developed at
** Institute of Soil Science, University of Hamburg, Germany
**                based on
**          US HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)
**                DEVELOPED BY ENVIRONMENTAL LABORATORY
**                USAE WATERWAYS EXPERIMENT STATION
**          FOR USEPA RISK REDUCTION ENGINEERING LABORATORY
**
**
*****
```

```
*****
TITLE:  Veolia Woodlawn ARC
*****
```

```
*****
WEATHER DATA SOURCES
-----
```

```
NOTE:  PRECIPITATION DATA FOR      Woodlawn      NSW
       WAS ENTERED FROM A TEXT FILE.
```

```
NOTE:  TEMPERATURE DATA FOR      Woodlawn      NSw
       WAS ENTERED FROM A TEXT FILE.
```

```
NOTE:  SOLAR RADIATION DATA FOR      Woodlawn      NSW
       WAS ENTERED FROM A TEXT FILE.
```

```
'No Waste Area'
```

```
*****
LAYER DATA      1
-----
```

```
VALID FOR  33 YEARS
```

```
NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER
       WERE SPECIFIED BY THE USER.
```

```
LAYER  1
-----
```

```
TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER  21
```

```
THICKNESS      =      30.00    CM
POROSITY        =      0.3970 VOL/VOL
FIELD CAPACITY  =      0.0320 VOL/VOL
```

WILTING POINT = 0.0130 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.0300 VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.= 0.3000 CM/SEC
SLOPE = 3.00 PERCENT
DRAINAGE LENGTH = 25.0 METERS

LAYER 2

TYPE 4 - FLEXIBLE MEMBRANE LINER

MATERIAL TEXTURE NUMBER 35

THICKNESS = 0.10 CM
EFFECTIVE SAT. HYD. CONDUCT.= 0.2000E-12 CM/SEC
FML PINHOLE DENSITY = 2.00 HOLES/HECTARE
FML INSTALLATION DEFECTS = 2.00 HOLES/HECTARE
FML PLACEMENT QUALITY = 4 - POOR

LAYER 3

TYPE 3 - BARRIER SOIL LINER

MATERIAL TEXTURE NUMBER 17

THICKNESS = 0.60 CM
POROSITY = 0.7500 VOL/VOL
FIELD CAPACITY = 0.7470 VOL/VOL
WILTING POINT = 0.4000 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.7500 VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.= 0.3000E-08 CM/SEC

LAYER 4

TYPE 2 - LATERAL DRAINAGE LAYER

MATERIAL TEXTURE NUMBER 20

THICKNESS = 0.50 CM
POROSITY = 0.8500 VOL/VOL
FIELD CAPACITY = 0.0100 VOL/VOL
WILTING POINT = 0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.0300 VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.= 10.00 CM/SEC
SLOPE = 3.00 PERCENT
DRAINAGE LENGTH = 25.0 METERS

LAYER 5

TYPE 4 - FLEXIBLE MEMBRANE LINER

MATERIAL TEXTURE NUMBER 35

THICKNESS = 0.10 CM
EFFECTIVE SAT. HYD. CONDUCT.= 0.2000E-12 CM/SEC
FML PINHOLE DENSITY = 2.00 HOLES/HECTARE
FML INSTALLATION DEFECTS = 2.00 HOLES/HECTARE
FML PLACEMENT QUALITY = 4 - POOR

LAYER 6

TYPE 3 - BARRIER SOIL LINER

MATERIAL TEXTURE NUMBER 17

139 THICKNESS = 0.60 CM
140 POROSITY = 0.7500 VOL/VOL
141 FIELD CAPACITY = 0.7470 VOL/VOL
142 WILTING POINT = 0.4000 VOL/VOL
143 INITIAL SOIL WATER CONTENT = 0.7500 VOL/VOL
144 EFFECTIVE SAT. HYD. CONDUCT.= 0.3000E-08 CM/SEC
145
146
147

148 *****

149
150 GENERAL DESIGN AND EVAPORATIVE ZONE DATA 1
151 -----

152
153 VALID FOR 33 YEARS
154
155

156 NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
157 SOIL DATA BASE USING SOIL TEXTURE #21 WITH BARE
158 GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND
159 A SLOPE LENGTH OF 75. METERS.
160

161 SCS RUNOFF CURVE NUMBER = 70.19
162 FRACTION OF AREA ALLOWING RUNOFF = 100.0 PERCENT
163 AREA PROJECTED ON HORIZONTAL PLANE = 1.0000 HECTARES
164 EVAPORATIVE ZONE DEPTH = 10.0 CM
165 INITIAL WATER IN EVAPORATIVE ZONE = 0.300 CM
166 UPPER LIMIT OF EVAPORATIVE STORAGE = 3.970 CM
167 FIELD CAPACITY OF EVAPORATIVE ZONE = 0.320 CM
168 LOWER LIMIT OF EVAPORATIVE STORAGE = 0.130 CM
169 SOIL EVAPORATION ZONE DEPTH = 10.0 CM
170 INITIAL SNOW WATER = 0.000 CM
171 INITIAL INTERCEPTION WATER = 0.000 CM
172 INITIAL WATER IN LAYER MATERIALS = 1.815 CM
173 TOTAL INITIAL WATER = 1.815 CM
174 TOTAL SUBSURFACE INFLOW = 0.00 MM/YR
175

176
177
178 *****

179
180 EVAPOTRANSPIRATION DATA 1
181 -----

182
183 VALID FOR 33 YEARS
184
185

186 NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
187 Woodlawn NSW
188 STATION LATITUDE = -35.00 DEGREES
189 MAXIMUM LEAF AREA INDEX = 0.00
190 START OF GROWING SEASON (JULIAN DATE) = 181
191 END OF GROWING SEASON (JULIAN DATE) = 151
192 EVAPORATIVE ZONE DEPTH = 10.0 CM
193 AVERAGE ANNUAL WIND SPEED = 19.00 KPH
194 AVERAGE 1ST QUARTER RELATIVE HUMIDITY = 69.2 %
195 AVERAGE 2ND QUARTER RELATIVE HUMIDITY = 78.0 %
196 AVERAGE 3RD QUARTER RELATIVE HUMIDITY = 76.4 %
197 AVERAGE 4TH QUARTER RELATIVE HUMIDITY = 72.8 %
198

199 *****
200 *****

201
202 MONTHLY TOTALS (MM) FOR YEAR 1969
203 -----

204
205 JAN/JUL FEB/AUG MAR/SEP APR/OCT MAY/NOV JUN/DEC
206 -----
207

208	PRECIPITATION	30.3	116.9	89.4	108.9	63.5	45.5
209		45.8	56.1	50.9	226.4	97.0	46.3
210							
211	RUNOFF	0.00	0.01	0.00	11.89	0.00	0.00
212		0.00	0.00	0.00	16.29	0.00	0.00
213							
214	POTENTIAL EVAPOTRANSPIRATION	200.96	146.54	134.82	82.83	51.02	38.94
215		45.78	64.03	77.70	118.44	138.19	176.66
216							
217	ACTUAL EVAPOTRANSPIRATION	8.56	25.15	22.11	13.30	11.28	14.96
218		13.74	17.06	31.87	23.75	48.89	13.07
219							
220	LATERAL DRAINAGE COLLECTED	23.044	87.568	60.215	94.971	36.237	46.522
221	FROM LAYER 1	32.056	38.889	19.145	114.485	116.059	35.340
222							
223	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
224	FROM LAYER 1 INTO L. 1	0.000	0.000	0.000	0.000	0.000	0.000
225							
226	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
227	LAYER 3	0.000	0.000	0.000	0.000	0.000	0.000
228							
229	LATERAL DRAINAGE COLLECTED	0.100	0.000	0.000	0.000	0.000	0.000
230	FROM LAYER 4	0.000	0.000	0.000	0.000	0.000	0.000
231							
232	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
233	FROM LAYER 4 INTO L. 4	0.000	0.000	0.000	0.000	0.000	0.000
234							
235	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
236	LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
237							

ANNUAL TOTALS FOR YEAR 1969

	MM	CU. METERS	PERCENT
	-----	-----	-----
245	PRECIPITATION	977.00	9770.002
246			100.00
247	RUNOFF	28.190	281.897
248			2.89
249	POTENTIAL EVAPOTRANSPIRATION	1275.914	12759.136
250			
251	ACTUAL EVAPOTRANSPIRATION	243.726	2437.260
252			24.95
253	DRAINAGE COLLECTED FROM LAYER 1	704.5312	7045.312
254			72.11
255	RECIRC. FROM LAYER 1 INTO L. 1	0.000000	0.000
256			0.00
257	PERC./LEAKAGE THROUGH LAYER 3	0.000739	0.007
258			0.00
259	AVG. HEAD ON TOP OF LAYER 2	3.1276	
260			
261	DRAINAGE COLLECTED FROM LAYER 4	0.1007	1.007
262			0.01
263	RECIRC. FROM LAYER 4 INTO L. 4	0.000000	0.000
264			0.00
265	PERC./LEAKAGE THROUGH LAYER 6	0.000007	0.000
266			0.00
267	AVG. HEAD ON TOP OF LAYER 5	0.0001	
268			
269	CHANGE IN WATER STORAGE	0.452	4.520
270			0.05
271	SOIL WATER AT START OF YEAR	18.150	181.498
272			
273	SOIL WATER AT END OF YEAR	18.602	186.019
274			
275	INTERCEPTION WATER AT START OF YEAR	0.000	0.000
276			

277	INTERCEPTION WATER AT END OF YEAR	0.000	0.000				
278							
279	SNOW WATER AT START OF YEAR	0.000	0.000	0.00			
280							
281	SNOW WATER AT END OF YEAR	0.000	0.000	0.00			
282							
283	ANNUAL WATER BUDGET BALANCE	0.0004	0.004	0.00			
284							
285	*****						
286	*****						
287							
288	MONTHLY TOTALS (MM) FOR YEAR 1970						
289	-----						
290							
291		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
292		-----	-----	-----	-----	-----	-----
293							
294	PRECIPITATION	90.5	59.7	65.1	102.3	96.4	27.2
295		3.0	49.3	134.0	43.0	64.1	93.4
296							
297	RUNOFF	0.00	0.00	0.00	0.18	0.05	0.00
298		0.00	0.00	0.00	0.00	0.00	0.00
299							
300	POTENTIAL EVAPOTRANSPIRATION	158.72	150.68	131.02	80.17	50.80	40.66
301		46.49	57.86	75.10	131.09	140.82	171.65
302							
303	ACTUAL EVAPOTRANSPIRATION	28.63	19.51	23.43	20.68	12.62	16.90
304		3.00	13.94	39.52	19.15	26.38	33.93
305							
306	LATERAL DRAINAGE COLLECTED	63.724	37.855	42.018	82.923	81.341	13.201
307	FROM LAYER 1	0.000	35.341	91.693	26.608	37.760	55.943
308							
309	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
310	FROM LAYER 1 INTO L. 1	0.000	0.000	0.000	0.000	0.000	0.000
311							
312	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
313	LAYER 3	0.000	0.000	0.000	0.000	0.000	0.000
314							
315	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
316	FROM LAYER 4	0.000	0.000	0.000	0.000	0.000	0.000
317							
318	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
319	FROM LAYER 4 INTO L. 4	0.000	0.000	0.000	0.000	0.000	0.000
320							
321	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
322	LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
323							
324	*****						
325							
326	ANNUAL TOTALS FOR YEAR 1970						
327	-----						
328							
329		MM		CU. METERS		PERCENT	
330		-----		-----		-----	
331	PRECIPITATION	828.00		8280.000		100.00	
332							
333	RUNOFF	0.229		2.288		0.03	
334							
335	POTENTIAL EVAPOTRANSPIRATION	1235.073		12350.733			
336							
337	ACTUAL EVAPOTRANSPIRATION	257.671		2576.711		31.12	
338							
339	DRAINAGE COLLECTED FROM LAYER 1	568.4072		5684.072		68.65	
340							
341	RECIRC. FROM LAYER 1 INTO L. 1	0.000000		0.000		0.00	
342							
343	PERC./LEAKAGE THROUGH LAYER 3	0.000570		0.006		0.00	
344							
345	AVG. HEAD ON TOP OF LAYER 2	2.5087					

346							
347	DRAINAGE COLLECTED FROM LAYER 4	0.0006	0.006	0.00			
348							
349	RECIRC. FROM LAYER 4 INTO L. 4	0.000000	0.000	0.00			
350							
351	PERC./LEAKAGE THROUGH LAYER 6	0.000007	0.000	0.00			
352							
353	AVG. HEAD ON TOP OF LAYER 5	0.0000					
354							
355	CHANGE IN WATER STORAGE	1.692	16.923	0.20			
356							
357	SOIL WATER AT START OF YEAR	18.602	186.019				
358							
359	SOIL WATER AT END OF YEAR	20.294	202.942				
360							
361	INTERCEPTION WATER AT START OF YEAR	0.000	0.000				
362							
363	INTERCEPTION WATER AT END OF YEAR	0.000	0.000				
364							
365	SNOW WATER AT START OF YEAR	0.000	0.000	0.00			
366							
367	SNOW WATER AT END OF YEAR	0.000	0.000	0.00			
368							
369	ANNUAL WATER BUDGET BALANCE	0.0001	0.001	0.00			
370							
371	*****						
372	*****						
373							
374	MONTHLY TOTALS (MM) FOR YEAR 1971						
375	-----						
376							
377		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
378		-----	-----	-----	-----	-----	-----
379							
380	PRECIPITATION	84.6	89.1	26.5	22.0	15.5	8.2
381		15.8	75.8	36.1	31.6	59.8	116.7
382							
383	RUNOFF	0.00	0.00	0.00	0.00	0.00	0.00
384		0.00	0.00	0.00	0.00	0.00	0.00
385							
386	POTENTIAL EVAPOTRANSPIRATION	166.79	134.69	129.98	80.18	52.54	39.41
387		42.11	60.23	85.62	135.21	135.07	166.98
388							
389	ACTUAL EVAPOTRANSPIRATION	38.50	43.30	11.66	15.56	5.46	5.43
390		3.08	21.72	19.95	13.41	24.27	46.05
391							
392	LATERAL DRAINAGE COLLECTED	37.060	58.100	11.457	9.830	9.034	4.043
393	FROM LAYER 1	8.053	53.126	21.058	18.904	23.318	66.927
394							
395	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
396	FROM LAYER 1 INTO L. 1	0.000	0.000	0.000	0.000	0.000	0.000
397							
398	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
399	LAYER 3	0.000	0.000	0.000	0.000	0.000	0.000
400							
401	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
402	FROM LAYER 4	0.000	0.000	0.000	0.000	0.000	0.000
403							
404	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
405	FROM LAYER 4 INTO L. 4	0.000	0.000	0.000	0.000	0.000	0.000
406							
407	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
408	LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
409							
410	*****						
411							
412	ANNUAL TOTALS FOR YEAR 1971						
413	-----						
414							

	MM	CU. METERS	PERCENT			
	-----	-----	-----			
PRECIPITATION	581.70	5817.001	100.00			
RUNOFF	0.000	0.000	0.00			
POTENTIAL EVAPOTRANSPIRATION	1228.806	12288.061				
ACTUAL EVAPOTRANSPIRATION	248.393	2483.931	42.70			
DRAINAGE COLLECTED FROM LAYER 1	320.9103	3209.104	55.17			
RECIRC. FROM LAYER 1 INTO L. 1	0.000000	0.000	0.00			
PERC./LEAKAGE THROUGH LAYER 3	0.000323	0.003	0.00			
AVG. HEAD ON TOP OF LAYER 2	1.4234					
DRAINAGE COLLECTED FROM LAYER 4	0.0003	0.003	0.00			
RECIRC. FROM LAYER 4 INTO L. 4	0.000000	0.000	0.00			
PERC./LEAKAGE THROUGH LAYER 6	0.000006	0.000	0.00			
AVG. HEAD ON TOP OF LAYER 5	0.0000					
CHANGE IN WATER STORAGE	12.396	123.962	2.13			
SOIL WATER AT START OF YEAR	20.294	202.942				
SOIL WATER AT END OF YEAR	32.690	326.904				
INTERCEPTION WATER AT START OF YEAR	0.000	0.000				
INTERCEPTION WATER AT END OF YEAR	0.000	0.000				
SNOW WATER AT START OF YEAR	0.000	0.000	0.00			
SNOW WATER AT END OF YEAR	0.000	0.000	0.00			
ANNUAL WATER BUDGET BALANCE	0.0001	0.001	0.00			

MONTHLY TOTALS (MM) FOR YEAR 1972						

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
PRECIPITATION	137.8	37.3	23.4	57.9	22.4	10.9
	12.5	75.7	19.9	90.2	48.5	5.8
RUNOFF	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00
POTENTIAL EVAPOTRANSPIRATION	155.73	142.26	133.40	78.85	55.80	40.22
	47.25	63.29	98.41	124.94	151.74	194.09
ACTUAL EVAPOTRANSPIRATION	54.97	25.86	14.05	14.63	8.02	1.86
	9.99	24.39	11.22	31.46	40.65	5.00
LATERAL DRAINAGE COLLECTED	98.673	10.981	9.905	43.275	14.380	0.000
FROM LAYER 1	11.492	42.214	16.775	43.258	24.387	0.000
LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
FROM LAYER 1 INTO L. 1	0.000	0.000	0.000	0.000	0.000	0.000

484	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
485	LAYER 3	0.000	0.000	0.000	0.000	0.000	0.000
486							
487	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
488	FROM LAYER 4	0.000	0.000	0.000	0.000	0.000	0.000
489							
490	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
491	FROM LAYER 4 INTO L. 4	0.000	0.000	0.000	0.000	0.000	0.000
492							
493	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
494	LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 1972

	MM	CU. METERS	PERCENT
	-----	-----	-----
501			
502			
503	PRECIPITATION	542.30	5423.000
504			100.00
505	RUNOFF	0.000	0.000
506			0.00
507	POTENTIAL EVAPOTRANSPIRATION	1285.984	12859.844
508			
509	ACTUAL EVAPOTRANSPIRATION	242.101	2421.014
510			44.64
511	DRAINAGE COLLECTED FROM LAYER 1	315.3394	3153.395
512			58.15
513	RECIRC. FROM LAYER 1 INTO L. 1	0.000000	0.000
514			0.00
515	PERC./LEAKAGE THROUGH LAYER 3	0.000320	0.003
516			0.00
517	AVG. HEAD ON TOP OF LAYER 2	1.3794	
518			
519	DRAINAGE COLLECTED FROM LAYER 4	0.0003	0.003
520			0.00
521	RECIRC. FROM LAYER 4 INTO L. 4	0.000000	0.000
522			0.00
523	PERC./LEAKAGE THROUGH LAYER 6	0.000006	0.000
524			0.00
525	AVG. HEAD ON TOP OF LAYER 5	0.0000	
526			
527	CHANGE IN WATER STORAGE	-15.141	-151.411
528			-2.79
529	SOIL WATER AT START OF YEAR	32.690	326.904
530			
531	SOIL WATER AT END OF YEAR	17.549	175.492
532			
533	INTERCEPTION WATER AT START OF YEAR	0.000	0.000
534			
535	INTERCEPTION WATER AT END OF YEAR	0.000	0.000
536			
537	SNOW WATER AT START OF YEAR	0.000	0.000
538			0.00
539	SNOW WATER AT END OF YEAR	0.000	0.000
540			0.00
541	ANNUAL WATER BUDGET BALANCE	0.0000	0.000
542			0.00

MONTHLY TOTALS (MM) FOR YEAR 1973

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
549						
550						
551						
552	PRECIPITATION	58.3	133.1	41.2	15.2	31.2
						45.6

553		74.7	84.4	38.8	110.4	118.6	50.2
554							
555	RUNOFF	0.00	0.00	0.00	0.00	0.00	0.00
556		0.00	0.00	0.00	0.00	0.00	0.00
557							
558	POTENTIAL EVAPOTRANSPIRATION	197.17	134.95	135.62	81.62	57.01	39.99
559		47.93	61.19	92.26	118.35	143.84	177.07
560							
561	ACTUAL EVAPOTRANSPIRATION	27.08	50.73	22.08	9.22	10.63	19.89
562		29.90	30.97	20.83	34.79	52.41	14.47
563							
564	LATERAL DRAINAGE COLLECTED	31.177	78.765	16.092	6.267	27.731	24.645
565	FROM LAYER 1	45.397	53.524	18.309	75.127	61.906	16.342
566							
567	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
568	FROM LAYER 1 INTO L. 1	0.000	0.000	0.000	0.000	0.000	0.000
569							
570	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
571	LAYER 3	0.000	0.000	0.000	0.000	0.000	0.000
572							
573	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
574	FROM LAYER 4	0.000	0.000	0.000	0.000	0.000	0.000
575							
576	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
577	FROM LAYER 4 INTO L. 4	0.000	0.000	0.000	0.000	0.000	0.000
578							
579	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
580	LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
581							

ANNUAL TOTALS FOR YEAR 1973

	MM	CU. METERS	PERCENT
	-----	-----	-----
589 PRECIPITATION	801.70	8017.001	100.00
591 RUNOFF	0.000	0.000	0.00
593 POTENTIAL EVAPOTRANSPIRATION	1286.999	12869.994	
595 ACTUAL EVAPOTRANSPIRATION	323.002	3230.018	40.29
597 DRAINAGE COLLECTED FROM LAYER 1	455.2816	4552.815	56.79
599 RECIRC. FROM LAYER 1 INTO L. 1	0.000000	0.000	0.00
601 PERC./LEAKAGE THROUGH LAYER 3	0.000448	0.004	0.00
603 AVG. HEAD ON TOP OF LAYER 2	2.0218		
605 DRAINAGE COLLECTED FROM LAYER 4	0.0004	0.004	0.00
607 RECIRC. FROM LAYER 4 INTO L. 4	0.000000	0.000	0.00
609 PERC./LEAKAGE THROUGH LAYER 6	0.000007	0.000	0.00
611 AVG. HEAD ON TOP OF LAYER 5	0.0000		
613 CHANGE IN WATER STORAGE	23.416	234.161	2.92
615 SOIL WATER AT START OF YEAR	17.549	175.492	
617 SOIL WATER AT END OF YEAR	40.965	409.653	
619 INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
621 INTERCEPTION WATER AT END OF YEAR	0.000	0.000	

622						
623	SNOW WATER AT START OF YEAR	0.000	0.000	0.00		
624						
625	SNOW WATER AT END OF YEAR	0.000	0.000	0.00		
626						
627	ANNUAL WATER BUDGET BALANCE	0.0002	0.002	0.00		
628						
629	*****					
630	*****					
631						
632	MONTHLY TOTALS (MM) FOR YEAR 1974					
633	-----					
634						
635		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV
636		-----	-----	-----	-----	-----
637						
638	PRECIPITATION	103.0	82.6	65.1	199.0	90.3
639		74.7	200.0	103.2	133.1	86.9
640						
641	RUNOFF	3.69	1.15	0.00	0.86	0.12
642		0.00	18.70	0.00	0.15	0.00
643						
644	POTENTIAL EVAPOTRANSPIRATION	165.50	142.63	131.99	69.29	54.27
645		45.27	59.37	78.66	116.83	137.48
646						
647	ACTUAL EVAPOTRANSPIRATION	28.75	11.51	13.35	50.11	20.46
648		34.35	19.56	28.81	51.86	38.39
649						
650	LATERAL DRAINAGE COLLECTED	94.779	69.942	37.206	156.924	75.345
651	FROM LAYER 1	47.782	160.954	68.902	82.841	47.932
652						
653	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000
654	FROM LAYER 1 INTO L. 1	0.000	0.000	0.000	0.000	0.000
655						
656	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000
657	LAYER 3	0.000	0.000	0.000	0.000	0.000
658						
659	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000
660	FROM LAYER 4	0.000	0.000	0.000	0.000	0.000
661						
662	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000
663	FROM LAYER 4 INTO L. 4	0.000	0.000	0.000	0.000	0.000
664						
665	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000
666	LAYER 6	0.000	0.000	0.000	0.000	0.000
667	*****					
668						
669	ANNUAL TOTALS FOR YEAR 1974					
670	-----					
671						
672		MM		CU. METERS		PERCENT
673		-----		-----		-----
674	PRECIPITATION	1168.20		11682.002		100.00
675						
676	RUNOFF	24.675		246.747		2.11
677						
678	POTENTIAL EVAPOTRANSPIRATION	1232.550		12325.504		
679						
680	ACTUAL EVAPOTRANSPIRATION	313.831		3138.311		26.86
681						
682	DRAINAGE COLLECTED FROM LAYER 1	853.9089		8539.090		73.10
683						
684	RECIRC. FROM LAYER 1 INTO L. 1	0.000000		0.000		0.00
685						
686	PERC./LEAKAGE THROUGH LAYER 3	0.000873		0.009		0.00
687						
688	AVG. HEAD ON TOP OF LAYER 2	3.7665				
689						
690	DRAINAGE COLLECTED FROM LAYER 4	0.0009		0.009		0.00

691				
692	RECIRC. FROM LAYER 4 INTO L. 4	0.000000	0.000	0.00
693				
694	PERC./LEAKAGE THROUGH LAYER 6	0.000007	0.000	0.00
695				
696	AVG. HEAD ON TOP OF LAYER 5	0.0000		
697				
698	CHANGE IN WATER STORAGE	-24.216	-242.155	-2.07
699				
700	SOIL WATER AT START OF YEAR	40.965	409.653	
701				
702	SOIL WATER AT END OF YEAR	16.750	167.498	
703				
704	INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
705				
706	INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
707				
708	SNOW WATER AT START OF YEAR	0.000	0.000	0.00
709				
710	SNOW WATER AT END OF YEAR	0.000	0.000	0.00
711				
712	ANNUAL WATER BUDGET BALANCE	0.0002	0.002	0.00

MONTHLY TOTALS (MM) FOR YEAR 1975

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
PRECIPITATION	37.2	76.6	65.1	72.8	19.9	152.6
	106.2	46.0	98.4	110.3	35.0	35.2
RUNOFF	0.00	0.00	0.00	0.00	0.00	6.20
	0.00	0.00	0.00	0.00	0.00	0.00
POTENTIAL EVAPOTRANSPIRATION	194.28	144.64	127.61	75.66	54.47	40.62
	48.92	61.86	82.37	115.71	160.78	170.07
ACTUAL EVAPOTRANSPIRATION	7.44	31.90	20.91	20.52	12.99	13.82
	16.82	13.73	31.37	48.56	21.79	13.42
LATERAL DRAINAGE COLLECTED	29.762	40.086	40.873	60.214	6.430	132.540
FROM LAYER 1	89.652	29.497	52.599	57.955	34.455	9.878
LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
FROM LAYER 1 INTO L. 1	0.000	0.000	0.000	0.000	0.000	0.000
PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
LAYER 3	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
FROM LAYER 4	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
FROM LAYER 4 INTO L. 4	0.000	0.000	0.000	0.000	0.000	0.000
PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 1975

MM

CU. METERS

PERCENT

760	PRECIPITATION	855.30	8553.000	100.00
761				
762	RUNOFF	6.198	61.980	0.72
763				
764	POTENTIAL EVAPOTRANSPIRATION	1277.003	12770.027	
765				
766	ACTUAL EVAPOTRANSPIRATION	253.258	2532.578	29.61
767				
768	DRAINAGE COLLECTED FROM LAYER 1	583.9382	5839.382	68.27
769				
770	RECIRC. FROM LAYER 1 INTO L. 1	0.000000	0.000	0.00
771				
772	PERC./LEAKAGE THROUGH LAYER 3	0.000580	0.006	0.00
773				
774	AVG. HEAD ON TOP OF LAYER 2	2.5847		
775				
776	DRAINAGE COLLECTED FROM LAYER 4	0.0006	0.006	0.00
777				
778	RECIRC. FROM LAYER 4 INTO L. 4	0.000000	0.000	0.00
779				
780	PERC./LEAKAGE THROUGH LAYER 6	0.000007	0.000	0.00
781				
782	AVG. HEAD ON TOP OF LAYER 5	0.0000		
783				
784	CHANGE IN WATER STORAGE	11.905	119.051	1.39
785				
786	SOIL WATER AT START OF YEAR	16.750	167.498	
787				
788	SOIL WATER AT END OF YEAR	28.655	286.549	
789				
790	INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
791				
792	INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
793				
794	SNOW WATER AT START OF YEAR	0.000	0.000	0.00
795				
796	SNOW WATER AT END OF YEAR	0.000	0.000	0.00
797				
798	ANNUAL WATER BUDGET BALANCE	0.0002	0.002	0.00
799				

MONTHLY TOTALS (MM) FOR YEAR 1976

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
809	PRECIPITATION	130.3	65.4	41.1	19.6	8.1
810		46.0	26.3	65.1	205.5	52.0
811						22.6
812	RUNOFF	1.01	0.00	0.00	0.00	0.00
813		0.00	0.00	0.00	5.86	0.00
814						
815	POTENTIAL EVAPOTRANSPIRATION	165.28	136.88	127.35	78.16	55.50
816		45.58	63.82	83.46	108.33	147.77
817						40.88
818	ACTUAL EVAPOTRANSPIRATION	43.18	44.27	16.41	10.34	6.80
819		21.63	15.31	21.20	36.62	23.96
820						24.18
821	LATERAL DRAINAGE COLLECTED	98.021	20.936	24.455	7.469	3.530
822	FROM LAYER 1	28.358	10.313	45.251	159.984	18.877
823						14.337
824	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000
825	FROM LAYER 1 INTO L. 1	0.000	0.000	0.000	0.000	0.000
826						
827	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000
828	LAYER 3	0.000	0.000	0.000	0.000	0.000

829							
830	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
831	FROM LAYER 4	0.000	0.000	0.000	0.000	0.000	0.000
832							
833	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
834	FROM LAYER 4 INTO L. 4	0.000	0.000	0.000	0.000	0.000	0.000
835							
836	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
837	LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
838							

ANNUAL TOTALS FOR YEAR 1976

	MM	CU. METERS	PERCENT
	-----	-----	-----
PRECIPITATION	743.00	7430.004	100.00
RUNOFF	6.872	68.716	0.92
POTENTIAL EVAPOTRANSPIRATION	1245.230	12452.299	
ACTUAL EVAPOTRANSPIRATION	284.341	2843.415	38.27
DRAINAGE COLLECTED FROM LAYER 1	463.6908	4636.908	62.41
RECIRC. FROM LAYER 1 INTO L. 1	0.000000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 3	0.000476	0.005	0.00
AVG. HEAD ON TOP OF LAYER 2	2.0269		
DRAINAGE COLLECTED FROM LAYER 4	0.0005	0.005	0.00
RECIRC. FROM LAYER 4 INTO L. 4	0.000000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 6	0.000008	0.000	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0000		
CHANGE IN WATER STORAGE	-11.904	-119.044	-1.60
SOIL WATER AT START OF YEAR	28.655	286.549	
SOIL WATER AT END OF YEAR	16.751	167.505	
INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0005	0.005	0.00

MONTHLY TOTALS (MM) FOR YEAR 1977

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
PRECIPITATION	37.4	207.5	37.0	30.6	63.3	49.1
	10.7	26.5	112.9	2.6	1.8	25.7

898							
899	RUNOFF	0.00	6.83	0.00	0.00	0.00	0.00
900		0.00	0.00	0.00	0.00	0.00	0.00
901							
902	POTENTIAL EVAPOTRANSPIRATION	193.88	153.53	133.46	83.64	52.37	39.74
903		45.23	68.18	86.19	145.61	165.02	196.98
904							
905	ACTUAL EVAPOTRANSPIRATION	26.74	22.63	22.64	8.64	15.89	15.51
906		9.03	8.51	30.18	4.30	2.91	7.71
907							
908	LATERAL DRAINAGE COLLECTED	10.664	177.253	14.904	22.210	44.190	27.254
909	FROM LAYER 1	8.945	19.808	70.852	9.493	0.000	15.860
910							
911	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
912	FROM LAYER 1 INTO L. 1	0.000	0.000	0.000	0.000	0.000	0.000
913							
914	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
915	LAYER 3	0.000	0.000	0.000	0.000	0.000	0.000
916							
917	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
918	FROM LAYER 4	0.000	0.000	0.000	0.000	0.000	0.000
919							
920	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
921	FROM LAYER 4 INTO L. 4	0.000	0.000	0.000	0.000	0.000	0.000
922							
923	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
924	LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
925							
926	*****						
927							

ANNUAL TOTALS FOR YEAR 1977

	MM	CU. METERS	PERCENT
	-----	-----	-----
928			
929			
930			
931			
932			
933	PRECIPITATION	605.10	6051.000
934			100.00
935	RUNOFF	6.828	68.285
936			1.13
937	POTENTIAL EVAPOTRANSPIRATION	1363.835	13638.352
938			
939	ACTUAL EVAPOTRANSPIRATION	174.682	1746.819
940			28.87
941	DRAINAGE COLLECTED FROM LAYER 1	421.4337	4214.337
942			69.65
943	RECIRC. FROM LAYER 1 INTO L. 1	0.000000	0.000
944			0.00
945	PERC./LEAKAGE THROUGH LAYER 3	0.000431	0.004
946			0.00
947	AVG. HEAD ON TOP OF LAYER 2	1.9224	
948			
949	DRAINAGE COLLECTED FROM LAYER 4	0.0004	0.004
950			0.00
951	RECIRC. FROM LAYER 4 INTO L. 4	0.000000	0.000
952			0.00
953	PERC./LEAKAGE THROUGH LAYER 6	0.000005	0.000
954			0.00
955	AVG. HEAD ON TOP OF LAYER 5	0.0000	
956			
957	CHANGE IN WATER STORAGE	2.156	21.556
958			0.36
959	SOIL WATER AT START OF YEAR	16.751	167.505
960			
961	SOIL WATER AT END OF YEAR	18.906	189.061
962			
963	INTERCEPTION WATER AT START OF YEAR	0.000	0.000
964			
965	INTERCEPTION WATER AT END OF YEAR	0.000	0.000
966			

967	SNOW WATER AT START OF YEAR	0.000	0.000	0.00
968				
969	SNOW WATER AT END OF YEAR	0.000	0.000	0.00
970				
971	ANNUAL WATER BUDGET BALANCE	-0.0002	-0.002	0.00
972				
973	*****			
974				
975				
976				
977				
978	*****			
979				
980	MONTHLY TOTALS (MM) FOR YEAR 1978			
981	-----			
982				
983		JAN/JUL	FEB/AUG	MAR/SEP
984		APR/OCT	MAY/NOV	JUN/DEC
985		-----	-----	-----
986	PRECIPITATION	195.8	12.9	170.2
987		57.2	26.3	123.2
988				
989	RUNOFF	4.41	0.00	6.83
990		0.00	0.00	0.08
991				
992	POTENTIAL EVAPOTRANSPIRATION	168.37	166.15	136.63
993		45.24	61.17	80.58
994				
995	ACTUAL EVAPOTRANSPIRATION	52.14	6.40	37.31
996		16.55	11.17	32.99
997				
998	LATERAL DRAINAGE COLLECTED	133.941	11.523	121.742
999	FROM LAYER 1	44.409	14.579	89.556
1000				
1001	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000
1002	FROM LAYER 1 INTO L. 1	0.000	0.000	0.000
1003				
1004	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000
1005	LAYER 3	0.000	0.000	0.000
1006				
1007	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000
1008	FROM LAYER 4	0.000	0.000	0.000
1009				
1010	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000
1011	FROM LAYER 4 INTO L. 4	0.000	0.000	0.000
1012				
1013	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000
1014	LAYER 6	0.000	0.000	0.000
1015				
1016				
1017				
1018	*****			
1019				
1020	ANNUAL TOTALS FOR YEAR 1978			
1021	-----			
1022				
1023		MM	CU. METERS	PERCENT
1024		-----	-----	-----
1025	PRECIPITATION	952.90	9528.998	100.00
1026				
1027	RUNOFF	11.316	113.162	1.19
1028				
1029	POTENTIAL EVAPOTRANSPIRATION	1272.909	12729.087	
1030				
1031	ACTUAL EVAPOTRANSPIRATION	290.604	2906.036	30.50
1032				
1033	DRAINAGE COLLECTED FROM LAYER 1	653.1296	6531.296	68.54
1034				
1035	RECIRC. FROM LAYER 1 INTO L. 1	0.000000	0.000	0.00

1036						
1037	PERC./LEAKAGE THROUGH LAYER 3	0.000658	0.007	0.00		
1038						
1039	AVG. HEAD ON TOP OF LAYER 2	2.8654				
1040						
1041	DRAINAGE COLLECTED FROM LAYER 4	0.0007	0.007	0.00		
1042						
1043	RECIRC. FROM LAYER 4 INTO L. 4	0.000000	0.000	0.00		
1044						
1045	PERC./LEAKAGE THROUGH LAYER 6	0.000008	0.000	0.00		
1046						
1047	AVG. HEAD ON TOP OF LAYER 5	0.0000				
1048						
1049	CHANGE IN WATER STORAGE	-2.150	-21.503	-0.23		
1050						
1051	SOIL WATER AT START OF YEAR	18.906	189.061			
1052						
1053	SOIL WATER AT END OF YEAR	16.756	167.558			
1054						
1055	INTERCEPTION WATER AT START OF YEAR	0.000	0.000			
1056						
1057	INTERCEPTION WATER AT END OF YEAR	0.000	0.000			
1058						
1059	SNOW WATER AT START OF YEAR	0.000	0.000	0.00		
1060						
1061	SNOW WATER AT END OF YEAR	0.000	0.000	0.00		
1062						
1063	ANNUAL WATER BUDGET BALANCE	-0.0001	-0.001	0.00		
1064						
1065	*****					
1066						
1067	*****					
1068						
1069	MONTHLY TOTALS (MM) FOR YEAR 1979					
1070	-----					
1071						
1072		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV
1073		-----	-----	-----	-----	-----
1074						
1075	PRECIPITATION	0.5	9.0	118.1	78.2	22.7
1076		24.7	46.0	33.7	56.7	52.2
1077						0.4
1078	RUNOFF	0.00	0.00	0.17	0.13	0.00
1079		0.00	0.00	0.00	0.00	0.00
1080						
1081	POTENTIAL EVAPOTRANSPIRATION	207.64	163.65	133.24	78.35	51.24
1082		46.59	59.75	83.69	129.67	156.32
1083						202.90
1084	ACTUAL EVAPOTRANSPIRATION	0.50	6.04	26.03	21.68	15.64
1085		16.95	19.45	18.31	31.45	11.23
1086						0.40
1087	LATERAL DRAINAGE COLLECTED	0.006	2.880	88.413	55.073	11.104
1088	FROM LAYER 1	10.589	25.514	6.951	34.948	40.973
1089						0.000
1090	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000
1091	FROM LAYER 1 INTO L. 1	0.000	0.000	0.000	0.000	0.000
1092						
1093	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000
1094	LAYER 3	0.000	0.000	0.000	0.000	0.000
1095						
1096	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000
1097	FROM LAYER 4	0.000	0.000	0.000	0.000	0.000
1098						
1099	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000
1100	FROM LAYER 4 INTO L. 4	0.000	0.000	0.000	0.000	0.000
1101						
1102	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000
1103	LAYER 6	0.000	0.000	0.000	0.000	0.000
1104						

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ANNUAL TOTALS FOR YEAR 1979

	MM	CU. METERS	PERCENT
	-----	-----	-----
PRECIPITATION	454.80	4548.001	100.00
RUNOFF	0.304	3.045	0.07
POTENTIAL EVAPOTRANSPIRATION	1354.731	13547.312	
ACTUAL EVAPOTRANSPIRATION	172.574	1725.737	37.94
DRAINAGE COLLECTED FROM LAYER 1	281.9276	2819.276	61.99
RECIRC. FROM LAYER 1 INTO L. 1	0.000000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 3	0.000294	0.003	0.00
AVG. HEAD ON TOP OF LAYER 2	1.2364		
DRAINAGE COLLECTED FROM LAYER 4	0.0003	0.003	0.00
RECIRC. FROM LAYER 4 INTO L. 4	0.000000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 6	0.000006	0.000	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0000		
CHANGE IN WATER STORAGE	-0.006	-0.060	0.00
SOIL WATER AT START OF YEAR	16.756	167.558	
SOIL WATER AT END OF YEAR	16.750	167.498	
INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0001	0.001	0.00

PEAK DAILY VALUES FOR YEARS 1969 THROUGH 2001

	(MM)	(CU. METERS)
	-----	-----
PRECIPITATION	151.70	1517.000
RUNOFF	56.052	560.5199

1174	DRAINAGE COLLECTED FROM LAYER 1	58.72448	587.24481
1175			
1176	PERCOLATION/LEAKAGE THROUGH LAYER 3	0.000076	0.00076
1177			
1178	AVERAGE HEAD ON TOP OF LAYER 2	94.377	
1179			
1180	MAXIMUM HEAD ON TOP OF LAYER 2	138.880	
1181			
1182	LOCATION OF MAXIMUM HEAD IN LAYER 1		
1183	(DISTANCE FROM DRAIN)	6.6 METERS	
1184			
1185	DRAINAGE COLLECTED FROM LAYER 4	0.10000	1.00000
1186			
1187	PERCOLATION/LEAKAGE THROUGH LAYER 6	0.000000	0.00000
1188			
1189	AVERAGE HEAD ON TOP OF LAYER 5	0.030	
1190			
1191	MAXIMUM HEAD ON TOP OF LAYER 5	0.073	
1192			
1193	LOCATION OF MAXIMUM HEAD IN LAYER 4		
1194	(DISTANCE FROM DRAIN)	0.0 METERS	
1195			
1196	SNOW WATER	0.80	8.0000
1197			
1198	MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.2665	
1199			
1200	MINIMUM VEG. SOIL WATER (VOL/VOL)	0.0130	
1201			
1202			

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

AVERAGE MONTHLY VALUES (MM) FOR YEARS 1969 THROUGH 2001

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	70.51	58.12	59.57	55.89	51.84	52.75
	56.92	59.65	65.63	79.27	67.37	50.27
STD. DEVIATIONS	48.81	44.60	50.18	50.36	35.61	40.40
	37.80	38.92	33.22	51.48	34.17	40.74
RUNOFF						
TOTALS	0.383	0.303	1.915	0.884	0.105	0.585
	0.014	0.602	0.007	0.822	0.018	0.002
STD. DEVIATIONS	1.049	1.237	9.791	2.545	0.404	2.421
	0.055	3.255	0.031	3.065	0.087	0.013
POTENTIAL EVAPOTRANSPIRATION						
TOTALS	184.505	152.974	135.909	79.883	54.529	40.254
	45.737	62.622	86.743	127.504	148.714	178.757

1243	STD. DEVIATIONS	14.872	10.214	6.918	4.840	1.717	1.075
1244		1.581	3.291	6.026	8.658	11.930	12.665
1245							
1246	ACTUAL EVAPOTRANSPIRATION						
1247	-----						
1248	TOTALS	26.352	18.588	19.255	15.043	14.377	14.960
1249		18.506	20.373	24.854	25.974	28.424	20.490
1250							
1251	STD. DEVIATIONS	14.974	13.247	10.391	11.275	7.551	6.729
1252		8.654	8.042	8.909	10.761	13.371	15.020
1253							
1254	LATERAL DRAINAGE COLLECTED FROM LAYER 1						
1255	-----						
1256	TOTALS	45.1782	37.5517	38.7669	38.6274	37.0669	38.0392
1257		40.4621	37.2676	39.8038	49.4249	42.0878	30.7105
1258							
1259	STD. DEVIATIONS	36.5624	35.9963	34.7941	40.6154	32.7286	36.1063
1260		32.2442	31.5071	24.4725	36.7429	27.2113	27.9794
1261							
1262	LATERAL DRAINAGE RECIRCULATED FROM LAYER 1 INTO L. 1						
1263	-----						
1264	TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1265		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1266							
1267	STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1268		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1269							
1270	PERCOLATION/LEAKAGE THROUGH LAYER 3						
1271	-----						
1272	TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1273		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1274							
1275	STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1276		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1277							
1278	LATERAL DRAINAGE COLLECTED FROM LAYER 4						
1279	-----						
1280	TOTALS	0.0031	0.0000	0.0000	0.0000	0.0000	0.0000
1281		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1282							
1283	STD. DEVIATIONS	0.0174	0.0000	0.0000	0.0000	0.0000	0.0000
1284		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1285							
1286	LATERAL DRAINAGE RECIRCULATED FROM LAYER 4 INTO L. 4						
1287	-----						
1288	TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1289		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1290							
1291	STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1292		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1293							
1294	PERCOLATION/LEAKAGE THROUGH LAYER 6						
1295	-----						
1296	TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1297		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1298							
1299	STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1300		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1301							
1302							
1303	-----						
1304							
1305							
1306							
1307							
1308	*****						
1309							
1310	AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1969 THROUGH 2001						
1311	-----						

		MM		CU. METERS	PERCENT
		-----		-----	-----
PRECIPITATION	727.79	(176.538)	7277.9	100.00	
RUNOFF	5.640	(11.2986)	56.40	0.775	
POTENTIAL EVAPOTRANSPIRATION	1298.131	(41.9938)	12981.31		
ACTUAL EVAPOTRANSPIRATION	247.195	(45.5928)	2471.95	33.965	
LATERAL DRAINAGE COLLECTED FROM LAYER 1	474.98709	(140.87372)	4749.871	65.26476	
DRAINAGE RECIRCULATED FROM LAYER 1 INTO L. 1	0.00000	(0.00000)	0.000	0.00000	
PERCOLATION/LEAKAGE THROUGH LAYER 3	0.00048	(0.00014)	0.005	0.00007	
AVERAGE HEAD ON TOP OF LAYER 2	2.094	(0.620)			
LATERAL DRAINAGE COLLECTED FROM LAYER 4	0.00350	(0.01745)	0.035	0.00048	
DRAINAGE RECIRCULATED FROM LAYER 4 INTO L. 4	0.00000	(0.00000)	0.000	0.00000	
PERCOLATION/LEAKAGE THROUGH LAYER 6	0.00001	(0.00000)	0.000	0.00000	
AVERAGE HEAD ON TOP OF LAYER 5	0.000	(0.000)			
CHANGE IN WATER STORAGE	-0.041	(0.3125)	-0.41	-0.006	

Active Area

LAYER DATA 1

VALID FOR 33 YEARS

NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER
WERE SPECIFIED BY THE USER.

LAYER 1

TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER 32

THICKNESS	=	250.00	CM
POROSITY	=	0.4500	VOL/VOL
FIELD CAPACITY	=	0.1160	VOL/VOL
WILTING POINT	=	0.0490	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1160	VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.	=	0.1000E-01	CM/SEC

LAYER 2

TYPE 2 - LATERAL DRAINAGE LAYER

MATERIAL TEXTURE NUMBER 21

THICKNESS	=	30.00	CM
POROSITY	=	0.3970	VOL/VOL
FIELD CAPACITY	=	0.0320	VOL/VOL
WILTING POINT	=	0.0130	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0300	VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.	=	0.3000	CM/SEC
SLOPE	=	3.00	PERCENT
DRAINAGE LENGTH	=	25.0	METERS

LAYER 3

TYPE 4 - FLEXIBLE MEMBRANE LINER

MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.10	CM
EFFECTIVE SAT. HYD. CONDUCT.	=	0.2000E-12	CM/SEC
FML PINHOLE DENSITY	=	2.00	HOLES/HECTARE
FML INSTALLATION DEFECTS	=	2.00	HOLES/HECTARE
FML PLACEMENT QUALITY	=	4 - POOR	

LAYER 4

TYPE 3 - BARRIER SOIL LINER

MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.60	CM
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL

EFFECTIVE SAT. HYD. CONDUCT.= 0.3000E-08 CM/SEC

LAYER 5

TYPE 2 - LATERAL DRAINAGE LAYER

MATERIAL TEXTURE NUMBER 20

THICKNESS = 0.50 CM
POROSITY = 0.8500 VOL/VOL
FIELD CAPACITY = 0.0100 VOL/VOL
WILTING POINT = 0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.0300 VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.= 10.00 CM/SEC
SLOPE = 3.00 PERCENT
DRAINAGE LENGTH = 25.0 METERS

LAYER 6

TYPE 4 - FLEXIBLE MEMBRANE LINER

MATERIAL TEXTURE NUMBER 35

THICKNESS = 0.10 CM
EFFECTIVE SAT. HYD. CONDUCT.= 0.2000E-12 CM/SEC
FML PINHOLE DENSITY = 2.00 HOLES/HECTARE
FML INSTALLATION DEFECTS = 2.00 HOLES/HECTARE
FML PLACEMENT QUALITY = 4 - POOR

LAYER 7

TYPE 3 - BARRIER SOIL LINER

MATERIAL TEXTURE NUMBER 17

THICKNESS = 0.60 CM
POROSITY = 0.7500 VOL/VOL
FIELD CAPACITY = 0.7470 VOL/VOL
WILTING POINT = 0.4000 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.7500 VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.= 0.3000E-08 CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA 1

VALID FOR 33 YEARS

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
SOIL DATA BASE USING SOIL TEXTURE #18 WITH BARE
GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND
A SLOPE LENGTH OF 75. METERS.

SCS RUNOFF CURVE NUMBER = 80.06
FRACTION OF AREA ALLOWING RUNOFF = 100.0 PERCENT
AREA PROJECTED ON HORIZONTAL PLANE = 0.1238 HECTARES
EVAPORATIVE ZONE DEPTH = 10.0 CM
INITIAL WATER IN EVAPORATIVE ZONE = 1.160 CM
UPPER LIMIT OF EVAPORATIVE STORAGE = 4.500 CM
FIELD CAPACITY OF EVAPORATIVE ZONE = 1.160 CM
LOWER LIMIT OF EVAPORATIVE STORAGE = 0.490 CM
SOIL EVAPORATION ZONE DEPTH = 10.0 CM

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139      INITIAL SNOW WATER              =      0.000  CM
140      INITIAL INTERCEPTION WATER      =      0.000  CM
141      INITIAL WATER IN LAYER MATERIALS =     30.815  CM
142      TOTAL INITIAL WATER              =     30.815  CM
143      TOTAL SUBSURFACE INFLOW          =      0.00  MM/YR
144
145
146

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147      *****

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148
149      EVAPOTRANSPIRATION DATA      1
150      -----

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151
152      VALID FOR  33 YEARS
153
154

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155      NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
156              Woodlawn              NSW

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157      STATION LATITUDE                  = -35.00 DEGREES
158      MAXIMUM LEAF AREA INDEX           =    0.00
159      START OF GROWING SEASON (JULIAN DATE) =    181
160      END OF GROWING SEASON (JULIAN DATE) =    151
161      EVAPORATIVE ZONE DEPTH            =   10.0  CM
162      AVERAGE ANNUAL WIND SPEED         =   19.00 KPH
163      AVERAGE 1ST QUARTER RELATIVE HUMIDITY =   69.2  %
164      AVERAGE 2ND QUARTER RELATIVE HUMIDITY =   78.0  %
165      AVERAGE 3RD QUARTER RELATIVE HUMIDITY =   76.4  %
166      AVERAGE 4TH QUARTER RELATIVE HUMIDITY =   72.8  %
167

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168      *****

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173      *****
174

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175      MONTHLY TOTALS (MM) FOR YEAR 1969
176      -----

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	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
PRECIPITATION	30.3	116.9	89.4	108.9	63.5	45.5
	45.8	56.1	50.9	226.4	97.0	46.3
RUNOFF	0.00	3.21	0.03	26.21	0.00	0.00
	0.00	0.00	0.00	43.20	0.00	0.00
POTENTIAL EVAPOTRANSPIRATION	200.96	146.54	134.82	82.83	51.02	38.94
	45.78	64.03	77.70	118.44	138.19	176.66
ACTUAL EVAPOTRANSPIRATION	14.32	30.33	35.38	24.11	16.45	27.24
	27.36	29.10	45.10	28.41	66.79	18.27
LATERAL DRAINAGE COLLECTED	0.000	0.000	4.080	66.735	45.758	30.520
FROM LAYER 2	37.088	23.074	22.217	16.845	132.930	44.383
LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
FROM LAYER 2 INTO L. 2	0.000	0.000	0.000	0.000	0.000	0.000
PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
LAYER 4	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE COLLECTED	0.100	0.000	0.000	0.000	0.000	0.000
FROM LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
FROM LAYER 5 INTO L. 5	0.000	0.000	0.000	0.000	0.000	0.000

208	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
209	LAYER 7	0.000	0.000	0.000	0.000	0.000	0.000

210							
211	*****						
212							

213	ANNUAL TOTALS FOR YEAR 1969						
214	-----						

215		MM	CU. METERS	PERCENT
216		-----	-----	-----
217				
218	PRECIPITATION	977.00	1209.526	100.00
219				
220	RUNOFF	72.646	89.935	7.44
221				
222	POTENTIAL EVAPOTRANSPIRATION	1275.914	1579.581	
223				
224	ACTUAL EVAPOTRANSPIRATION	362.844	449.201	37.14
225				
226	DRAINAGE COLLECTED FROM LAYER 2	423.6307	524.455	43.36
227				
228	RECIRC. FROM LAYER 2 INTO L. 2	0.000000	0.000	0.00
229				
230	PERC./LEAKAGE THROUGH LAYER 4	0.000396	0.000	0.00
231				
232	AVG. HEAD ON TOP OF LAYER 3	1.8688		
233				
234	DRAINAGE COLLECTED FROM LAYER 5	0.1004	0.124	0.01
235				
236	RECIRC. FROM LAYER 5 INTO L. 5	0.000000	0.000	0.00
237				
238	PERC./LEAKAGE THROUGH LAYER 7	0.000008	0.000	0.00
239				
240	AVG. HEAD ON TOP OF LAYER 6	0.0001		
241				
242	CHANGE IN WATER STORAGE	117.779	145.811	12.06
243				
244	SOIL WATER AT START OF YEAR	308.149	381.489	
245				
246	SOIL WATER AT END OF YEAR	425.929	527.300	
247				
248	INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
249				
250	INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
251				
252	SNOW WATER AT START OF YEAR	0.000	0.000	0.00
253				
254	SNOW WATER AT END OF YEAR	0.000	0.000	0.00
255				
256	ANNUAL WATER BUDGET BALANCE	0.0002	0.000	0.00

257	
258	*****
259	*****

260	
261	MONTHLY TOTALS (MM) FOR YEAR 1970
262	-----

263		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
264		-----	-----	-----	-----	-----	-----
265							
266							
267	PRECIPITATION	90.5	59.7	65.1	102.3	96.4	27.2
268		3.0	49.3	134.0	43.0	64.1	93.4
269							
270	RUNOFF	0.63	0.00	0.00	3.55	4.12	0.00
271		0.00	0.00	0.48	0.00	0.00	2.05
272							
273	POTENTIAL EVAPOTRANSPIRATION	158.72	150.68	131.02	80.17	50.80	40.66
274		46.49	57.86	75.10	131.09	140.82	171.65
275							
276	ACTUAL EVAPOTRANSPIRATION	44.99	30.01	33.18	33.15	16.08	27.58

277		3.00	16.24	51.48	32.87	35.88	40.92
278							
279	LATERAL DRAINAGE COLLECTED	46.699	26.431	29.145	43.882	45.985	61.551
280	FROM LAYER 2	28.828	16.986	9.482	59.273	32.472	44.629
281							
282	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
283	FROM LAYER 2 INTO L. 2	0.000	0.000	0.000	0.000	0.000	0.000
284							
285	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
286	LAYER 4	0.000	0.000	0.000	0.000	0.000	0.000
287							
288	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
289	FROM LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
290							
291	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
292	FROM LAYER 5 INTO L. 5	0.000	0.000	0.000	0.000	0.000	0.000
293							
294	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
295	LAYER 7	0.000	0.000	0.000	0.000	0.000	0.000
296							

ANNUAL TOTALS FOR YEAR 1970

	MM	CU. METERS	PERCENT
	-----	-----	-----
304	PRECIPITATION	828.00	1025.064
306	RUNOFF	10.833	13.412
308	POTENTIAL EVAPOTRANSPIRATION	1235.073	1529.021
310	ACTUAL EVAPOTRANSPIRATION	365.384	452.345
312	DRAINAGE COLLECTED FROM LAYER 2	445.3638	551.360
314	RECIRC. FROM LAYER 2 INTO L. 2	0.000000	0.000
316	PERC./LEAKAGE THROUGH LAYER 4	0.000420	0.001
318	AVG. HEAD ON TOP OF LAYER 3	1.9599	
320	DRAINAGE COLLECTED FROM LAYER 5	0.0004	0.001
322	RECIRC. FROM LAYER 5 INTO L. 5	0.000000	0.000
324	PERC./LEAKAGE THROUGH LAYER 7	0.000010	0.000
326	AVG. HEAD ON TOP OF LAYER 6	0.0000	
328	CHANGE IN WATER STORAGE	6.418	7.946
330	SOIL WATER AT START OF YEAR	425.929	527.300
332	SOIL WATER AT END OF YEAR	432.347	535.246
334	INTERCEPTION WATER AT START OF YEAR	0.000	0.000
336	INTERCEPTION WATER AT END OF YEAR	0.000	0.000
338	SNOW WATER AT START OF YEAR	0.000	0.000
340	SNOW WATER AT END OF YEAR	0.000	0.000
342	ANNUAL WATER BUDGET BALANCE	0.0002	0.000

MONTHLY TOTALS (MM) FOR YEAR 1971

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	84.6 15.8	89.1 75.8	26.5 36.1	22.0 31.6	15.5 59.8	8.2 116.7
RUNOFF	0.00 0.00	0.64 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00
POTENTIAL EVAPOTRANSPIRATION	166.79 42.11	134.69 60.23	129.98 85.62	80.18 135.21	52.54 135.07	39.41 166.98
ACTUAL EVAPOTRANSPIRATION	55.84 5.38	50.66 28.24	13.62 33.32	20.90 18.26	12.90 33.90	7.26 57.31
LATERAL DRAINAGE COLLECTED FROM LAYER 2	30.977 9.978	32.527 7.788	38.510 8.660	17.412 21.991	10.851 8.606	11.356 19.479
LATERAL DRAINAGE RECIRCULATED FROM LAYER 2 INTO L. 2	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000
LATERAL DRAINAGE COLLECTED FROM LAYER 5	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000
LATERAL DRAINAGE RECIRCULATED FROM LAYER 5 INTO L. 5	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000
PERCOLATION/LEAKAGE THROUGH LAYER 7	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000

ANNUAL TOTALS FOR YEAR 1971

	MM	CU. METERS	PERCENT
PRECIPITATION	581.70	720.145	100.00
RUNOFF	0.641	0.794	0.11
POTENTIAL EVAPOTRANSPIRATION	1228.806	1521.262	
ACTUAL EVAPOTRANSPIRATION	337.590	417.936	58.04
DRAINAGE COLLECTED FROM LAYER 2	218.1348	270.051	37.50
RECIRC. FROM LAYER 2 INTO L. 2	0.000000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 4	0.000228	0.000	0.00
AVG. HEAD ON TOP OF LAYER 3	0.9652		
DRAINAGE COLLECTED FROM LAYER 5	0.0002	0.000	0.00
RECIRC. FROM LAYER 5 INTO L. 5	0.000000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 7	0.000010	0.000	0.00
AVG. HEAD ON TOP OF LAYER 6	0.0000		
CHANGE IN WATER STORAGE	25.334	31.363	4.36

416	SOIL WATER AT START OF YEAR	432.347	535.246				
418	SOIL WATER AT END OF YEAR	457.681	566.609				
420	INTERCEPTION WATER AT START OF YEAR	0.000	0.000				
422	INTERCEPTION WATER AT END OF YEAR	0.000	0.000				
424	SNOW WATER AT START OF YEAR	0.000	0.000	0.00			
426	SNOW WATER AT END OF YEAR	0.000	0.000	0.00			
428	ANNUAL WATER BUDGET BALANCE	0.0000	0.000	0.00			
430	*****						
431	*****						
433	MONTHLY TOTALS (MM) FOR YEAR 1972						
434	-----						
436		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
437		-----	-----	-----	-----	-----	-----
439	PRECIPITATION	137.8	37.3	23.4	57.9	22.4	10.9
440		12.5	75.7	19.9	90.2	48.5	5.8
442	RUNOFF	1.14	0.00	0.00	0.00	0.00	0.00
443		0.00	0.00	0.00	0.55	0.00	0.00
445	POTENTIAL EVAPOTRANSPIRATION	155.73	142.26	133.40	78.85	55.80	40.22
446		47.25	63.29	98.41	124.94	151.74	194.09
448	ACTUAL EVAPOTRANSPIRATION	67.96	34.39	19.44	24.21	14.43	1.52
449		6.87	40.19	19.92	36.36	51.81	4.42
451	LATERAL DRAINAGE COLLECTED	79.380	38.471	22.036	14.873	15.680	19.761
452	FROM LAYER 2	13.242	7.859	8.168	17.970	24.354	24.469
454	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
455	FROM LAYER 2 INTO L. 2	0.000	0.000	0.000	0.000	0.000	0.000
457	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
458	LAYER 4	0.000	0.000	0.000	0.000	0.000	0.000
460	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
461	FROM LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
463	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
464	FROM LAYER 5 INTO L. 5	0.000	0.000	0.000	0.000	0.000	0.000
466	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
467	LAYER 7	0.000	0.000	0.000	0.000	0.000	0.000
468	*****						
470	ANNUAL TOTALS FOR YEAR 1972						
471	-----						
473		MM		CU. METERS		PERCENT	
474		-----		-----		-----	
475	PRECIPITATION	542.30		671.367		100.00	
477	RUNOFF	1.687		2.088		0.31	
479	POTENTIAL EVAPOTRANSPIRATION	1285.984		1592.049			
481	ACTUAL EVAPOTRANSPIRATION	321.524		398.047		59.29	
483	DRAINAGE COLLECTED FROM LAYER 2	286.2625		354.393		52.79	

484						
485	RECIRC. FROM LAYER 2 INTO L. 2	0.000000	0.000	0.00		
486						
487	PERC./LEAKAGE THROUGH LAYER 4	0.000284	0.000	0.00		
488						
489	AVG. HEAD ON TOP OF LAYER 3	1.2594				
490						
491	DRAINAGE COLLECTED FROM LAYER 5	0.0003	0.000	0.00		
492						
493	RECIRC. FROM LAYER 5 INTO L. 5	0.000000	0.000	0.00		
494						
495	PERC./LEAKAGE THROUGH LAYER 7	0.000010	0.000	0.00		
496						
497	AVG. HEAD ON TOP OF LAYER 6	0.0000				
498						
499	CHANGE IN WATER STORAGE	-67.174	-83.161	-12.39		
500						
501	SOIL WATER AT START OF YEAR	457.681	566.609			
502						
503	SOIL WATER AT END OF YEAR	390.507	483.448			
504						
505	INTERCEPTION WATER AT START OF YEAR	0.000	0.000			
506						
507	INTERCEPTION WATER AT END OF YEAR	0.000	0.000			
508						
509	SNOW WATER AT START OF YEAR	0.000	0.000	0.00		
510						
511	SNOW WATER AT END OF YEAR	0.000	0.000	0.00		
512						
513	ANNUAL WATER BUDGET BALANCE	0.0002	0.000	0.00		
514						
515	*****					
516	*****					
517						
518	MONTHLY TOTALS (MM) FOR YEAR 1973					
519	-----					
520						
521		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV
522		-----	-----	-----	-----	-----
523						
524	PRECIPITATION	58.3	133.1	41.2	15.2	31.2
525		74.7	84.4	38.8	110.4	118.6
526						
527	RUNOFF	0.00	0.91	0.00	0.00	0.00
528		0.00	0.00	0.00	0.00	0.07
529						
530	POTENTIAL EVAPOTRANSPIRATION	197.17	134.95	135.62	81.62	57.01
531		47.93	61.19	92.26	118.35	143.84
532						
533	ACTUAL EVAPOTRANSPIRATION	36.28	67.81	25.54	12.41	15.48
534		41.03	38.19	34.59	55.15	65.98
535						
536	LATERAL DRAINAGE COLLECTED	13.915	17.892	37.663	19.096	18.596
537	FROM LAYER 2	19.309	26.068	32.499	26.815	51.464
538						
539	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000
540	FROM LAYER 2 INTO L. 2	0.000	0.000	0.000	0.000	0.000
541						
542	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000
543	LAYER 4	0.000	0.000	0.000	0.000	0.000
544						
545	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000
546	FROM LAYER 5	0.000	0.000	0.000	0.000	0.000
547						
548	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000
549	FROM LAYER 5 INTO L. 5	0.000	0.000	0.000	0.000	0.000
550						
551	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000
552	LAYER 7	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 1973

	MM	CU. METERS	PERCENT
	-----	-----	-----
PRECIPITATION	801.70	992.505	100.00
RUNOFF	0.984	1.218	0.12
POTENTIAL EVAPOTRANSPIRATION	1286.999	1593.305	
ACTUAL EVAPOTRANSPIRATION	437.446	541.558	54.56
DRAINAGE COLLECTED FROM LAYER 2	315.9290	391.120	39.41
RECIRC. FROM LAYER 2 INTO L. 2	0.000000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 4	0.000308	0.000	0.00
AVG. HEAD ON TOP OF LAYER 3	1.3922		
DRAINAGE COLLECTED FROM LAYER 5	0.0003	0.000	0.00
RECIRC. FROM LAYER 5 INTO L. 5	0.000000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 7	0.000010	0.000	0.00
AVG. HEAD ON TOP OF LAYER 6	0.0000		
CHANGE IN WATER STORAGE	47.341	58.608	5.91
SOIL WATER AT START OF YEAR	390.507	483.448	
SOIL WATER AT END OF YEAR	437.848	542.056	
INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0001	0.000	0.00

MONTHLY TOTALS (MM) FOR YEAR 1974

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
PRECIPITATION	103.0 74.7	82.6 200.0	65.1 103.2	199.0 133.1	90.3 86.9	30.0 0.3
RUNOFF	11.55 1.04	6.97 43.86	0.54 0.31	9.06 3.47	3.19 0.00	0.00 0.00
POTENTIAL EVAPOTRANSPIRATION	165.50 45.27	142.63 59.37	131.99 78.66	69.29 116.83	54.27 137.48	39.83 191.44
ACTUAL EVAPOTRANSPIRATION	41.60 43.27	16.51 25.38	17.57 38.91	63.24 62.08	26.95 47.53	19.94 5.85

622	LATERAL DRAINAGE COLLECTED	44.119	42.910	61.419	93.289	64.418	62.900
623	FROM LAYER 2	23.686	28.872	133.469	69.356	46.259	38.375
624							
625	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
626	FROM LAYER 2 INTO L. 2	0.000	0.000	0.000	0.000	0.000	0.000
627							
628	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
629	LAYER 4	0.000	0.000	0.000	0.000	0.000	0.000
630							
631	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
632	FROM LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
633							
634	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
635	FROM LAYER 5 INTO L. 5	0.000	0.000	0.000	0.000	0.000	0.000
636							
637	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
638	LAYER 7	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 1974

	MM	CU. METERS	PERCENT
	-----	-----	-----
647 PRECIPITATION	1168.20	1446.232	100.00
649 RUNOFF	79.999	99.039	6.85
651 POTENTIAL EVAPOTRANSPIRATION	1232.550	1525.897	
653 ACTUAL EVAPOTRANSPIRATION	408.834	506.136	35.00
655 DRAINAGE COLLECTED FROM LAYER 2	709.0728	877.832	60.70
657 RECIRC. FROM LAYER 2 INTO L. 2	0.000000	0.000	0.00
659 PERC./LEAKAGE THROUGH LAYER 4	0.000652	0.001	0.00
661 AVG. HEAD ON TOP OF LAYER 3	3.1354		
663 DRAINAGE COLLECTED FROM LAYER 5	0.0006	0.001	0.00
665 RECIRC. FROM LAYER 5 INTO L. 5	0.000000	0.000	0.00
667 PERC./LEAKAGE THROUGH LAYER 7	0.000010	0.000	0.00
669 AVG. HEAD ON TOP OF LAYER 6	0.0000		
671 CHANGE IN WATER STORAGE	-29.706	-36.776	-2.54
673 SOIL WATER AT START OF YEAR	437.848	542.056	
675 SOIL WATER AT END OF YEAR	408.142	505.280	
677 INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
679 INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
681 SNOW WATER AT START OF YEAR	0.000	0.000	0.00
683 SNOW WATER AT END OF YEAR	0.000	0.000	0.00
685 ANNUAL WATER BUDGET BALANCE	0.0002	0.000	0.00

MONTHLY TOTALS (MM) FOR YEAR 1975

691							
692							
693		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
694							
695							
696	PRECIPITATION	37.2	76.6	65.1	72.8	19.9	152.6
697		106.2	46.0	98.4	110.3	35.0	35.2
698							
699	RUNOFF	0.00	0.19	0.00	0.22	0.00	17.81
700		1.99	0.00	0.04	0.00	0.00	0.00
701							
702	POTENTIAL EVAPOTRANSPIRATION	194.28	144.64	127.61	75.66	54.47	40.62
703		48.92	61.86	82.37	115.71	160.78	170.07
704							
705	ACTUAL EVAPOTRANSPIRATION	13.36	37.87	34.90	32.28	17.26	14.70
706		26.85	22.69	41.79	61.56	32.04	18.10
707							
708	LATERAL DRAINAGE COLLECTED	22.508	13.051	27.900	29.275	46.997	23.542
709	FROM LAYER 2	134.965	42.771	24.031	34.842	50.202	26.281
710							
711	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
712	FROM LAYER 2 INTO L. 2	0.000	0.000	0.000	0.000	0.000	0.000
713							
714	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
715	LAYER 4	0.000	0.000	0.000	0.000	0.000	0.000
716							
717	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
718	FROM LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
719							
720	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
721	FROM LAYER 5 INTO L. 5	0.000	0.000	0.000	0.000	0.000	0.000
722							
723	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
724	LAYER 7	0.000	0.000	0.000	0.000	0.000	0.000
725							
726	*****						
727							
728	ANNUAL TOTALS FOR YEAR 1975						
729	-----						
730							
731			MM		CU. METERS		PERCENT
732							
733	PRECIPITATION		855.30		1058.861		100.00
734							
735	RUNOFF		20.248		25.067		2.37
736							
737	POTENTIAL EVAPOTRANSPIRATION		1277.003		1580.929		
738							
739	ACTUAL EVAPOTRANSPIRATION		353.399		437.508		41.32
740							
741	DRAINAGE COLLECTED FROM LAYER 2		476.3662		589.741		55.70
742							
743	RECIRC. FROM LAYER 2 INTO L. 2		0.000000		0.000		0.00
744							
745	PERC./LEAKAGE THROUGH LAYER 4		0.000447		0.001		0.00
746							
747	AVG. HEAD ON TOP OF LAYER 3		2.0849				
748							
749	DRAINAGE COLLECTED FROM LAYER 5		0.0004		0.001		0.00
750							
751	RECIRC. FROM LAYER 5 INTO L. 5		0.000000		0.000		0.00
752							
753	PERC./LEAKAGE THROUGH LAYER 7		0.000010		0.000		0.00
754							
755	AVG. HEAD ON TOP OF LAYER 6		0.0000				
756							
757	CHANGE IN WATER STORAGE		5.287		6.545		0.62
758							
759	SOIL WATER AT START OF YEAR		408.142		505.280		

760							
761	SOIL WATER AT END OF YEAR	413.429		511.825			
762							
763	INTERCEPTION WATER AT START OF YEAR	0.000		0.000			
764							
765	INTERCEPTION WATER AT END OF YEAR	0.000		0.000			
766							
767	SNOW WATER AT START OF YEAR	0.000		0.000		0.00	
768							
769	SNOW WATER AT END OF YEAR	0.000		0.000		0.00	
770							
771	ANNUAL WATER BUDGET BALANCE	0.0000		0.000		0.00	
772							
773	*****						
774	*****						
775							
776	MONTHLY TOTALS (MM) FOR YEAR 1976						
777	-----						
778							
779		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
780		-----	-----	-----	-----	-----	-----
781							
782	PRECIPITATION	130.3	65.4	41.1	19.6	8.1	61.0
783		46.0	26.3	65.1	205.5	52.0	22.6
784							
785	RUNOFF	6.48	0.00	0.00	0.00	0.00	0.00
786		0.00	0.00	0.06	21.98	0.00	0.00
787							
788	POTENTIAL EVAPOTRANSPIRATION	165.28	136.88	127.35	78.16	55.50	40.88
789		45.58	63.82	83.46	108.33	147.77	192.22
790							
791	ACTUAL EVAPOTRANSPIRATION	59.71	53.75	20.15	17.01	9.96	28.93
792		33.84	20.21	31.44	48.58	30.51	26.32
793							
794	LATERAL DRAINAGE COLLECTED	14.264	55.783	23.834	17.543	16.644	11.343
795	FROM LAYER 2	6.976	13.219	16.770	93.001	52.245	22.798
796							
797	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
798	FROM LAYER 2 INTO L. 2	0.000	0.000	0.000	0.000	0.000	0.000
799							
800	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
801	LAYER 4	0.000	0.000	0.000	0.000	0.000	0.000
802							
803	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
804	FROM LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
805							
806	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
807	FROM LAYER 5 INTO L. 5	0.000	0.000	0.000	0.000	0.000	0.000
808							
809	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
810	LAYER 7	0.000	0.000	0.000	0.000	0.000	0.000
811							
812	*****						
813							
814	ANNUAL TOTALS FOR YEAR 1976						
815	-----						
816							
817		MM		CU. METERS		PERCENT	
818		-----		-----		-----	
819	PRECIPITATION	743.00		919.835		100.00	
820							
821	RUNOFF	28.524		35.312		3.84	
822							
823	POTENTIAL EVAPOTRANSPIRATION	1245.230		1541.595			
824							
825	ACTUAL EVAPOTRANSPIRATION	380.416		470.955		51.20	
826							
827	DRAINAGE COLLECTED FROM LAYER 2	344.4212		426.393		46.36	
828							

829	RECIRC. FROM LAYER 2 INTO L. 2	0.000000	0.000	0.00
830				
831	PERC./LEAKAGE THROUGH LAYER 4	0.000336	0.000	0.00
832				
833	AVG. HEAD ON TOP OF LAYER 3	1.5205		
834				
835	DRAINAGE COLLECTED FROM LAYER 5	0.0003	0.000	0.00
836				
837	RECIRC. FROM LAYER 5 INTO L. 5	0.000000	0.000	0.00
838				
839	PERC./LEAKAGE THROUGH LAYER 7	0.000010	0.000	0.00
840				
841	AVG. HEAD ON TOP OF LAYER 6	0.0000		
842				
843	CHANGE IN WATER STORAGE	-10.362	-12.828	-1.39
844				
845	SOIL WATER AT START OF YEAR	413.429	511.825	
846				
847	SOIL WATER AT END OF YEAR	403.067	498.997	
848				
849	INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
850				
851	INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
852				
853	SNOW WATER AT START OF YEAR	0.000	0.000	0.00
854				
855	SNOW WATER AT END OF YEAR	0.000	0.000	0.00
856				
857	ANNUAL WATER BUDGET BALANCE	0.0006	0.001	0.00

MONTHLY TOTALS (MM) FOR YEAR 1977

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
PRECIPITATION	37.4	207.5	37.0	30.6	63.3	49.1
	10.7	26.5	112.9	2.6	1.8	25.7
RUNOFF	0.00	26.14	0.00	0.00	0.00	0.00
	0.00	0.00	1.73	0.00	0.00	0.00
POTENTIAL EVAPOTRANSPIRATION	193.88	153.53	133.46	83.64	52.37	39.74
	45.23	68.18	86.19	145.61	165.02	196.98
ACTUAL EVAPOTRANSPIRATION	32.00	31.76	27.99	13.43	20.84	26.74
	14.01	13.25	46.68	9.22	2.88	6.18
LATERAL DRAINAGE COLLECTED	15.904	12.325	116.711	26.481	23.047	21.019
FROM LAYER 2	25.541	16.330	30.455	29.161	18.719	11.095
LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
FROM LAYER 2 INTO L. 2	0.000	0.000	0.000	0.000	0.000	0.000
PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
LAYER 4	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
FROM LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
FROM LAYER 5 INTO L. 5	0.000	0.000	0.000	0.000	0.000	0.000
PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
LAYER 7	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 1977

	MM	CU. METERS	PERCENT
PRECIPITATION	605.10	749.114	100.00
RUNOFF	27.864	34.495	4.60
POTENTIAL EVAPOTRANSPIRATION	1363.835	1688.428	
ACTUAL EVAPOTRANSPIRATION	244.982	303.288	40.49
DRAINAGE COLLECTED FROM LAYER 2	346.7879	429.323	57.31
RECIRC. FROM LAYER 2 INTO L. 2	0.000000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 4	0.000336	0.000	0.00
AVG. HEAD ON TOP OF LAYER 3	1.5197		
DRAINAGE COLLECTED FROM LAYER 5	0.0003	0.000	0.00
RECIRC. FROM LAYER 5 INTO L. 5	0.000000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 7	0.000010	0.000	0.00
AVG. HEAD ON TOP OF LAYER 6	0.0000		
CHANGE IN WATER STORAGE	-14.534	-17.993	-2.40
SOIL WATER AT START OF YEAR	403.067	498.997	
SOIL WATER AT END OF YEAR	388.534	481.005	
INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	-0.0002	0.000	0.00

MONTHLY TOTALS (MM) FOR YEAR 1978

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	195.8 57.2	12.9 26.3	170.2 123.2	30.5 51.7	84.4 68.5	89.5 42.7
RUNOFF	14.94 0.00	0.00 0.00	22.12 3.49	0.00 0.00	0.00 0.37	0.00 0.00
POTENTIAL EVAPOTRANSPIRATION	168.37 45.24	166.15 61.17	136.63 80.58	81.37 126.77	56.68 147.93	39.00 163.03
ACTUAL EVAPOTRANSPIRATION	63.28 26.07	8.96 20.20	42.97 42.42	23.19 23.96	25.71 31.27	36.73 43.90
LATERAL DRAINAGE COLLECTED FROM LAYER 2	6.989 58.172	76.393 31.201	51.043 48.756	70.081 34.473	24.986 27.574	49.724 29.567

967							
968	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
969	FROM LAYER 2 INTO L. 2	0.000	0.000	0.000	0.000	0.000	0.000
970							
971	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
972	LAYER 4	0.000	0.000	0.000	0.000	0.000	0.000
973							
974	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
975	FROM LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
976							
977	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
978	FROM LAYER 5 INTO L. 5	0.000	0.000	0.000	0.000	0.000	0.000
979							
980	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
981	LAYER 7	0.000	0.000	0.000	0.000	0.000	0.000
982							

ANNUAL TOTALS FOR YEAR 1978

	MM	CU. METERS	PERCENT
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986			
987			
988			
989			
990	PRECIPITATION	952.90	1179.690
991			100.00
992	RUNOFF	40.919	50.658
993			4.29
994	POTENTIAL EVAPOTRANSPIRATION	1272.909	1575.861
995			
996	ACTUAL EVAPOTRANSPIRATION	388.659	481.160
997			40.79
998	DRAINAGE COLLECTED FROM LAYER 2	508.9599	630.092
999			53.41
1000	RECIRC. FROM LAYER 2 INTO L. 2	0.000000	0.000
1001			0.00
1002	PERC./LEAKAGE THROUGH LAYER 4	0.000477	0.001
1003			0.00
1004	AVG. HEAD ON TOP OF LAYER 3	2.2652	
1005			
1006	DRAINAGE COLLECTED FROM LAYER 5	0.0005	0.001
1007			0.00
1008	RECIRC. FROM LAYER 5 INTO L. 5	0.000000	0.000
1009			0.00
1010	PERC./LEAKAGE THROUGH LAYER 7	0.000010	0.000
1011			0.00
1012	AVG. HEAD ON TOP OF LAYER 6	0.0000	
1013			
1014	CHANGE IN WATER STORAGE	14.361	17.779
1015			1.51
1016	SOIL WATER AT START OF YEAR	388.534	481.005
1017			
1018	SOIL WATER AT END OF YEAR	402.895	498.784
1019			
1020	INTERCEPTION WATER AT START OF YEAR	0.000	0.000
1021			
1022	INTERCEPTION WATER AT END OF YEAR	0.000	0.000
1023			
1024	SNOW WATER AT START OF YEAR	0.000	0.000
1025			0.00
1026	SNOW WATER AT END OF YEAR	0.000	0.000
1027			0.00
1028	ANNUAL WATER BUDGET BALANCE	-0.0004	0.000
1029			0.00

MONTHLY TOTALS (MM) FOR YEAR 1979

		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
1036		-----	-----	-----	-----	-----	-----
1037							
1038							
1039	PRECIPITATION	0.5	9.0	118.1	78.2	22.7	12.6
1040		24.7	46.0	33.7	56.7	52.2	0.4
1041							
1042	RUNOFF	0.00	0.00	3.85	3.05	0.00	0.00
1043		0.00	0.00	0.00	0.00	0.01	0.00
1044							
1045	POTENTIAL EVAPOTRANSPIRATION	207.64	163.65	133.24	78.35	51.24	41.70
1046		46.59	59.75	83.69	129.67	156.32	202.90
1047							
1048	ACTUAL EVAPOTRANSPIRATION	0.46	6.27	39.36	27.22	22.47	8.27
1049		18.36	29.02	27.25	41.29	14.98	0.40
1050							
1051	LATERAL DRAINAGE COLLECTED	18.725	12.442	8.934	57.789	26.662	18.236
1052	FROM LAYER 2	13.644	6.490	4.442	10.212	10.810	27.153
1053							
1054	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1055	FROM LAYER 2 INTO L. 2	0.000	0.000	0.000	0.000	0.000	0.000
1056							
1057	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
1058	LAYER 4	0.000	0.000	0.000	0.000	0.000	0.000
1059							
1060	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
1061	FROM LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
1062							
1063	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1064	FROM LAYER 5 INTO L. 5	0.000	0.000	0.000	0.000	0.000	0.000
1065							
1066	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
1067	LAYER 7	0.000	0.000	0.000	0.000	0.000	0.000
1068	*****						

ANNUAL TOTALS FOR YEAR 1979

1071	-----			
1072				
1073		MM	CU. METERS	PERCENT
1074		-----	-----	-----
1075	PRECIPITATION	454.80	563.043	100.00
1076				
1077	RUNOFF	6.902	8.544	1.52
1078				
1079	POTENTIAL EVAPOTRANSPIRATION	1354.731	1677.157	
1080				
1081	ACTUAL EVAPOTRANSPIRATION	235.340	291.350	51.75
1082				
1083	DRAINAGE COLLECTED FROM LAYER 2	215.5400	266.839	47.39
1084				
1085	RECIRC. FROM LAYER 2 INTO L. 2	0.000000	0.000	0.00
1086				
1087	PERC./LEAKAGE THROUGH LAYER 4	0.000226	0.000	0.00
1088				
1089	AVG. HEAD ON TOP OF LAYER 3	0.9512		
1090				
1091	DRAINAGE COLLECTED FROM LAYER 5	0.0002	0.000	0.00
1092				
1093	RECIRC. FROM LAYER 5 INTO L. 5	0.000000	0.000	0.00
1094				
1095	PERC./LEAKAGE THROUGH LAYER 7	0.000010	0.000	0.00
1096				
1097	AVG. HEAD ON TOP OF LAYER 6	0.0000		
1098				
1099	CHANGE IN WATER STORAGE	-2.981	-3.691	-0.66
1100				
1101	SOIL WATER AT START OF YEAR	402.895	498.784	
1102				
1103	SOIL WATER AT END OF YEAR	399.914	495.093	
1104				

1105	INTERCEPTION WATER AT START OF YEAR	0.000	0.000				
1106							
1107	INTERCEPTION WATER AT END OF YEAR	0.000	0.000				
1108							
1109	SNOW WATER AT START OF YEAR	0.000	0.000	0.00			
1110							
1111	SNOW WATER AT END OF YEAR	0.000	0.000	0.00			
1112							
1113	ANNUAL WATER BUDGET BALANCE	0.0000	0.000	0.00			
1114							
1115	*****						
1116	*****						
1117							
1118	MONTHLY TOTALS (MM) FOR YEAR 1980						
1119	-----						
1120							
1121		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
1122		-----	-----	-----	-----	-----	-----
1123							
1124	PRECIPITATION	45.3	54.6	41.1	13.0	68.4	32.7
1125		39.2	21.8	33.5	43.2	41.4	28.9
1126							
1127	RUNOFF	0.00	0.15	0.00	0.00	0.00	0.00
1128		0.00	0.00	0.00	0.00	0.00	0.00
1129							
1130	POTENTIAL EVAPOTRANSPIRATION	179.83	164.76	146.65	87.21	55.27	40.48
1131		45.74	67.52	100.21	140.46	166.78	188.15
1132							
1133	ACTUAL EVAPOTRANSPIRATION	23.31	17.17	17.16	6.98	38.48	17.17
1134		22.92	22.40	34.26	24.73	24.32	24.00
1135							
1136	LATERAL DRAINAGE COLLECTED	18.710	22.923	26.211	25.231	11.531	16.548
1137	FROM LAYER 2	14.302	14.183	16.533	11.855	3.907	12.651
1138							
1139	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1140	FROM LAYER 2 INTO L. 2	0.000	0.000	0.000	0.000	0.000	0.000
1141							
1142	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
1143	LAYER 4	0.000	0.000	0.000	0.000	0.000	0.000
1144							
1145	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
1146	FROM LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
1147							
1148	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1149	FROM LAYER 5 INTO L. 5	0.000	0.000	0.000	0.000	0.000	0.000
1150							
1151	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
1152	LAYER 7	0.000	0.000	0.000	0.000	0.000	0.000
1153							
1154	*****						
1155							
1156	ANNUAL TOTALS FOR YEAR 1980						
1157	-----						
1158							
1159		MM		CU. METERS		PERCENT	
1160		-----		-----		-----	
1161	PRECIPITATION	463.10		573.318		100.00	
1162							
1163	RUNOFF	0.148		0.184		0.03	
1164							
1165	POTENTIAL EVAPOTRANSPIRATION	1383.068		1712.238			
1166							
1167	ACTUAL EVAPOTRANSPIRATION	272.894		337.843		58.93	
1168							
1169	DRAINAGE COLLECTED FROM LAYER 2	194.5840		240.895		42.02	
1170							
1171	RECIRC. FROM LAYER 2 INTO L. 2	0.000000		0.000		0.00	
1172							
1173	PERC./LEAKAGE THROUGH LAYER 4	0.000206		0.000		0.00	

1174						
1175	AVG. HEAD ON TOP OF LAYER 3	0.8575				
1176						
1177	DRAINAGE COLLECTED FROM LAYER 5	0.0002	0.000	0.00		
1178						
1179	RECIRC. FROM LAYER 5 INTO L. 5	0.000000	0.000	0.00		
1180						
1181	PERC./LEAKAGE THROUGH LAYER 7	0.000010	0.000	0.00		
1182						
1183	AVG. HEAD ON TOP OF LAYER 6	0.0000				
1184						
1185	CHANGE IN WATER STORAGE	-4.527	-5.604	-0.98		
1186						
1187	SOIL WATER AT START OF YEAR	399.914	495.093			
1188						
1189	SOIL WATER AT END OF YEAR	395.387	489.489			
1190						
1191	INTERCEPTION WATER AT START OF YEAR	0.000	0.000			
1192						
1193	INTERCEPTION WATER AT END OF YEAR	0.000	0.000			
1194						
1195	SNOW WATER AT START OF YEAR	0.000	0.000	0.00		
1196						
1197	SNOW WATER AT END OF YEAR	0.000	0.000	0.00		
1198						
1199	ANNUAL WATER BUDGET BALANCE	0.0001	0.000	0.00		
1200						
1201	*****					
1202	*****					
1203						
1204	MONTHLY TOTALS (MM) FOR YEAR 1981					
1205	-----					
1206						
1207		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV
1208						JUN/DEC
1209		-----	-----	-----	-----	-----
1210	PRECIPITATION	18.6	109.5	3.9	27.5	63.3
1211		95.1	49.3	28.5	66.6	91.9
1212						63.4
1213	RUNOFF	0.00	0.03	0.00	0.00	0.00
1214		0.00	0.00	0.00	0.00	0.00
1215						
1216	POTENTIAL EVAPOTRANSPIRATION	199.67	149.33	143.53	85.91	53.17
1217		45.42	60.94	95.61	131.52	138.88
1218						39.70
1219	ACTUAL EVAPOTRANSPIRATION	19.29	44.77	1.03	9.94	14.05
1220		45.39	49.43	20.69	36.08	67.68
1221						47.24
1222	LATERAL DRAINAGE COLLECTED	12.431	8.258	36.440	18.958	20.992
1223	FROM LAYER 2	46.165	46.812	23.329	10.054	17.270
1224						29.823
1225	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000
1226	FROM LAYER 2 INTO L. 2	0.000	0.000	0.000	0.000	0.000
1227						
1228	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000
1229	LAYER 4	0.000	0.000	0.000	0.000	0.000
1230						
1231	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000
1232	FROM LAYER 5	0.000	0.000	0.000	0.000	0.000
1233						
1234	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000
1235	FROM LAYER 5 INTO L. 5	0.000	0.000	0.000	0.000	0.000
1236						
1237	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000
1238	LAYER 7	0.000	0.000	0.000	0.000	0.000
1239	*****					
1240						
1241	ANNUAL TOTALS FOR YEAR 1981					
1242	-----					

1243		MM	CU. METERS	PERCENT			
1244		-----	-----	-----			
1245							
1246	PRECIPITATION	707.30	875.637	100.00			
1247							
1248	RUNOFF	0.032	0.039	0.00			
1249							
1250	POTENTIAL EVAPOTRANSPIRATION	1319.449	1633.478				
1251							
1252	ACTUAL EVAPOTRANSPIRATION	393.188	486.766	55.59			
1253							
1254	DRAINAGE COLLECTED FROM LAYER 2	296.8908	367.551	41.98			
1255							
1256	RECIRC. FROM LAYER 2 INTO L. 2	0.000000	0.000	0.00			
1257							
1258	PERC./LEAKAGE THROUGH LAYER 4	0.000293	0.000	0.00			
1259							
1260	AVG. HEAD ON TOP OF LAYER 3	1.3009					
1261							
1262	DRAINAGE COLLECTED FROM LAYER 5	0.0003	0.000	0.00			
1263							
1264	RECIRC. FROM LAYER 5 INTO L. 5	0.000000	0.000	0.00			
1265							
1266	PERC./LEAKAGE THROUGH LAYER 7	0.000010	0.000	0.00			
1267							
1268	AVG. HEAD ON TOP OF LAYER 6	0.0000					
1269							
1270	CHANGE IN WATER STORAGE	17.190	21.281	2.43			
1271							
1272	SOIL WATER AT START OF YEAR	395.387	489.489				
1273							
1274	SOIL WATER AT END OF YEAR	412.577	510.770				
1275							
1276	INTERCEPTION WATER AT START OF YEAR	0.000	0.000				
1277							
1278	INTERCEPTION WATER AT END OF YEAR	0.000	0.000				
1279							
1280	SNOW WATER AT START OF YEAR	0.000	0.000	0.00			
1281							
1282	SNOW WATER AT END OF YEAR	0.000	0.000	0.00			
1283							
1284	ANNUAL WATER BUDGET BALANCE	-0.0003	0.000	0.00			
1285							
1286	*****						
1287	*****						
1288							
1289	MONTHLY TOTALS (MM) FOR YEAR 1982						
1290	-----						
1291							
1292		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
1293		-----	-----	-----	-----	-----	-----
1294							
1295	PRECIPITATION	27.2	15.1	126.0	22.0	2.8	14.2
1296		3.9	17.7	64.9	8.7	1.8	22.7
1297							
1298	RUNOFF	0.00	0.00	1.07	0.00	0.00	0.00
1299		0.00	0.00	0.00	0.00	0.00	0.00
1300							
1301	POTENTIAL EVAPOTRANSPIRATION	191.45	165.47	127.36	82.08	54.74	38.97
1302		44.22	69.31	87.71	134.61	182.84	173.62
1303							
1304	ACTUAL EVAPOTRANSPIRATION	11.93	16.57	41.30	12.48	5.26	14.28
1305		3.08	5.68	29.54	16.01	5.00	4.49
1306							
1307	LATERAL DRAINAGE COLLECTED	15.129	17.142	11.927	56.645	25.510	15.442
1308	FROM LAYER 2	10.139	7.874	6.213	3.150	11.553	11.005
1309							
1310	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1311	FROM LAYER 2 INTO L. 2	0.000	0.000	0.000	0.000	0.000	0.000

1312							
1313	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
1314	LAYER 4	0.000	0.000	0.000	0.000	0.000	0.000
1315							
1316	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
1317	FROM LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
1318							
1319	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1320	FROM LAYER 5 INTO L. 5	0.000	0.000	0.000	0.000	0.000	0.000
1321							
1322	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
1323	LAYER 7	0.000	0.000	0.000	0.000	0.000	0.000
1324	*****						

ANNUAL TOTALS FOR YEAR 1982

1327	-----			
1328				
1329		MM	CU. METERS	PERCENT
1330		-----	-----	-----
1331	PRECIPITATION	327.00	404.826	100.00
1332				
1333	RUNOFF	1.074	1.329	0.33
1334				
1335	POTENTIAL EVAPOTRANSPIRATION	1352.391	1674.260	
1336				
1337	ACTUAL EVAPOTRANSPIRATION	165.635	205.056	50.65
1338				
1339	DRAINAGE COLLECTED FROM LAYER 2	191.7283	237.360	58.63
1340				
1341	RECIRC. FROM LAYER 2 INTO L. 2	0.000000	0.000	0.00
1342				
1343	PERC./LEAKAGE THROUGH LAYER 4	0.000207	0.000	0.00
1344				
1345	AVG. HEAD ON TOP OF LAYER 3	0.8502		
1346				
1347	DRAINAGE COLLECTED FROM LAYER 5	0.0002	0.000	0.00
1348				
1349	RECIRC. FROM LAYER 5 INTO L. 5	0.000000	0.000	0.00
1350				
1351	PERC./LEAKAGE THROUGH LAYER 7	0.000009	0.000	0.00
1352				
1353	AVG. HEAD ON TOP OF LAYER 6	0.0000		
1354				
1355	CHANGE IN WATER STORAGE	-31.437	-38.919	-9.61
1356				
1357	SOIL WATER AT START OF YEAR	412.577	510.770	
1358				
1359	SOIL WATER AT END OF YEAR	381.139	471.851	
1360				
1361	INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
1362				
1363	INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
1364				
1365	SNOW WATER AT START OF YEAR	0.000	0.000	0.00
1366				
1367	SNOW WATER AT END OF YEAR	0.000	0.000	0.00
1368				
1369	ANNUAL WATER BUDGET BALANCE	0.0004	0.000	0.00

MONTHLY TOTALS (MM) FOR YEAR 1983

1370	-----					
1371						
1372						
1373						
1374						
1375						
1376						
1377		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV
1378		-----	-----	-----	-----	-----
1379						
1380	PRECIPITATION	73.6	54.7	76.8	37.3	123.2

53.1

1381		30.1	43.1	65.1	158.0	91.6	122.8
1382							
1383	RUNOFF	9.63	0.31	3.32	0.00	1.18	0.00
1384		0.00	0.00	0.00	1.27	0.66	0.48
1385							
1386	POTENTIAL EVAPOTRANSPIRATION	203.78	161.50	148.30	71.65	54.65	39.99
1387		44.39	61.23	87.87	121.22	140.93	168.16
1388							
1389	ACTUAL EVAPOTRANSPIRATION	18.43	16.46	28.51	22.37	35.54	33.62
1390		20.70	28.99	44.85	51.55	39.43	67.16
1391							
1392	LATERAL DRAINAGE COLLECTED	16.267	19.238	30.414	41.203	35.314	49.373
1393	FROM LAYER 2	30.437	22.634	11.189	29.730	91.173	73.262
1394							
1395	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1396	FROM LAYER 2 INTO L. 2	0.000	0.000	0.000	0.000	0.000	0.000
1397							
1398	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
1399	LAYER 4	0.000	0.000	0.000	0.000	0.000	0.000
1400							
1401	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
1402	FROM LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
1403							
1404	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1405	FROM LAYER 5 INTO L. 5	0.000	0.000	0.000	0.000	0.000	0.000
1406							
1407	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
1408	LAYER 7	0.000	0.000	0.000	0.000	0.000	0.000
1409							

ANNUAL TOTALS FOR YEAR 1983

1412				
1413				
1414				
1415		MM	CU. METERS	PERCENT
1416		-----	-----	-----
1417	PRECIPITATION	929.40	1150.598	100.00
1418				
1419	RUNOFF	16.851	20.861	1.81
1420				
1421	POTENTIAL EVAPOTRANSPIRATION	1303.671	1613.945	
1422				
1423	ACTUAL EVAPOTRANSPIRATION	407.600	504.609	43.86
1424				
1425	DRAINAGE COLLECTED FROM LAYER 2	450.2342	557.390	48.44
1426				
1427	RECIRC. FROM LAYER 2 INTO L. 2	0.000000	0.000	0.00
1428				
1429	PERC./LEAKAGE THROUGH LAYER 4	0.000425	0.001	0.00
1430				
1431	AVG. HEAD ON TOP OF LAYER 3	1.9842		
1432				
1433	DRAINAGE COLLECTED FROM LAYER 5	0.0004	0.001	0.00
1434				
1435	RECIRC. FROM LAYER 5 INTO L. 5	0.000000	0.000	0.00
1436				
1437	PERC./LEAKAGE THROUGH LAYER 7	0.000010	0.000	0.00
1438				
1439	AVG. HEAD ON TOP OF LAYER 6	0.0000		
1440				
1441	CHANGE IN WATER STORAGE	54.714	67.736	5.89
1442				
1443	SOIL WATER AT START OF YEAR	381.139	471.851	
1444				
1445	SOIL WATER AT END OF YEAR	435.854	539.587	
1446				
1447	INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
1448				
1449	INTERCEPTION WATER AT END OF YEAR	0.000	0.000	

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1450
1451     SNOW WATER AT START OF YEAR                0.000                0.000                0.00
1452
1453     SNOW WATER AT END OF YEAR                    0.000                0.000                0.00
1454
1455     ANNUAL WATER BUDGET BALANCE                  0.0003                0.000                0.00
1456
1457     *****
1458     *****
1459
1460             MONTHLY TOTALS (MM) FOR YEAR 1984
1461     -----
1462
1463             JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
1464             -----
1465
1466     PRECIPITATION                161.3      65.0      33.4      96.1      31.3      42.1
1467                                112.3      52.7      72.8      38.9      38.0      28.7
1468
1469     RUNOFF                        4.16       0.00      0.00     17.80      0.00      0.55
1470                                1.46       0.00      0.00      0.00      0.00      0.00
1471
1472     POTENTIAL EVAPOTRANSPIRATION  172.60    152.43    130.73     75.35     52.64     40.60
1473                                43.17      62.18     78.02    124.51    153.93    179.14
1474
1475     ACTUAL EVAPOTRANSPIRATION      62.48     45.83     14.82     21.57     12.29     14.95
1476                                35.16     39.74     50.62     18.25     33.89     10.14
1477
1478     LATERAL DRAINAGE COLLECTED     54.952    54.321    37.813    25.283    49.851    24.530
1479     FROM LAYER 2                  25.178    58.022    30.503    26.420    14.313    19.255
1480
1481     LATERAL DRAINAGE RECIRCULATED   0.000     0.000     0.000     0.000     0.000     0.000
1482     FROM LAYER 2 INTO L. 2         0.000     0.000     0.000     0.000     0.000     0.000
1483
1484     PERCOLATION/LEAKAGE THROUGH     0.000     0.000     0.000     0.000     0.000     0.000
1485     LAYER 4                       0.000     0.000     0.000     0.000     0.000     0.000
1486
1487     LATERAL DRAINAGE COLLECTED     0.000     0.000     0.000     0.000     0.000     0.000
1488     FROM LAYER 5                   0.000     0.000     0.000     0.000     0.000     0.000
1489
1490     LATERAL DRAINAGE RECIRCULATED   0.000     0.000     0.000     0.000     0.000     0.000
1491     FROM LAYER 5 INTO L. 5         0.000     0.000     0.000     0.000     0.000     0.000
1492
1493     PERCOLATION/LEAKAGE THROUGH     0.000     0.000     0.000     0.000     0.000     0.000
1494     LAYER 7                       0.000     0.000     0.000     0.000     0.000     0.000
1495     *****
1496
1497             ANNUAL TOTALS FOR YEAR 1984
1498     -----
1499
1500                                MM                CU. METERS        PERCENT
1501                                -----
1502     PRECIPITATION                772.60                956.479        100.00
1503
1504     RUNOFF                        23.966                29.670         3.10
1505
1506     POTENTIAL EVAPOTRANSPIRATION  1265.299                1566.440
1507
1508     ACTUAL EVAPOTRANSPIRATION      359.765                445.389        46.57
1509
1510     DRAINAGE COLLECTED FROM LAYER 2  420.4400                520.505        54.42
1511
1512     RECIRC. FROM LAYER 2 INTO L. 2    0.000000                0.000         0.00
1513
1514     PERC./LEAKAGE THROUGH LAYER 4    0.000398                0.000         0.00
1515
1516     AVG. HEAD ON TOP OF LAYER 3       1.8484
1517
1518     DRAINAGE COLLECTED FROM LAYER 5    0.0004                0.000         0.00

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1519							
1520	RECIRC. FROM LAYER 5 INTO L. 5	0.000000	0.000	0.00			
1521							
1522	PERC./LEAKAGE THROUGH LAYER 7	0.000010	0.000	0.00			
1523							
1524	AVG. HEAD ON TOP OF LAYER 6	0.0000					
1525							
1526	CHANGE IN WATER STORAGE	-31.572	-39.086	-4.09			
1527							
1528	SOIL WATER AT START OF YEAR	435.854	539.587				
1529							
1530	SOIL WATER AT END OF YEAR	404.282	500.501				
1531							
1532	INTERCEPTION WATER AT START OF YEAR	0.000	0.000				
1533							
1534	INTERCEPTION WATER AT END OF YEAR	0.000	0.000				
1535							
1536	SNOW WATER AT START OF YEAR	0.000	0.000	0.00			
1537							
1538	SNOW WATER AT END OF YEAR	0.000	0.000	0.00			
1539							
1540	ANNUAL WATER BUDGET BALANCE	-0.0001	0.000	0.00			
1541							
1542	*****						
1543	*****						
1544							
1545	MONTHLY TOTALS (MM) FOR YEAR 1985						
1546	-----						
1547							
1548		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
1549		-----	-----	-----	-----	-----	-----
1550							
1551	PRECIPITATION	9.9	17.7	65.3	34.1	38.1	38.8
1552		24.9	75.6	72.6	83.9	87.0	38.9
1553							
1554	RUNOFF	0.00	0.00	0.00	0.00	0.00	0.00
1555		0.00	0.00	0.22	0.00	0.37	0.00
1556							
1557	POTENTIAL EVAPOTRANSPIRATION	195.12	147.85	140.94	78.20	55.15	39.93
1558		44.96	59.93	83.26	121.72	138.89	169.63
1559							
1560	ACTUAL EVAPOTRANSPIRATION	12.22	16.97	35.76	24.57	20.88	27.72
1561		15.18	40.07	38.36	51.85	47.55	30.63
1562							
1563	LATERAL DRAINAGE COLLECTED	11.378	11.468	11.154	7.545	14.266	8.958
1564	FROM LAYER 2	17.339	10.625	20.943	32.260	34.014	31.526
1565							
1566	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1567	FROM LAYER 2 INTO L. 2	0.000	0.000	0.000	0.000	0.000	0.000
1568							
1569	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
1570	LAYER 4	0.000	0.000	0.000	0.000	0.000	0.000
1571							
1572	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
1573	FROM LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
1574							
1575	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1576	FROM LAYER 5 INTO L. 5	0.000	0.000	0.000	0.000	0.000	0.000
1577							
1578	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
1579	LAYER 7	0.000	0.000	0.000	0.000	0.000	0.000
1580	*****						
1581							
1582	ANNUAL TOTALS FOR YEAR 1985						
1583	-----						
1584							
1585		MM		CU. METERS		PERCENT	
1586		-----		-----		-----	
1587	PRECIPITATION	586.80		726.459		100.00	

1588							
1589	RUNOFF	0.593	0.734	0.10			
1590							
1591	POTENTIAL EVAPOTRANSPIRATION	1275.600	1579.193				
1592							
1593	ACTUAL EVAPOTRANSPIRATION	361.763	447.862	61.65			
1594							
1595	DRAINAGE COLLECTED FROM LAYER 2	211.4747	261.806	36.04			
1596							
1597	RECIRC. FROM LAYER 2 INTO L. 2	0.000000	0.000	0.00			
1598							
1599	PERC./LEAKAGE THROUGH LAYER 4	0.000223	0.000	0.00			
1600							
1601	AVG. HEAD ON TOP OF LAYER 3	0.9303					
1602							
1603	DRAINAGE COLLECTED FROM LAYER 5	0.0002	0.000	0.00			
1604							
1605	RECIRC. FROM LAYER 5 INTO L. 5	0.000000	0.000	0.00			
1606							
1607	PERC./LEAKAGE THROUGH LAYER 7	0.000010	0.000	0.00			
1608							
1609	AVG. HEAD ON TOP OF LAYER 6	0.0000					
1610							
1611	CHANGE IN WATER STORAGE	12.970	16.056	2.21			
1612							
1613	SOIL WATER AT START OF YEAR	404.282	500.501				
1614							
1615	SOIL WATER AT END OF YEAR	417.252	516.558				
1616							
1617	INTERCEPTION WATER AT START OF YEAR	0.000	0.000				
1618							
1619	INTERCEPTION WATER AT END OF YEAR	0.000	0.000				
1620							
1621	SNOW WATER AT START OF YEAR	0.000	0.000	0.00			
1622							
1623	SNOW WATER AT END OF YEAR	0.000	0.000	0.00			
1624							
1625	ANNUAL WATER BUDGET BALANCE	0.0003	0.000	0.00			
1626							
1627	*****						
1628	*****						
1629							
1630	MONTHLY TOTALS (MM) FOR YEAR 1986						
1631	-----						
1632							
1633		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
1634		-----	-----	-----	-----	-----	-----
1635							
1636	PRECIPITATION	58.5	1.8	3.9	49.2	38.2	7.1
1637		84.6	75.7	41.7	66.8	113.0	20.0
1638							
1639	RUNOFF	0.00	0.00	0.00	0.06	0.00	0.00
1640		0.00	0.00	0.00	0.00	7.37	0.00
1641							
1642	POTENTIAL EVAPOTRANSPIRATION	179.19	153.99	147.52	88.45	55.38	39.11
1643		45.15	61.80	83.20	116.10	133.97	173.69
1644							
1645	ACTUAL EVAPOTRANSPIRATION	31.18	2.77	3.90	3.31	40.73	5.04
1646		38.90	37.81	31.40	38.21	37.22	13.93
1647							
1648	LATERAL DRAINAGE COLLECTED	22.849	22.392	19.102	12.093	8.025	17.523
1649	FROM LAYER 2	13.615	23.319	30.606	23.880	32.992	50.110
1650							
1651	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1652	FROM LAYER 2 INTO L. 2	0.000	0.000	0.000	0.000	0.000	0.000
1653							
1654	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
1655	LAYER 4	0.000	0.000	0.000	0.000	0.000	0.000
1656							

1657	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
1658	FROM LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
1659							
1660	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1661	FROM LAYER 5 INTO L. 5	0.000	0.000	0.000	0.000	0.000	0.000
1662							
1663	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
1664	LAYER 7	0.000	0.000	0.000	0.000	0.000	0.000
1665	*****						

		MM	CU. METERS	PERCENT
1670				
1671				
1672	PRECIPITATION	560.50	693.899	100.00
1673				
1674	RUNOFF	7.427	9.194	1.33
1675				
1676	POTENTIAL EVAPOTRANSPIRATION	1277.563	1581.623	
1677				
1678	ACTUAL EVAPOTRANSPIRATION	284.408	352.097	50.74
1679				
1680	DRAINAGE COLLECTED FROM LAYER 2	276.5057	342.314	49.33
1681				
1682	RECIRC. FROM LAYER 2 INTO L. 2	0.000000	0.000	0.00
1683				
1684	PERC./LEAKAGE THROUGH LAYER 4	0.000274	0.000	0.00
1685				
1686	AVG. HEAD ON TOP OF LAYER 3	1.2198		
1687				
1688	DRAINAGE COLLECTED FROM LAYER 5	0.0003	0.000	0.00
1689				
1690	RECIRC. FROM LAYER 5 INTO L. 5	0.000000	0.000	0.00
1691				
1692	PERC./LEAKAGE THROUGH LAYER 7	0.000010	0.000	0.00
1693				
1694	AVG. HEAD ON TOP OF LAYER 6	0.0000		
1695				
1696	CHANGE IN WATER STORAGE	-7.840	-9.706	-1.40
1697				
1698	SOIL WATER AT START OF YEAR	417.252	516.558	
1699				
1700	SOIL WATER AT END OF YEAR	409.411	506.851	
1701				
1702	INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
1703				
1704	INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
1705				
1706	SNOW WATER AT START OF YEAR	0.000	0.000	0.00
1707				
1708	SNOW WATER AT END OF YEAR	0.000	0.000	0.00
1709				
1710	ANNUAL WATER BUDGET BALANCE	0.0000	0.000	0.00

1715 MONTHLY TOTALS (MM) FOR YEAR 1987

1726							
1727	POTENTIAL EVAPOTRANSPIRATION	199.65	158.95	127.90	83.29	54.91	41.25
1728		44.90	60.03	93.82	124.32	153.95	173.63
1729							
1730	ACTUAL EVAPOTRANSPIRATION	18.98	21.70	29.96	19.70	35.50	22.75
1731		26.52	28.95	20.92	46.98	46.14	42.76
1732							
1733	LATERAL DRAINAGE COLLECTED	29.367	19.242	45.315	23.225	11.693	13.940
1734	FROM LAYER 2	9.895	13.965	16.543	14.248	11.749	32.444
1735							
1736	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1737	FROM LAYER 2 INTO L. 2	0.000	0.000	0.000	0.000	0.000	0.000
1738							
1739	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
1740	LAYER 4	0.000	0.000	0.000	0.000	0.000	0.000
1741							
1742	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
1743	FROM LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
1744							
1745	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1746	FROM LAYER 5 INTO L. 5	0.000	0.000	0.000	0.000	0.000	0.000
1747							
1748	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
1749	LAYER 7	0.000	0.000	0.000	0.000	0.000	0.000
1750							
1751	*****						
1752							
1753	ANNUAL TOTALS FOR YEAR 1987						
1754	-----						
1755							
1756		MM		CU. METERS		PERCENT	
1757		-----		-----		-----	
1758	PRECIPITATION	633.50		784.273		100.00	
1759							
1760	RUNOFF	0.005		0.007		0.00	
1761							
1762	POTENTIAL EVAPOTRANSPIRATION	1316.606		1629.958			
1763							
1764	ACTUAL EVAPOTRANSPIRATION	360.873		446.760		56.96	
1765							
1766	DRAINAGE COLLECTED FROM LAYER 2	241.6263		299.133		38.14	
1767							
1768	RECIRC. FROM LAYER 2 INTO L. 2	0.000000		0.000		0.00	
1769							
1770	PERC./LEAKAGE THROUGH LAYER 4	0.000246		0.000		0.00	
1771							
1772	AVG. HEAD ON TOP OF LAYER 3	1.0635					
1773							
1774	DRAINAGE COLLECTED FROM LAYER 5	0.0002		0.000		0.00	
1775							
1776	RECIRC. FROM LAYER 5 INTO L. 5	0.000000		0.000		0.00	
1777							
1778	PERC./LEAKAGE THROUGH LAYER 7	0.000010		0.000		0.00	
1779							
1780	AVG. HEAD ON TOP OF LAYER 6	0.0000					
1781							
1782	CHANGE IN WATER STORAGE	30.995		38.372		4.89	
1783							
1784	SOIL WATER AT START OF YEAR	409.411		506.851			
1785							
1786	SOIL WATER AT END OF YEAR	440.407		545.223			
1787							
1788	INTERCEPTION WATER AT START OF YEAR	0.000		0.000			
1789							
1790	INTERCEPTION WATER AT END OF YEAR	0.000		0.000			
1791							
1792	SNOW WATER AT START OF YEAR	0.000		0.000		0.00	
1793							
1794	SNOW WATER AT END OF YEAR	0.000		0.000		0.00	

1795						
1796	ANNUAL WATER BUDGET BALANCE	0.0002	0.000	0.00		
1797						
1798	*****					
1799	*****					
1800						
1801	MONTHLY TOTALS (MM) FOR YEAR 1988					
1802	-----					
1803						
1804		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV
1805		-----	-----	-----	-----	-----
1806						
1807	PRECIPITATION	37.3	70.6	37.1	123.2	84.6
1808		106.5	63.6	61.3	35.1	148.5
1809						
1810	RUNOFF	0.00	8.67	0.00	15.81	3.02
1811		3.52	0.00	0.00	0.00	3.09
1812						
1813	POTENTIAL EVAPOTRANSPIRATION	204.60	154.86	136.48	72.05	55.46
1814		49.53	66.31	89.43	143.03	154.81
1815						
1816	ACTUAL EVAPOTRANSPIRATION	24.33	16.71	12.20	36.33	37.22
1817		30.32	33.22	24.49	26.91	57.78
1818						
1819	LATERAL DRAINAGE COLLECTED	32.115	39.566	31.394	18.671	71.673
1820	FROM LAYER 2	53.177	33.293	30.867	34.947	22.798
1821						
1822	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000
1823	FROM LAYER 2 INTO L. 2	0.000	0.000	0.000	0.000	0.000
1824						
1825	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000
1826	LAYER 4	0.000	0.000	0.000	0.000	0.000
1827						
1828	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000
1829	FROM LAYER 5	0.000	0.000	0.000	0.000	0.000
1830						
1831	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000
1832	FROM LAYER 5 INTO L. 5	0.000	0.000	0.000	0.000	0.000
1833						
1834	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000
1835	LAYER 7	0.000	0.000	0.000	0.000	0.000
1836	*****					
1837						
1838	ANNUAL TOTALS FOR YEAR 1988					
1839	-----					
1840						
1841		MM		CU. METERS		PERCENT
1842		-----		-----		-----
1843	PRECIPITATION	952.10		1178.700		100.00
1844						
1845	RUNOFF	35.023		43.358		3.68
1846						
1847	POTENTIAL EVAPOTRANSPIRATION	1337.903		1656.324		
1848						
1849	ACTUAL EVAPOTRANSPIRATION	403.952		500.093		42.43
1850						
1851	DRAINAGE COLLECTED FROM LAYER 2	476.5155		589.926		50.05
1852						
1853	RECIRC. FROM LAYER 2 INTO L. 2	0.000000		0.000		0.00
1854						
1855	PERC./LEAKAGE THROUGH LAYER 4	0.000447		0.001		0.00
1856						
1857	AVG. HEAD ON TOP OF LAYER 3	2.0892				
1858						
1859	DRAINAGE COLLECTED FROM LAYER 5	0.0004		0.001		0.00
1860						
1861	RECIRC. FROM LAYER 5 INTO L. 5	0.000000		0.000		0.00
1862						
1863	PERC./LEAKAGE THROUGH LAYER 7	0.000010		0.000		0.00

1864							
1865	AVG. HEAD ON TOP OF LAYER 6	0.0000					
1866							
1867	CHANGE IN WATER STORAGE	36.609		45.322		3.85	
1868							
1869	SOIL WATER AT START OF YEAR	440.407		545.223			
1870							
1871	SOIL WATER AT END OF YEAR	477.016		590.546			
1872							
1873	INTERCEPTION WATER AT START OF YEAR	0.000		0.000			
1874							
1875	INTERCEPTION WATER AT END OF YEAR	0.000		0.000			
1876							
1877	SNOW WATER AT START OF YEAR	0.000		0.000		0.00	
1878							
1879	SNOW WATER AT END OF YEAR	0.000		0.000		0.00	
1880							
1881	ANNUAL WATER BUDGET BALANCE	0.0001		0.000		0.00	
1882							
1883	*****						
1884	*****						
1885							
1886	MONTHLY TOTALS (MM) FOR YEAR 1989						
1887	-----						
1888							
1889		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
1890		-----	-----	-----	-----	-----	-----
1891							
1892	PRECIPITATION	30.3	8.9	246.3	171.0	58.8	61.1
1893		65.8	46.1	28.5	43.1	86.9	35.2
1894							
1895	RUNOFF	0.00	0.00	86.37	3.41	0.00	0.00
1896		0.19	0.00	0.00	0.00	1.39	0.00
1897							
1898	POTENTIAL EVAPOTRANSPIRATION	178.50	156.83	127.16	75.36	55.17	40.09
1899		44.18	57.74	88.28	130.31	146.19	181.24
1900							
1901	ACTUAL EVAPOTRANSPIRATION	26.37	4.29	50.96	45.76	42.43	38.92
1902		21.47	33.49	29.61	31.29	46.02	21.91
1903							
1904	LATERAL DRAINAGE COLLECTED	64.976	24.105	48.512	126.137	44.339	17.285
1905	FROM LAYER 2	30.548	38.068	23.921	16.107	9.824	23.710
1906							
1907	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1908	FROM LAYER 2 INTO L. 2	0.000	0.000	0.000	0.000	0.000	0.000
1909							
1910	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
1911	LAYER 4	0.000	0.000	0.000	0.000	0.000	0.000
1912							
1913	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
1914	FROM LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
1915							
1916	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1917	FROM LAYER 5 INTO L. 5	0.000	0.000	0.000	0.000	0.000	0.000
1918							
1919	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
1920	LAYER 7	0.000	0.000	0.000	0.000	0.000	0.000
1921							
1922	*****						
1923							
1924	ANNUAL TOTALS FOR YEAR 1989						
1925	-----						
1926							
1927		MM		CU. METERS		PERCENT	
1928		-----		-----		-----	
1929	PRECIPITATION	882.00		1091.916		100.00	
1930							
1931	RUNOFF	91.363		113.107		10.36	
1932							

1933	POTENTIAL EVAPOTRANSPIRATION	1281.048	1585.937	
1934				
1935	ACTUAL EVAPOTRANSPIRATION	392.530	485.952	44.50
1936				
1937	DRAINAGE COLLECTED FROM LAYER 2	467.5310	578.803	53.01
1938				
1939	RECIRC. FROM LAYER 2 INTO L. 2	0.000000	0.000	0.00
1940				
1941	PERC./LEAKAGE THROUGH LAYER 4	0.000439	0.001	0.00
1942				
1943	AVG. HEAD ON TOP OF LAYER 3	2.0590		
1944				
1945	DRAINAGE COLLECTED FROM LAYER 5	0.0004	0.001	0.00
1946				
1947	RECIRC. FROM LAYER 5 INTO L. 5	0.000000	0.000	0.00
1948				
1949	PERC./LEAKAGE THROUGH LAYER 7	0.000010	0.000	0.00
1950				
1951	AVG. HEAD ON TOP OF LAYER 6	0.0000		
1952				
1953	CHANGE IN WATER STORAGE	-69.424	-85.947	-7.87
1954				
1955	SOIL WATER AT START OF YEAR	477.016	590.546	
1956				
1957	SOIL WATER AT END OF YEAR	407.592	504.599	
1958				
1959	INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
1960				
1961	INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
1962				
1963	SNOW WATER AT START OF YEAR	0.000	0.000	0.00
1964				
1965	SNOW WATER AT END OF YEAR	0.000	0.000	0.00
1966				
1967	ANNUAL WATER BUDGET BALANCE	-0.0002	0.000	0.00

PEAK DAILY VALUES FOR YEARS 1969 THROUGH 2001

	(MM)	(CU. METERS)
PRECIPITATION	151.70	187.805
RUNOFF	86.372	106.9291
DRAINAGE COLLECTED FROM LAYER 2	12.15807	15.05170
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.000011	0.00001
AVERAGE HEAD ON TOP OF LAYER 3	19.563	
MAXIMUM HEAD ON TOP OF LAYER 3	34.721	
LOCATION OF MAXIMUM HEAD IN LAYER 2 (DISTANCE FROM DRAIN)	2.8 METERS	
DRAINAGE COLLECTED FROM LAYER 5	0.10000	0.12380
PERCOLATION/LEAKAGE THROUGH LAYER 7	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 6	0.030	
MAXIMUM HEAD ON TOP OF LAYER 6	0.010	
LOCATION OF MAXIMUM HEAD IN LAYER 5 (DISTANCE FROM DRAIN)	0.0 METERS	

2002			
2003	SNOW WATER	0.80	0.9904
2004			
2005	MAXIMUM VEG. SOIL WATER (VOL/VOL)		0.3337
2006			
2007	MINIMUM VEG. SOIL WATER (VOL/VOL)		0.0490
2008			
2009			

2010 *** Maximum heads are computed using McEnroe's equations. ***

2011

2012 Reference: Maximum Saturated Depth over Landfill Liner

2013 by Bruce M. McEnroe, University of Kansas

2014 ASCE Journal of Environmental Engineering

2015 Vol. 119, No. 2, March 1993, pp. 262-270.

2016

2017 *****

2018 *****

2019

2020 AVERAGE MONTHLY VALUES (MM) FOR YEARS 1969 THROUGH 2001

2021 -----

2022		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
2023		-----	-----	-----	-----	-----	-----
2024							

2025 PRECIPITATION

2026 -----

2027	TOTALS	70.51	58.12	59.57	55.89	51.84	52.75
2028		56.92	59.65	65.63	79.27	67.37	50.27

2029							
2030	STD. DEVIATIONS	48.81	44.60	50.18	50.36	35.61	40.40
2031		37.80	38.92	33.22	51.48	34.17	40.74

2032

2033 RUNOFF

2034 -----

2035	TOTALS	1.841	1.467	3.601	2.810	0.921	1.930
2036		0.529	1.599	0.350	2.667	0.527	0.318

2037							
2038	STD. DEVIATIONS	3.944	4.838	15.361	6.335	2.129	6.669
2039		1.288	7.704	0.870	8.548	1.429	0.956

2040

2041 POTENTIAL EVAPOTRANSPIRATION

2042 -----

2043	TOTALS	184.505	152.974	135.909	79.883	54.529	40.254
2044		45.737	62.622	86.743	127.504	148.714	178.757

2045							
2046	STD. DEVIATIONS	14.872	10.214	6.918	4.840	1.717	1.075
2047		1.581	3.291	6.026	8.658	11.930	12.665

2048

2049 ACTUAL EVAPOTRANSPIRATION

2050 -----

2051	TOTALS	33.802	25.005	25.679	20.625	20.855	21.929
2052		26.300	29.720	35.817	35.787	37.336	27.522

2053							
2054	STD. DEVIATIONS	18.976	16.980	14.241	13.716	11.255	8.898
2055		11.886	11.466	11.107	13.929	17.245	19.417

2056

2057 LATERAL DRAINAGE COLLECTED FROM LAYER 2

2058 -----

2059	TOTALS	29.3772	27.8974	32.0730	34.4321	29.0115	27.1947
2060		32.4701	28.3898	27.0898	31.8454	34.8292	31.7375

2061							
2062	STD. DEVIATIONS	20.8550	18.2196	20.0229	25.8976	17.2584	18.2547
2063		27.7710	19.1832	23.0968	20.5779	26.7607	15.8224

2064

2065 LATERAL DRAINAGE RECIRCULATED FROM LAYER 2 INTO L. 2

2066 -----

2067	TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2068		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

2069							
2070	STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

2071		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2072							
2073	PERCOLATION/LEAKAGE THROUGH LAYER	4					
2074	-----						
2075	TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2076		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2077							
2078	STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2079		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2080							
2081	LATERAL DRAINAGE COLLECTED FROM LAYER	5					
2082	-----						
2083	TOTALS	0.0031	0.0000	0.0000	0.0000	0.0000	0.0000
2084		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2085							
2086	STD. DEVIATIONS	0.0174	0.0000	0.0000	0.0000	0.0000	0.0000
2087		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2088							
2089	LATERAL DRAINAGE RECIRCULATED FROM LAYER	5 INTO L.	5				
2090	-----						
2091	TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2092		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2093							
2094	STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2095		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2096							
2097	PERCOLATION/LEAKAGE THROUGH LAYER	7					
2098	-----						
2099	TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2100		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2101							
2102	STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2103		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2104							
2105							
2106	-----						
2107	AVERAGES OF MONTHLY AVERAGED DAILY HEADS (CM)						
2108	-----						
2109							
2110	DAILY AVERAGE HEAD ON TOP OF LAYER	3					
2111	-----						
2112	AVERAGES	0.1525	0.1583	0.1665	0.1847	0.1506	0.1459
2113		0.1685	0.1474	0.1453	0.1653	0.1868	0.1647
2114							
2115	STD. DEVIATIONS	0.1082	0.1024	0.1039	0.1389	0.0896	0.0979
2116		0.1441	0.0996	0.1239	0.1068	0.1435	0.0821
2117							
2118	DAILY AVERAGE HEAD ON TOP OF LAYER	6					
2119	-----						
2120	AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2121		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2122							
2123	STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2124		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2125							
2126	*****						
2127	*****						
2128							
2129	AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1969 THROUGH 2001						
2130	-----						
2131							
2132		MM		CU. METERS		PERCENT	
2133		-----		-----		-----	
2134	PRECIPITATION	727.79	(176.538)	901.0		100.00	
2135							
2136	RUNOFF	18.560	(23.2825)	22.98		2.550	
2137							
2138	POTENTIAL EVAPOTRANSPIRATION	1298.131	(41.9938)	1607.09			
2139							

2140	ACTUAL EVAPOTRANSPIRATION	340.377	(61.0806)	421.39	46.769
2141					
2142	LATERAL DRAINAGE COLLECTED	366.34784	(113.12882)	453.539	50.33737
2143	FROM LAYER 2				
2144					
2145	DRAINAGE RECIRCULATED	0.00000	(0.00000)	0.000	0.00000
2146	FROM LAYER 2 INTO L. 2				
2147					
2148	PERCOLATION/LEAKAGE THROUGH	0.00035	(0.00010)	0.000	0.00005
2149	LAYER 4				
2150					
2151	AVERAGE HEAD ON TOP	1.614	(0.499)		
2152	OF LAYER 3				
2153					
2154	LATERAL DRAINAGE COLLECTED	0.00337	(0.01742)	0.004	0.00046
2155	FROM LAYER 5				
2156					
2157	DRAINAGE RECIRCULATED	0.00000	(0.00000)	0.000	0.00000
2158	FROM LAYER 5 INTO L. 5				
2159					
2160	PERCOLATION/LEAKAGE THROUGH	0.00001	(0.00000)	0.000	0.00000
2161	LAYER 7				
2162					
2163	AVERAGE HEAD ON TOP	0.000	(0.000)		
2164	OF LAYER 6				
2165					
2166	CHANGE IN WATER STORAGE	2.496	(1.6489)	3.09	0.343
2167					
2168	*****				
2169	*****				
2170					
2171					

Daily Cover

LAYER 1

TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER 0

THICKNESS = 15.00 CM
POROSITY = 0.4530 VOL/VOL
FIELD CAPACITY = 0.1900 VOL/VOL
WILTING POINT = 0.0850 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.1520 VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.= 0.2000E-04 CM/SEC

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER 32

THICKNESS = 250.00 CM
POROSITY = 0.4500 VOL/VOL
FIELD CAPACITY = 0.1160 VOL/VOL
WILTING POINT = 0.0490 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.1160 VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.= 0.1000E-01 CM/SEC

LAYER 3

TYPE 2 - LATERAL DRAINAGE LAYER

MATERIAL TEXTURE NUMBER 21

THICKNESS = 30.00 CM
POROSITY = 0.3970 VOL/VOL
FIELD CAPACITY = 0.0320 VOL/VOL
WILTING POINT = 0.0130 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.0300 VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.= 0.3000 CM/SEC
SLOPE = 3.00 PERCENT
DRAINAGE LENGTH = 25.0 METERS

LAYER 4

TYPE 4 - FLEXIBLE MEMBRANE LINER

MATERIAL TEXTURE NUMBER 35

THICKNESS = 0.10 CM
EFFECTIVE SAT. HYD. CONDUCT.= 0.2000E-12 CM/SEC
FML PINHOLE DENSITY = 2.00 HOLES/HECTARE
FML INSTALLATION DEFECTS = 2.00 HOLES/HECTARE
FML PLACEMENT QUALITY = 4 - POOR

LAYER 5

TYPE 3 - BARRIER SOIL LINER

MATERIAL TEXTURE NUMBER 17

THICKNESS = 0.60 CM
POROSITY = 0.7500 VOL/VOL
FIELD CAPACITY = 0.7470 VOL/VOL

WILTING POINT = 0.4000 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.7500 VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.= 0.3000E-08 CM/SEC

LAYER 6

TYPE 2 - LATERAL DRAINAGE LAYER

MATERIAL TEXTURE NUMBER 20

THICKNESS = 0.50 CM
POROSITY = 0.8500 VOL/VOL
FIELD CAPACITY = 0.0100 VOL/VOL
WILTING POINT = 0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.0300 VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.= 10.00 CM/SEC
SLOPE = 3.00 PERCENT
DRAINAGE LENGTH = 25.0 METERS

LAYER 7

TYPE 4 - FLEXIBLE MEMBRANE LINER

MATERIAL TEXTURE NUMBER 35

THICKNESS = 0.10 CM
EFFECTIVE SAT. HYD. CONDUCT.= 0.2000E-12 CM/SEC
FML PINHOLE DENSITY = 2.00 HOLES/HECTARE
FML INSTALLATION DEFECTS = 2.00 HOLES/HECTARE
FML PLACEMENT QUALITY = 4 - POOR

LAYER 8

TYPE 3 - BARRIER SOIL LINER

MATERIAL TEXTURE NUMBER 17

THICKNESS = 0.60 CM
POROSITY = 0.7500 VOL/VOL
FIELD CAPACITY = 0.7470 VOL/VOL
WILTING POINT = 0.4000 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.7500 VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.= 0.3000E-08 CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA 1

VALID FOR 33 YEARS

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
SOIL DATA BASE USING SOIL TEXTURE # 6 WITH BARE
GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND
A SLOPE LENGTH OF 75. METERS.

SCS RUNOFF CURVE NUMBER = 85.85
FRACTION OF AREA ALLOWING RUNOFF = 100.0 PERCENT
AREA PROJECTED ON HORIZONTAL PLANE = 1.0000 HECTARES
EVAPORATIVE ZONE DEPTH = 10.0 CM
INITIAL WATER IN EVAPORATIVE ZONE = 1.520 CM
UPPER LIMIT OF EVAPORATIVE STORAGE = 4.530 CM
FIELD CAPACITY OF EVAPORATIVE ZONE = 1.900 CM

Woodlawn NSW

STATION LATITUDE = -35.00 DEGREES

MAXIMUM LEAF AREA INDEX = 0.00

START OF GROWING SEASON (JULIAN DATE) = 181

END OF GROWING SEASON (JULIAN DATE) = 151

EVAPORATIVE ZONE DEPTH = 10.0 CM

AVERAGE ANNUAL WIND SPEED = 19.00 KPH

AVERAGE 1ST QUARTER RELATIVE HUMIDITY = 69.2 %

AVERAGE 2ND QUARTER RELATIVE HUMIDITY = 78.0 %

AVERAGE 3RD QUARTER RELATIVE HUMIDITY = 76.1 %

AVERAGE 4TH QUARTER RELATIVE HUMIDITY = 72.8

Year	1990	1991	1992	1993	1994	1995
1990	1991	1992	1993	1994	1995	1996
1996	1997	1998	1999	2000	2001	2002
2002	2003	2004	2005	2006	2007	2008
2008	2009	2010	2011	2012	2013	2014
2014	2015	2016	2017	2018	2019	2020
2020	2021	2022	2023	2024	2025	2026
2026	2027	2028	2029	2030	2031	2032
2032	2033	2034	2035	2036	2037	2038
2038	2039	2040	2041	2042	2043	2044
2044	2045	2046	2047	2048	2049	2050
2050	2051	2052	2053	2054	2055	2056
2056	2057	2058	2059	2060	2061	2062
2062	2063	2064	2065	2066	2067	2068
2068	2069	2070	2071	2072	2073	2074
2074	2075	2076	2077	2078	2079	2080
2080	2081	2082	2083	2084	2085	2086
2086	2087	2088	2089	2090	2091	2092
2092	2093	2094	2095	2096	2097	2098
2098	2099	2100	2101	2102	2103	2104
2104	2105	2106	2107	2108	2109	2110
2110	2111	2112	2113	2114	2115	2116
2116	2117	2118	2119	2120	2121	2122
2122	2123	2124	2125	2126	2127	2128
2128	2129	2130	2131	2132	2133	2134
2134	2135	2136	2137	2138	2139	2140
2140	2141	2142	2143	2144	2145	2146
2146	2147	2148	2149	2150	2151	2152
2152	2153	2154	2155	2156	2157	2158
2158	2159	2160	2161	2162	2163	2164
2164	2165	2166	2167	2168	2169	2170
2170	2171	2172	2173	2174	2175	2176
2176	2177	2178	2179	2180	2181	2182
2182	2183	2184	2185	2186	2187	2188
2188	2189	2190	2191	2192	2193	2194
2194	2195	2196	2197	2198	2199	2200
2200	2201	2202	2203	2204	2205	2206
2206	2207	2208	2209	2210	2211	2212
2212	2213	2214	2215	2216	2217	2218
2218	2219	2220	2221	2222	2223	2224
2224	2225	2226	2227	2228	2229	2230
2230	2231	2232	2233	2234	2235	2236
2236	2237	2238	2239	2240	2241	2242
2242	2243	2244	2245	2246	2247	2248
2248	2249	2250	2251	2252	2253	2254
2254	2255	2256	2257	2258	2259	2260
2260	2261	2262	2263	2264	2265	2266
2266	2267	2268	2269	2270	2271	2272
2272	2273	2274	2275	2276	2277	2278
2278	2279	2280	2281	2282	2283	2284
2284	2285	2286	2287	2288	2289	2290
2290	2291	2292	2293	2294	2295	2296
2296	2297	2298	2299	2300	2301	2302

45.8 56.1 50.9 226.4 97.0 46.3

0.87	0.05	0.00	131.40	4.57	9.39
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45.78 64.03 77.70 118.44 138.19 176.66

36.77 35.95 51.07 45.30 80.33 29.20

LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.250	0.399	2.67
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FROM LAYER	3	10.371	15.901	8.418	15.145	12.997	31.455
------------	---	--------	--------	-------	--------	--------	--------

LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
-------------------------------	-------	-------	-------	-------	-------	-------

FROM LAYER 3 INTO L. 3 0.000 0.000 0.000 0.000 0.000 0.000

PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
-----------------------------	-------	-------	-------	-------	-------	-------

LAYER	5	0.000	0.000	0.000	0.000	0.000	0.000
-------	---	-------	-------	-------	-------	-------	-------

LATERAL DRAINAGE COLLECTED	0.100	0.000	0.000	0.000	0.000	0.000
----------------------------	-------	-------	-------	-------	-------	-------

FROM LAYER	6	0.000	0.000	0.000	0.000	0.000	0.000
------------	---	-------	-------	-------	-------	-------	-------

LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
-------------------------------	-------	-------	-------	-------	-------	-------

FROM LAYER	6	INITIAL	6	0.000	0.000	0.000	0.000	0.000	0.000
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PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
-----------------------------	-------	-------	-------	-------	-------	-------

LAYER	8	0.000	0.000	0.000	0.000	0.000	0.000
-------	---	-------	-------	-------	-------	-------	-------

208	*****					
209						
210		ANNUAL TOTALS FOR YEAR 1969				
211	-----					
212						
213			MM	CU. METERS	PERCENT	
214			-----	-----	-----	
215	PRECIPITATION		977.00	9770.002	100.00	
216						
217	RUNOFF		278.359	2783.587	28.49	
218						
219	POTENTIAL EVAPOTRANSPIRATION		1275.914	12759.136		
220						
221	ACTUAL EVAPOTRANSPIRATION		479.205	4792.051	49.05	
222						
223	DRAINAGE COLLECTED FROM LAYER 3		97.6118	976.118	9.99	
224						
225	RECIRC. FROM LAYER 3 INTO L. 3		0.000000	0.000	0.00	
226						
227	PERC./LEAKAGE THROUGH LAYER 5		0.000114	0.001	0.00	
228						
229	AVG. HEAD ON TOP OF LAYER 4		0.4257			
230						
231	DRAINAGE COLLECTED FROM LAYER 6		0.1001	1.001	0.01	
232						
233	RECIRC. FROM LAYER 6 INTO L. 6		0.000000	0.000	0.00	
234						
235	PERC./LEAKAGE THROUGH LAYER 8		0.000006	0.000	0.00	
236						
237	AVG. HEAD ON TOP OF LAYER 7		0.0001			
238						
239	CHANGE IN WATER STORAGE		121.724	1217.245	12.46	
240						
241	SOIL WATER AT START OF YEAR		330.949	3309.492		
242						
243	SOIL WATER AT END OF YEAR		452.674	4526.737		
244						
245	INTERCEPTION WATER AT START OF YEAR		0.000	0.000		
246						
247	INTERCEPTION WATER AT END OF YEAR		0.000	0.000		
248						
249	SNOW WATER AT START OF YEAR		0.000	0.000	0.00	
250						
251	SNOW WATER AT END OF YEAR		0.000	0.000	0.00	
252						
253	ANNUAL WATER BUDGET BALANCE		0.0001	0.001	0.00	
254						
255	*****					
256	*****					
257						
258		MONTHLY TOTALS (MM) FOR YEAR 1970				
259	-----					
260						
261		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV
262		-----	-----	-----	-----	-----
263						
264	PRECIPITATION	90.5	59.7	65.1	102.3	96.4
265		3.0	49.3	134.0	43.0	64.1
266						
267	RUNOFF	22.27	14.70	7.02	29.01	44.00
268		0.00	3.01	26.07	0.69	0.60
269						
270	POTENTIAL EVAPOTRANSPIRATION	158.72	150.68	131.02	80.17	50.80
271		46.49	57.86	75.10	131.09	140.82
272						
273	ACTUAL EVAPOTRANSPIRATION	46.97	35.02	37.52	43.80	27.65
274		10.45	14.96	60.44	54.86	36.30
275						
276	LATERAL DRAINAGE COLLECTED	20.605	13.176	15.568	9.507	23.397

277	FROM LAYER 3	17.890	13.445	8.425	16.551	22.730	9.691
278							
279	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
280	FROM LAYER 3 INTO L. 3	0.000	0.000	0.000	0.000	0.000	0.000
281							
282	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
283	LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
284							
285	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
286	FROM LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
287							
288	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
289	FROM LAYER 6 INTO L. 6	0.000	0.000	0.000	0.000	0.000	0.000
290							
291	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
292	LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
293	*****						

ANNUAL TOTALS FOR YEAR 1970

	MM	CU. METERS	PERCENT
	-----	-----	-----
300 PRECIPITATION	828.00	8280.000	100.00
301			
302 RUNOFF	171.673	1716.735	20.73
303			
304 POTENTIAL EVAPOTRANSPIRATION	1235.073	12350.733	
305			
306 ACTUAL EVAPOTRANSPIRATION	451.389	4513.890	54.52
307			
308 DRAINAGE COLLECTED FROM LAYER 3	191.4025	1914.025	23.12
309			
310 RECIRC. FROM LAYER 3 INTO L. 3	0.000000	0.000	0.00
311			
312 PERC./LEAKAGE THROUGH LAYER 5	0.000202	0.002	0.00
313			
314 AVG. HEAD ON TOP OF LAYER 4	0.8428		
315			
316 DRAINAGE COLLECTED FROM LAYER 6	0.0002	0.002	0.00
317			
318 RECIRC. FROM LAYER 6 INTO L. 6	0.000000	0.000	0.00
319			
320 PERC./LEAKAGE THROUGH LAYER 8	0.000010	0.000	0.00
321			
322 AVG. HEAD ON TOP OF LAYER 7	0.0000		
323			
324 CHANGE IN WATER STORAGE	13.535	135.349	1.63
325			
326 SOIL WATER AT START OF YEAR	452.674	4526.737	
327			
328 SOIL WATER AT END OF YEAR	466.209	4662.086	
329			
330 INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
331			
332 INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
333			
334 SNOW WATER AT START OF YEAR	0.000	0.000	0.00
335			
336 SNOW WATER AT END OF YEAR	0.000	0.000	0.00
337			
338 ANNUAL WATER BUDGET BALANCE	-0.0001	-0.001	0.00
339			
340 *****			
341 *****			

MONTHLY TOTALS (MM) FOR YEAR 1971

		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
346		-----	-----	-----	-----	-----	-----
347							
348							
349	PRECIPITATION	84.6	89.1	26.5	22.0	15.5	8.2
350		15.8	75.8	36.1	31.6	59.8	116.7
351							
352	RUNOFF	0.70	16.35	0.00	0.00	0.00	0.00
353		0.00	6.30	0.00	0.87	0.00	16.55
354							
355	POTENTIAL EVAPOTRANSPIRATION	166.79	134.69	129.98	80.18	52.54	39.41
356		42.11	60.23	85.62	135.21	135.07	166.98
357							
358	ACTUAL EVAPOTRANSPIRATION	65.38	65.80	13.30	23.60	24.85	6.54
359		5.41	35.43	41.02	29.72	45.08	65.58
360							
361	LATERAL DRAINAGE COLLECTED	24.048	9.268	25.022	18.047	12.736	9.840
362	FROM LAYER 3	7.177	6.072	4.156	2.046	6.414	7.287
363							
364	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
365	FROM LAYER 3 INTO L. 3	0.000	0.000	0.000	0.000	0.000	0.000
366							
367	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
368	LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
369							
370	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
371	FROM LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
372							
373	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
374	FROM LAYER 6 INTO L. 6	0.000	0.000	0.000	0.000	0.000	0.000
375							
376	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
377	LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
378	*****						

ANNUAL TOTALS FOR YEAR 1971

380						
381						
382						
383		MM	CU. METERS	PERCENT		
384						
385	PRECIPITATION	581.70	5817.001	100.00		
386						
387	RUNOFF	40.759	407.594	7.01		
388						
389	POTENTIAL EVAPOTRANSPIRATION	1228.806	12288.061			
390						
391	ACTUAL EVAPOTRANSPIRATION	421.713	4217.132	72.50		
392						
393	DRAINAGE COLLECTED FROM LAYER 3	132.1117	1321.117	22.71		
394						
395	RECIRC. FROM LAYER 3 INTO L. 3	0.000000	0.000	0.00		
396						
397	PERC./LEAKAGE THROUGH LAYER 5	0.000159	0.002	0.00		
398						
399	AVG. HEAD ON TOP OF LAYER 4	0.5813				
400						
401	DRAINAGE COLLECTED FROM LAYER 6	0.0001	0.001	0.00		
402						
403	RECIRC. FROM LAYER 6 INTO L. 6	0.000000	0.000	0.00		
404						
405	PERC./LEAKAGE THROUGH LAYER 8	0.000009	0.000	0.00		
406						
407	AVG. HEAD ON TOP OF LAYER 7	0.0000				
408						
409	CHANGE IN WATER STORAGE	-12.884	-128.844	-2.21		
410						
411	SOIL WATER AT START OF YEAR	466.209	4662.086			
412						
413	SOIL WATER AT END OF YEAR	453.324	4533.242			
414						

415	INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
416				
417	INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
418				
419	SNOW WATER AT START OF YEAR	0.000	0.000	0.00
420				
421	SNOW WATER AT END OF YEAR	0.000	0.000	0.00
422				
423	ANNUAL WATER BUDGET BALANCE	0.0000	0.000	0.00

MONTHLY TOTALS (MM) FOR YEAR 1972

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
PRECIPITATION	137.8	37.3	23.4	57.9	22.4	10.9
	12.5	75.7	19.9	90.2	48.5	5.8
RUNOFF	38.55	0.00	0.00	3.12	0.00	0.00
	0.00	2.69	0.00	13.53	0.02	0.00
POTENTIAL EVAPOTRANSPIRATION	155.73	142.26	133.40	78.85	55.80	40.22
	47.25	63.29	98.41	124.94	151.74	194.09
ACTUAL EVAPOTRANSPIRATION	84.31	41.48	28.93	36.67	23.78	8.00
	16.45	42.90	32.22	39.90	61.22	10.98
LATERAL DRAINAGE COLLECTED FROM LAYER 3	3.345	23.370	18.666	12.839	6.473	7.171
	7.079	6.331	5.962	1.105	3.288	5.999
LATERAL DRAINAGE RECIRCULATED FROM LAYER 3 INTO L. 3	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE COLLECTED FROM LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE RECIRCULATED FROM LAYER 6 INTO L. 6	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 1972

	MM	CU. METERS	PERCENT
	-----	-----	-----
PRECIPITATION	542.30	5423.000	100.00
RUNOFF	57.901	579.011	10.68
POTENTIAL EVAPOTRANSPIRATION	1285.984	12859.844	
ACTUAL EVAPOTRANSPIRATION	426.827	4268.271	78.71
DRAINAGE COLLECTED FROM LAYER 3	101.6286	1016.286	18.74
RECIRC. FROM LAYER 3 INTO L. 3	0.000000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 5	0.000138	0.001	0.00

484	AVG. HEAD ON TOP OF LAYER 4	0.4508				
485						
486	DRAINAGE COLLECTED FROM LAYER 6	0.0001	0.001	0.00		
487						
488	RECIRC. FROM LAYER 6 INTO L. 6	0.000000	0.000	0.00		
489						
490	PERC./LEAKAGE THROUGH LAYER 8	0.000009	0.000	0.00		
491						
492	AVG. HEAD ON TOP OF LAYER 7	0.0000				
493						
494	CHANGE IN WATER STORAGE	-44.057	-440.568	-8.12		
495						
496	SOIL WATER AT START OF YEAR	453.324	4533.242			
497						
498	SOIL WATER AT END OF YEAR	409.267	4092.675			
499						
500	INTERCEPTION WATER AT START OF YEAR	0.000	0.000			
501						
502	INTERCEPTION WATER AT END OF YEAR	0.000	0.000			
503						
504	SNOW WATER AT START OF YEAR	0.000	0.000	0.00		
505						
506	SNOW WATER AT END OF YEAR	0.000	0.000	0.00		
507						
508	ANNUAL WATER BUDGET BALANCE	-0.0001	-0.001	0.00		
509						
510	*****					
511	*****					
512						
513	MONTHLY TOTALS (MM) FOR YEAR 1973					
514	-----					
515						
516		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV JUN/DEC
517		-----	-----	-----	-----	-----
518						
519	PRECIPITATION	58.3	133.1	41.2	15.2	31.2 45.6
520		74.7	84.4	38.8	110.4	118.6 50.2
521						
522	RUNOFF	1.36	21.91	0.26	0.00	1.76 0.01
523		7.13	10.07	0.48	9.84	16.27 4.14
524						
525	POTENTIAL EVAPOTRANSPIRATION	197.17	134.95	135.62	81.62	57.01 39.99
526		47.93	61.19	92.26	118.35	143.84 177.07
527						
528	ACTUAL EVAPOTRANSPIRATION	42.81	74.09	26.64	20.44	25.39 26.18
529		44.68	41.23	44.60	59.29	78.23 31.58
530						
531	LATERAL DRAINAGE COLLECTED	9.382	7.865	4.019	11.051	8.947 14.204
532	FROM LAYER 3	9.299	13.319	14.800	18.491	20.513 27.065
533						
534	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000 0.000
535	FROM LAYER 3 INTO L. 3	0.000	0.000	0.000	0.000	0.000 0.000
536						
537	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000 0.000
538	LAYER 5	0.000	0.000	0.000	0.000	0.000 0.000
539						
540	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000 0.000
541	FROM LAYER 6	0.000	0.000	0.000	0.000	0.000 0.000
542						
543	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000 0.000
544	FROM LAYER 6 INTO L. 6	0.000	0.000	0.000	0.000	0.000 0.000
545						
546	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000 0.000
547	LAYER 8	0.000	0.000	0.000	0.000	0.000 0.000
548						
549	*****					
550						
551	ANNUAL TOTALS FOR YEAR 1973					
552	-----					

553						
554			MM	CU. METERS	PERCENT	
555			-----	-----	-----	
556	PRECIPITATION		801.70	8017.001	100.00	
557						
558	RUNOFF		73.225	732.245	9.13	
559						
560	POTENTIAL EVAPOTRANSPIRATION		1286.999	12869.994		
561						
562	ACTUAL EVAPOTRANSPIRATION		515.165	5151.648	64.26	
563						
564	DRAINAGE COLLECTED FROM LAYER 3		158.9554	1589.554	19.83	
565						
566	RECIRC. FROM LAYER 3 INTO L. 3		0.000000	0.000	0.00	
567						
568	PERC./LEAKAGE THROUGH LAYER 5		0.000180	0.002	0.00	
569						
570	AVG. HEAD ON TOP OF LAYER 4		0.6999			
571						
572	DRAINAGE COLLECTED FROM LAYER 6		0.0002	0.002	0.00	
573						
574	RECIRC. FROM LAYER 6 INTO L. 6		0.000000	0.000	0.00	
575						
576	PERC./LEAKAGE THROUGH LAYER 8		0.000009	0.000	0.00	
577						
578	AVG. HEAD ON TOP OF LAYER 7		0.0000			
579						
580	CHANGE IN WATER STORAGE		54.355	543.553	6.78	
581						
582	SOIL WATER AT START OF YEAR		409.267	4092.675		
583						
584	SOIL WATER AT END OF YEAR		463.623	4636.228		
585						
586	INTERCEPTION WATER AT START OF YEAR		0.000	0.000		
587						
588	INTERCEPTION WATER AT END OF YEAR		0.000	0.000		
589						
590	SNOW WATER AT START OF YEAR		0.000	0.000	0.00	
591						
592	SNOW WATER AT END OF YEAR		0.000	0.000	0.00	
593						
594	ANNUAL WATER BUDGET BALANCE		-0.0001	-0.001	0.00	
595						
596	*****					
597	*****					
598						
599	MONTHLY TOTALS (MM) FOR YEAR 1974					
600	-----					
601						
602		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV
603		-----	-----	-----	-----	-----
604						
605	PRECIPITATION	103.0	82.6	65.1	199.0	90.3
606		74.7	200.0	103.2	133.1	86.9
607						
608	RUNOFF	41.18	34.03	6.14	67.36	37.61
609		17.39	126.98	21.59	23.80	7.57
610						
611	POTENTIAL EVAPOTRANSPIRATION	165.50	142.63	131.99	69.29	54.27
612		45.27	59.37	78.66	116.83	137.48
613						
614	ACTUAL EVAPOTRANSPIRATION	52.79	28.80	27.59	66.49	31.03
615		43.96	33.96	48.37	70.51	64.36
616						
617	LATERAL DRAINAGE COLLECTED	13.663	18.812	17.362	23.902	52.056
618	FROM LAYER 3	23.663	13.606	18.423	29.400	42.858
619						
620	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000
621	FROM LAYER 3 INTO L. 3	0.000	0.000	0.000	0.000	0.000

622							
623	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
624	LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
625							
626	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
627	FROM LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
628							
629	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
630	FROM LAYER 6 INTO L. 6	0.000	0.000	0.000	0.000	0.000	0.000
631							
632	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
633	LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
634	*****						

635

636 ANNUAL TOTALS FOR YEAR 1974

637 -----

	MM	CU. METERS	PERCENT
	-----	-----	-----
639			
640			
641	PRECIPITATION	1168.20	11682.002
642			100.00
643	RUNOFF	383.647	3836.467
644			32.84
645	POTENTIAL EVAPOTRANSPIRATION	1232.550	12325.504
646			
647	ACTUAL EVAPOTRANSPIRATION	511.472	5114.719
648			43.78
649	DRAINAGE COLLECTED FROM LAYER 3	297.2890	2972.890
650			25.45
651	RECIRC. FROM LAYER 3 INTO L. 3	0.000000	0.000
652			0.00
653	PERC./LEAKAGE THROUGH LAYER 5	0.000292	0.003
654			0.00
655	AVG. HEAD ON TOP OF LAYER 4	1.3106	
656			
657	DRAINAGE COLLECTED FROM LAYER 6	0.0003	0.003
658			0.00
659	RECIRC. FROM LAYER 6 INTO L. 6	0.000000	0.000
660			0.00
661	PERC./LEAKAGE THROUGH LAYER 8	0.000010	0.000
662			0.00
663	AVG. HEAD ON TOP OF LAYER 7	0.0000	
664			
665	CHANGE IN WATER STORAGE	-24.208	-242.079
666			-2.07
667	SOIL WATER AT START OF YEAR	463.623	4636.228
668			
669	SOIL WATER AT END OF YEAR	439.415	4394.148
670			
671	INTERCEPTION WATER AT START OF YEAR	0.000	0.000
672			
673	INTERCEPTION WATER AT END OF YEAR	0.000	0.000
674			
675	SNOW WATER AT START OF YEAR	0.000	0.000
676			0.00
677	SNOW WATER AT END OF YEAR	0.000	0.000
678			0.00
679	ANNUAL WATER BUDGET BALANCE	0.0002	0.002
680			0.00

681 *****

682 *****

683

684 MONTHLY TOTALS (MM) FOR YEAR 1975

685 -----

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
687						
688						
689						
690	PRECIPITATION	37.2	76.6	65.1	72.8	19.9
						152.6

691		106.2	46.0	98.4	110.3	35.0	35.2
692							
693	RUNOFF	1.28	6.77	2.75	13.73	0.00	74.78
694		27.67	0.00	3.32	6.24	0.00	0.02
695							
696	POTENTIAL EVAPOTRANSPIRATION	194.28	144.64	127.61	75.66	54.47	40.62
697		48.92	61.86	82.37	115.71	160.78	170.07
698							
699	ACTUAL EVAPOTRANSPIRATION	10.74	48.77	48.26	44.95	21.88	18.55
700		34.61	33.61	53.48	80.97	45.00	19.21
701							
702	LATERAL DRAINAGE COLLECTED	20.839	11.954	11.631	13.132	14.753	18.557
703	FROM LAYER 3	38.528	43.336	18.448	18.214	17.669	22.974
704							
705	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
706	FROM LAYER 3 INTO L. 3	0.000	0.000	0.000	0.000	0.000	0.000
707							
708	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
709	LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
710							
711	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
712	FROM LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
713							
714	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
715	FROM LAYER 6 INTO L. 6	0.000	0.000	0.000	0.000	0.000	0.000
716							
717	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
718	LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
719							

ANNUAL TOTALS FOR YEAR 1975

	MM	CU. METERS	PERCENT
	-----	-----	-----
727 PRECIPITATION	855.30	8553.000	100.00
729 RUNOFF	136.558	1365.583	15.97
731 POTENTIAL EVAPOTRANSPIRATION	1277.003	12770.027	
733 ACTUAL EVAPOTRANSPIRATION	460.009	4600.090	53.78
735 DRAINAGE COLLECTED FROM LAYER 3	250.0352	2500.353	29.23
737 RECIRC. FROM LAYER 3 INTO L. 3	0.000000	0.000	0.00
739 PERC./LEAKAGE THROUGH LAYER 5	0.000251	0.003	0.00
741 AVG. HEAD ON TOP OF LAYER 4	1.0968		
743 DRAINAGE COLLECTED FROM LAYER 6	0.0002	0.002	0.00
745 RECIRC. FROM LAYER 6 INTO L. 6	0.000000	0.000	0.00
747 PERC./LEAKAGE THROUGH LAYER 8	0.000010	0.000	0.00
749 AVG. HEAD ON TOP OF LAYER 7	0.0000		
751 CHANGE IN WATER STORAGE	8.697	86.973	1.02
753 SOIL WATER AT START OF YEAR	439.415	4394.148	
755 SOIL WATER AT END OF YEAR	448.112	4481.121	
757 INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
759 INTERCEPTION WATER AT END OF YEAR	0.000	0.000	

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760
761     SNOW WATER AT START OF YEAR                0.000                0.000                0.00
762
763     SNOW WATER AT END OF YEAR                  0.000                0.000                0.00
764
765     ANNUAL WATER BUDGET BALANCE                -0.0001              -0.001                0.00
766
767     *****
768     *****
769
770             MONTHLY TOTALS (MM) FOR YEAR 1976
771     -----
772
773             JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
774             -----
775
776     PRECIPITATION                130.3      65.4      41.1      19.6      8.1      61.0
777                                46.0      26.3      65.1     205.5     52.0     22.6
778
779     RUNOFF                      34.37      0.08      0.00      0.00      0.00      0.21
780                                0.05      0.00      5.39     81.52      0.00      0.00
781
782     POTENTIAL EVAPOTRANSPIRATION  165.28    136.88    127.35     78.16     55.50     40.88
783                                45.58      63.82     83.46    108.33    147.77    192.22
784
785     ACTUAL EVAPOTRANSPIRATION     75.56      58.06      34.45     21.57      9.42     29.99
786                                38.44      30.56     42.20     63.28     38.72     32.81
787
788     LATERAL DRAINAGE COLLECTED     16.767     11.403     19.891     11.654     10.404      8.847
789     FROM LAYER 3                  4.530      3.602      5.535      9.042     40.247     21.093
790
791     LATERAL DRAINAGE RECIRCULATED   0.000      0.000      0.000      0.000      0.000      0.000
792     FROM LAYER 3 INTO L. 3        0.000      0.000      0.000      0.000      0.000      0.000
793
794     PERCOLATION/LEAKAGE THROUGH     0.000      0.000      0.000      0.000      0.000      0.000
795     LAYER 5                       0.000      0.000      0.000      0.000      0.000      0.000
796
797     LATERAL DRAINAGE COLLECTED     0.000      0.000      0.000      0.000      0.000      0.000
798     FROM LAYER 6                  0.000      0.000      0.000      0.000      0.000      0.000
799
800     LATERAL DRAINAGE RECIRCULATED   0.000      0.000      0.000      0.000      0.000      0.000
801     FROM LAYER 6 INTO L. 6        0.000      0.000      0.000      0.000      0.000      0.000
802
803     PERCOLATION/LEAKAGE THROUGH     0.000      0.000      0.000      0.000      0.000      0.000
804     LAYER 8                       0.000      0.000      0.000      0.000      0.000      0.000
805
806     *****
807
808             ANNUAL TOTALS FOR YEAR 1976
809     -----
810
811                                MM                CU. METERS                PERCENT
812                                -----
813     PRECIPITATION                743.00                7430.004                100.00
814
815     RUNOFF                      121.626                1216.263                16.37
816
817     POTENTIAL EVAPOTRANSPIRATION  1245.230                12452.299
818
819     ACTUAL EVAPOTRANSPIRATION     475.071                4750.710                63.94
820
821     DRAINAGE COLLECTED FROM LAYER 3  163.0164                1630.164                21.94
822
823     RECIRC. FROM LAYER 3 INTO L. 3    0.000000                0.000                0.00
824
825     PERC./LEAKAGE THROUGH LAYER 5    0.000185                0.002                0.00
826
827     AVG. HEAD ON TOP OF LAYER 4      0.7181
828

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829	DRAINAGE COLLECTED FROM LAYER 6	0.0002	0.002	0.00
830				
831	RECIRC. FROM LAYER 6 INTO L. 6	0.000000	0.000	0.00
832				
833	PERC./LEAKAGE THROUGH LAYER 8	0.000010	0.000	0.00
834				
835	AVG. HEAD ON TOP OF LAYER 7	0.0000		
836				
837	CHANGE IN WATER STORAGE	-16.714	-167.136	-2.25
838				
839	SOIL WATER AT START OF YEAR	448.112	4481.121	
840				
841	SOIL WATER AT END OF YEAR	431.399	4313.985	
842				
843	INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
844				
845	INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
846				
847	SNOW WATER AT START OF YEAR	0.000	0.000	0.00
848				
849	SNOW WATER AT END OF YEAR	0.000	0.000	0.00
850				
851	ANNUAL WATER BUDGET BALANCE	0.0001	0.001	0.00

MONTHLY TOTALS (MM) FOR YEAR 1977

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
PRECIPITATION	37.4	207.5	37.0	30.6	63.3	49.1
	10.7	26.5	112.9	2.6	1.8	25.7
RUNOFF	0.75	112.74	0.00	2.93	0.53	0.00
	0.00	0.68	14.34	0.00	0.00	0.00
POTENTIAL EVAPOTRANSPIRATION	193.88	153.53	133.46	83.64	52.37	39.74
	45.23	68.18	86.19	145.61	165.02	196.98
ACTUAL EVAPOTRANSPIRATION	39.00	45.59	37.09	23.95	22.11	35.31
	21.24	23.22	57.40	16.01	5.57	11.38
LATERAL DRAINAGE COLLECTED FROM LAYER 3	14.212	10.733	7.187	13.594	15.366	7.956
	18.569	14.812	8.432	16.931	14.417	11.338
LATERAL DRAINAGE RECIRCULATED FROM LAYER 3 INTO L. 3	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE COLLECTED FROM LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE RECIRCULATED FROM LAYER 6 INTO L. 6	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 1977

MM	CU. METERS	PERCENT
----	------------	---------

898						
899	PRECIPITATION	605.10	6051.000	100.00		
900						
901	RUNOFF	131.987	1319.873	21.81		
902						
903	POTENTIAL EVAPOTRANSPIRATION	1363.835	13638.352			
904						
905	ACTUAL EVAPOTRANSPIRATION	337.873	3378.727	55.84		
906						
907	DRAINAGE COLLECTED FROM LAYER 3	153.5447	1535.447	25.38		
908						
909	RECIRC. FROM LAYER 3 INTO L. 3	0.000000	0.000	0.00		
910						
911	PERC./LEAKAGE THROUGH LAYER 5	0.000173	0.002	0.00		
912						
913	AVG. HEAD ON TOP OF LAYER 4	0.6755				
914						
915	DRAINAGE COLLECTED FROM LAYER 6	0.0002	0.002	0.00		
916						
917	RECIRC. FROM LAYER 6 INTO L. 6	0.000000	0.000	0.00		
918						
919	PERC./LEAKAGE THROUGH LAYER 8	0.000010	0.000	0.00		
920						
921	AVG. HEAD ON TOP OF LAYER 7	0.0000				
922						
923	CHANGE IN WATER STORAGE	-18.305	-183.046	-3.03		
924						
925	SOIL WATER AT START OF YEAR	431.399	4313.985			
926						
927	SOIL WATER AT END OF YEAR	413.094	4130.938			
928						
929	INTERCEPTION WATER AT START OF YEAR	0.000	0.000			
930						
931	INTERCEPTION WATER AT END OF YEAR	0.000	0.000			
932						
933	SNOW WATER AT START OF YEAR	0.000	0.000	0.00		
934						
935	SNOW WATER AT END OF YEAR	0.000	0.000	0.00		
936						
937	ANNUAL WATER BUDGET BALANCE	-0.0002	-0.002	0.00		
938						
939	*****					
940	*****					
941						
942	MONTHLY TOTALS (MM) FOR YEAR 1978					
943	-----					
944						
945		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV
946		-----	-----	-----	-----	-----
947						
948	PRECIPITATION	195.8	12.9	170.2	30.5	84.4
949		57.2	26.3	123.2	51.7	68.5
950						
951	RUNOFF	68.87	0.00	80.87	0.77	1.91
952		2.00	0.00	37.35	4.43	12.70
953						
954	POTENTIAL EVAPOTRANSPIRATION	168.37	166.15	136.63	81.37	56.68
955		45.24	61.17	80.58	126.77	147.93
956						
957	ACTUAL EVAPOTRANSPIRATION	75.66	17.45	47.94	30.87	33.04
958		35.59	30.95	49.29	25.67	47.67
959						
960	LATERAL DRAINAGE COLLECTED	9.700	4.500	17.130	13.828	25.040
961	FROM LAYER 3	49.017	32.300	14.073	22.324	10.668
962						
963	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000
964	FROM LAYER 3 INTO L. 3	0.000	0.000	0.000	0.000	0.000
965						
966	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000

967	LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
968							
969	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
970	FROM LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
971							
972	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
973	FROM LAYER 6 INTO L. 6	0.000	0.000	0.000	0.000	0.000	0.000
974							
975	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
976	LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 1978

	MM	CU. METERS	PERCENT
PRECIPITATION	952.90	9528.998	100.00
RUNOFF	219.358	2193.582	23.02
POTENTIAL EVAPOTRANSPIRATION	1272.909	12729.087	
ACTUAL EVAPOTRANSPIRATION	484.193	4841.932	50.81
DRAINAGE COLLECTED FROM LAYER 3	233.6387	2336.387	24.52
RECIRC. FROM LAYER 3 INTO L. 3	0.000000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 5	0.000240	0.002	0.00
AVG. HEAD ON TOP OF LAYER 4	1.0210		
DRAINAGE COLLECTED FROM LAYER 6	0.0002	0.002	0.00
RECIRC. FROM LAYER 6 INTO L. 6	0.000000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 8	0.000010	0.000	0.00
AVG. HEAD ON TOP OF LAYER 7	0.0000		
CHANGE IN WATER STORAGE	15.709	157.094	1.65
SOIL WATER AT START OF YEAR	413.094	4130.938	
SOIL WATER AT END OF YEAR	428.803	4288.033	
INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.000	0.00

MONTHLY TOTALS (MM) FOR YEAR 1979

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.5	9.0	118.1	78.2	22.7	12.6
	24.7	46.0	33.7	56.7	52.2	0.4

1036							
1037	RUNOFF	0.00	0.00	27.07	17.67	0.00	0.00
1038		0.00	0.80	0.00	0.80	12.45	0.00
1039							
1040	POTENTIAL EVAPOTRANSPIRATION	207.64	163.65	133.24	78.35	51.24	41.70
1041		46.59	59.75	83.69	129.67	156.32	202.90
1042							
1043	ACTUAL EVAPOTRANSPIRATION	6.02	4.96	57.78	37.61	27.94	8.71
1044		19.64	35.34	38.71	52.43	27.87	3.55
1045							
1046	LATERAL DRAINAGE COLLECTED	14.795	10.267	9.748	2.737	12.990	13.403
1047	FROM LAYER 3	10.371	7.764	7.069	3.394	4.211	1.592
1048							
1049	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1050	FROM LAYER 3 INTO L. 3	0.000	0.000	0.000	0.000	0.000	0.000
1051							
1052	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
1053	LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
1054							
1055	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
1056	FROM LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
1057							
1058	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1059	FROM LAYER 6 INTO L. 6	0.000	0.000	0.000	0.000	0.000	0.000
1060							
1061	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
1062	LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
1063							
1064	*****						
1065							
1066	ANNUAL TOTALS FOR YEAR 1979						
1067	-----						
1068							
1069			MM		CU. METERS		PERCENT
1070			-----		-----		-----
1071	PRECIPITATION		454.80		4548.001		100.00
1072							
1073	RUNOFF		58.797		587.966		12.93
1074							
1075	POTENTIAL EVAPOTRANSPIRATION		1354.731		13547.312		
1076							
1077	ACTUAL EVAPOTRANSPIRATION		320.567		3205.673		70.49
1078							
1079	DRAINAGE COLLECTED FROM LAYER 3		98.3430		983.430		21.62
1080							
1081	RECIRC. FROM LAYER 3 INTO L. 3		0.000000		0.000		0.00
1082							
1083	PERC./LEAKAGE THROUGH LAYER 5		0.000133		0.001		0.00
1084							
1085	AVG. HEAD ON TOP OF LAYER 4		0.4341				
1086							
1087	DRAINAGE COLLECTED FROM LAYER 6		0.0001		0.001		0.00
1088							
1089	RECIRC. FROM LAYER 6 INTO L. 6		0.000000		0.000		0.00
1090							
1091	PERC./LEAKAGE THROUGH LAYER 8		0.000009		0.000		0.00
1092							
1093	AVG. HEAD ON TOP OF LAYER 7		0.0000				
1094							
1095	CHANGE IN WATER STORAGE		-22.907		-229.069		-5.04
1096							
1097	SOIL WATER AT START OF YEAR		428.803		4288.033		
1098							
1099	SOIL WATER AT END OF YEAR		405.896		4058.964		
1100							
1101	INTERCEPTION WATER AT START OF YEAR		0.000		0.000		
1102							
1103	INTERCEPTION WATER AT END OF YEAR		0.000		0.000		
1104							

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1105      SNOW WATER AT START OF YEAR          0.000          0.000          0.00
1106
1107      SNOW WATER AT END OF YEAR              0.000          0.000          0.00
1108
1109      ANNUAL WATER BUDGET BALANCE             0.0001          0.001          0.00
1110
1111      *****
1112      *****
1113
1114      PEAK DAILY VALUES FOR YEARS 1969 THROUGH 2001
1115      -----
1116
1117                                     (MM)          (CU. METERS)
1118                                     -----          -----
1119      PRECIPITATION                        151.70          1517.000
1120
1121      RUNOFF                              137.201          1372.0055
1122
1123      DRAINAGE COLLECTED FROM LAYER 3        3.42468          34.24677
1124
1125      PERCOLATION/LEAKAGE THROUGH LAYER 5    0.000003          0.00003
1126
1127      AVERAGE HEAD ON TOP OF LAYER 4        5.511
1128
1129      MAXIMUM HEAD ON TOP OF LAYER 4         10.490
1130
1131      LOCATION OF MAXIMUM HEAD IN LAYER 3
1132      (DISTANCE FROM DRAIN)                 1.2 METERS
1133
1134      DRAINAGE COLLECTED FROM LAYER 6        0.10000          1.00000
1135
1136      PERCOLATION/LEAKAGE THROUGH LAYER 8    0.000000          0.00000
1137
1138      AVERAGE HEAD ON TOP OF LAYER 7        0.030
1139
1140      MAXIMUM HEAD ON TOP OF LAYER 7         0.010
1141
1142      LOCATION OF MAXIMUM HEAD IN LAYER 6
1143      (DISTANCE FROM DRAIN)                 0.0 METERS
1144
1145      SNOW WATER                           0.80          8.0000
1146
1147      MAXIMUM VEG. SOIL WATER (VOL/VOL)      0.4468
1148
1149      MINIMUM VEG. SOIL WATER (VOL/VOL)      0.0850
1150
1151
1152      *** Maximum heads are computed using McEnroe's equations. ***
1153
1154      Reference: Maximum Saturated Depth over Landfill Liner
1155                  by Bruce M. McEnroe, University of Kansas
1156                  ASCE Journal of Environmental Engineering
1157                  Vol. 119, No. 2, March 1993, pp. 262-270.
1158
1159      *****
1160      *****
1161
1162      AVERAGE MONTHLY VALUES (MM) FOR YEARS 1969 THROUGH 2001
1163      -----
1164
1165                  JAN/JUL    FEB/AUG    MAR/SEP    APR/OCT    MAY/NOV    JUN/DEC
1166                  -----    -----    -----    -----    -----    -----
1167      PRECIPITATION
1168      -----
1169      TOTALS                70.51    58.12    59.57    55.89    51.84    52.75
1170                        56.92    59.65    65.63    79.27    67.37    50.27
1171
1172      STD. DEVIATIONS       48.81    44.60    50.18    50.36    35.61    40.40
1173                        37.80    38.92    33.22    51.48    34.17    40.74

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1243
1244         STD. DEVIATIONS          0.0000    0.0000    0.0000    0.0000    0.0000    0.0000
1245         0.0000    0.0000    0.0000    0.0000    0.0000    0.0000
1246
1247
1248 -----
1249             AVERAGES OF MONTHLY AVERAGED DAILY HEADS (CM)
1250 -----
1251
1252
1253     DAILY AVERAGE HEAD ON TOP OF LAYER  4
1254     -----
1255         AVERAGES          0.0723    0.0628    0.0649    0.0647    0.0779    0.0664
1256         0.0744    0.0886    0.0758    0.0766    0.0828    0.0800
1257
1258         STD. DEVIATIONS    0.0390    0.0375    0.0344    0.0375    0.0554    0.0370
1259         0.0572    0.0642    0.0559    0.0393    0.0520    0.0490
1260
1261     DAILY AVERAGE HEAD ON TOP OF LAYER  7
1262     -----
1263         AVERAGES          0.0000    0.0000    0.0000    0.0000    0.0000    0.0000
1264         0.0000    0.0000    0.0000    0.0000    0.0000    0.0000
1265
1266         STD. DEVIATIONS    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000
1267         0.0000    0.0000    0.0000    0.0000    0.0000    0.0000
1268
1269     *****
1270
1271     *****
1272
1273             AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1969 THROUGH 2001
1274     -----
1275
1276                                     MM                      CU. METERS          PERCENT
1277                                     -----
1278     PRECIPITATION          727.79    ( 176.538)          7277.9    100.00
1279
1280     RUNOFF          122.797    ( 79.2882)          1227.97    16.873
1281
1282     POTENTIAL EVAPOTRANSPIRATION 1298.131    ( 41.9938)          12981.31
1283
1284     ACTUAL EVAPOTRANSPIRATION    434.210    ( 68.5373)          4342.10    59.662
1285
1286     LATERAL DRAINAGE COLLECTED    168.11909 ( 55.88004)          1681.191    23.10010
1287     FROM LAYER  3
1288
1289     DRAINAGE RECIRCULATED          0.00000 ( 0.00000)          0.000    0.00000
1290     FROM LAYER  3 INTO L.  3
1291
1292     PERCOLATION/LEAKAGE THROUGH    0.00019 ( 0.00004)          0.002    0.00003
1293     LAYER  5
1294
1295     AVERAGE HEAD ON TOP          0.739    ( 0.245)
1296     OF LAYER  4
1297
1298     LATERAL DRAINAGE COLLECTED    0.00321 ( 0.01740)          0.032    0.00044
1299     FROM LAYER  6
1300
1301     DRAINAGE RECIRCULATED          0.00000 ( 0.00000)          0.000    0.00000
1302     FROM LAYER  6 INTO L.  6
1303
1304     PERCOLATION/LEAKAGE THROUGH    0.00001 ( 0.00000)          0.000    0.00000
1305     LAYER  8
1306
1307     AVERAGE HEAD ON TOP          0.000    ( 0.000)
1308     OF LAYER  7
1309
1310     CHANGE IN WATER STORAGE    2.655    ( 1.4506)          26.55    0.365
1311

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1312	*****
1313	*****
1314	
1315	

Intermediate Cover

LAYER DATA 1

VALID FOR 33 YEARS

NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER
WERE SPECIFIED BY THE USER.

LAYER 1

TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER 0

THICKNESS	=	30.00	CM
POROSITY	=	0.4610	VOL/VOL
FIELD CAPACITY	=	0.3600	VOL/VOL
WILTING POINT	=	0.2030	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2268	VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.	=	0.8000E-05	CM/SEC

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER 32

THICKNESS	=	500.00	CM
POROSITY	=	0.4500	VOL/VOL
FIELD CAPACITY	=	0.1160	VOL/VOL
WILTING POINT	=	0.0490	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1160	VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.	=	0.1000E-01	CM/SEC

LAYER 3

TYPE 2 - LATERAL DRAINAGE LAYER

MATERIAL TEXTURE NUMBER 21

THICKNESS	=	30.00	CM
POROSITY	=	0.3970	VOL/VOL
FIELD CAPACITY	=	0.0320	VOL/VOL
WILTING POINT	=	0.0130	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0300	VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.	=	0.3000	CM/SEC
SLOPE	=	3.00	PERCENT
DRAINAGE LENGTH	=	25.0	METERS

LAYER 4

TYPE 4 - FLEXIBLE MEMBRANE LINER

MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.10	CM
EFFECTIVE SAT. HYD. CONDUCT.	=	0.2000E-12	CM/SEC
FML PINHOLE DENSITY	=	2.00	HOLES/HECTARE
FML INSTALLATION DEFECTS	=	2.00	HOLES/HECTARE

FML PLACEMENT QUALITY = 4 - POOR

LAYER 5

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS = 0.60 CM
POROSITY = 0.7500 VOL/VOL
FIELD CAPACITY = 0.7470 VOL/VOL
WILTING POINT = 0.4000 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.7500 VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.= 0.3000E-08 CM/SEC

LAYER 6

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 20

THICKNESS = 0.50 CM
POROSITY = 0.8500 VOL/VOL
FIELD CAPACITY = 0.0100 VOL/VOL
WILTING POINT = 0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.0300 VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.= 10.00 CM/SEC
SLOPE = 3.00 PERCENT
DRAINAGE LENGTH = 25.0 METERS

LAYER 7

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS = 0.10 CM
EFFECTIVE SAT. HYD. CONDUCT.= 0.2000E-12 CM/SEC
FML PINHOLE DENSITY = 2.00 HOLES/HECTARE
FML INSTALLATION DEFECTS = 2.00 HOLES/HECTARE
FML PLACEMENT QUALITY = 4 - POOR

LAYER 8

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS = 0.60 CM
POROSITY = 0.7500 VOL/VOL
FIELD CAPACITY = 0.7470 VOL/VOL
WILTING POINT = 0.4000 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.7500 VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.= 0.3000E-08 CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA 1

VALID FOR 33 YEARS

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
SOIL DATA BASE USING SOIL TEXTURE #23 WITH BARE
GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND
A SLOPE LENGTH OF 75. METERS.

SCS RUNOFF CURVE NUMBER	=	96.66	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.0000	HECTARES
EVAPORATIVE ZONE DEPTH	=	10.0	CM
INITIAL WATER IN EVAPORATIVE ZONE	=	2.268	CM
UPPER LIMIT OF EVAPORATIVE STORAGE	=	4.610	CM
FIELD CAPACITY OF EVAPORATIVE ZONE	=	3.600	CM
LOWER LIMIT OF EVAPORATIVE STORAGE	=	2.030	CM
SOIL EVAPORATION ZONE DEPTH	=	10.0	CM
INITIAL SNOW WATER	=	0.000	CM
INITIAL INTERCEPTION WATER	=	0.000	CM
INITIAL WATER IN LAYER MATERIALS	=	66.619	CM
TOTAL INITIAL WATER	=	66.619	CM
TOTAL SUBSURFACE INFLOW	=	0.00	MM/YR

EVAPOTRANSPIRATION DATA 1

VALID FOR 33 YEARS

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM

Woodlawn NSW

STATION LATITUDE	=	-35.00	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	181	
END OF GROWING SEASON (JULIAN DATE)	=	151	
EVAPORATIVE ZONE DEPTH	=	10.0	CM
AVERAGE ANNUAL WIND SPEED	=	19.00	KPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	69.2	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	78.0	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	76.4	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	72.8	%

MONTHLY TOTALS (MM) FOR YEAR 1969

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
PRECIPITATION	30.3	116.9	89.4	108.9	63.5	45.5
	45.8	56.1	50.9	226.4	97.0	46.3
RUNOFF	11.29	65.40	46.47	84.97	21.06	19.94
	13.04	15.15	5.89	173.84	29.06	22.47
POTENTIAL EVAPOTRANSPIRATION	200.96	146.54	134.82	82.83	51.02	38.94
	45.78	64.03	77.70	118.44	138.19	176.66
ACTUAL EVAPOTRANSPIRATION	21.39	26.32	37.56	38.39	21.58	38.31
	31.24	38.32	50.95	28.08	81.48	19.95
LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
FROM LAYER 3	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
FROM LAYER 3 INTO L. 3	0.000	0.000	0.000	0.000	0.000	0.000

208							
209	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
210	LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
211							
212	LATERAL DRAINAGE COLLECTED	0.100	0.000	0.000	0.000	0.000	0.000
213	FROM LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
214							
215	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
216	FROM LAYER 6 INTO L. 6	0.000	0.000	0.000	0.000	0.000	0.000
217							
218	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
219	LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
220	*****						

ANNUAL TOTALS FOR YEAR 1969

	MM	CU. METERS	PERCENT
225			
226			
227	PRECIPITATION	977.00	9770.002
228			100.00
229	RUNOFF	508.576	5085.759
230			52.05
231	POTENTIAL EVAPOTRANSPIRATION	1275.914	12759.136
232			
233	ACTUAL EVAPOTRANSPIRATION	433.570	4335.705
234			44.38
235	DRAINAGE COLLECTED FROM LAYER 3	0.0000	0.000
236			0.00
237	RECIRC. FROM LAYER 3 INTO L. 3	0.000000	0.000
238			0.00
239	PERC./LEAKAGE THROUGH LAYER 5	0.000000	0.000
240			0.00
241	AVG. HEAD ON TOP OF LAYER 4	0.0000	
242			
243	DRAINAGE COLLECTED FROM LAYER 6	0.1000	1.000
244			0.01
245	RECIRC. FROM LAYER 6 INTO L. 6	0.000000	0.000
246			0.00
247	PERC./LEAKAGE THROUGH LAYER 8	0.000000	0.000
248			0.00
249	AVG. HEAD ON TOP OF LAYER 7	0.0001	
250			
251	CHANGE IN WATER STORAGE	34.753	347.534
252			3.56
253	SOIL WATER AT START OF YEAR	666.189	6661.887
254			
255	SOIL WATER AT END OF YEAR	700.942	7009.421
256			
257	INTERCEPTION WATER AT START OF YEAR	0.000	0.000
258			
259	INTERCEPTION WATER AT END OF YEAR	0.000	0.000
260			
261	SNOW WATER AT START OF YEAR	0.000	0.000
262			0.00
263	SNOW WATER AT END OF YEAR	0.000	0.000
264			0.00
265	ANNUAL WATER BUDGET BALANCE	0.0004	0.004
266			0.00

MONTHLY TOTALS (MM) FOR YEAR 1970

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
271						
272						
273						
274						
275						
276	PRECIPITATION	90.5	59.7	65.1	102.3	96.4
						27.2

277		3.0	49.3	134.0	43.0	64.1	93.4
278							
279	RUNOFF	43.62	30.77	25.72	53.57	67.60	1.71
280		0.00	15.45	56.13	11.00	19.92	45.37
281							
282	POTENTIAL EVAPOTRANSPIRATION	158.72	150.68	131.02	80.17	50.80	40.66
283		46.49	57.86	75.10	131.09	140.82	171.65
284							
285	ACTUAL EVAPOTRANSPIRATION	49.33	31.66	37.76	45.31	26.70	33.26
286		3.68	10.62	62.41	46.08	35.09	42.41
287							
288	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.615	1.185	0.410	0.170
289	FROM LAYER 3	0.957	0.168	0.103	0.124	0.306	0.075
290							
291	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
292	FROM LAYER 3 INTO L. 3	0.000	0.000	0.000	0.000	0.000	0.000
293							
294	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
295	LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
296							
297	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
298	FROM LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
299							
300	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
301	FROM LAYER 6 INTO L. 6	0.000	0.000	0.000	0.000	0.000	0.000
302							
303	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
304	LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
305							

ANNUAL TOTALS FOR YEAR 1970

	MM	CU. METERS	PERCENT
	-----	-----	-----
313	PRECIPITATION	828.00	100.00
314			
315	RUNOFF	370.857	44.79
316			
317	POTENTIAL EVAPOTRANSPIRATION	1235.073	12350.733
318			
319	ACTUAL EVAPOTRANSPIRATION	424.314	51.25
320			
321	DRAINAGE COLLECTED FROM LAYER 3	4.1134	0.50
322			
323	RECIRC. FROM LAYER 3 INTO L. 3	0.000000	0.00
324			
325	PERC./LEAKAGE THROUGH LAYER 5	0.000040	0.00
326			
327	AVG. HEAD ON TOP OF LAYER 4	0.0180	
328			
329	DRAINAGE COLLECTED FROM LAYER 6	0.0000	0.00
330			
331	RECIRC. FROM LAYER 6 INTO L. 6	0.000000	0.00
332			
333	PERC./LEAKAGE THROUGH LAYER 8	0.000005	0.00
334			
335	AVG. HEAD ON TOP OF LAYER 7	0.0000	
336			
337	CHANGE IN WATER STORAGE	28.715	3.47
338			
339	SOIL WATER AT START OF YEAR	700.942	7009.421
340			
341	SOIL WATER AT END OF YEAR	729.657	7296.568
342			
343	INTERCEPTION WATER AT START OF YEAR	0.000	0.000
344			
345	INTERCEPTION WATER AT END OF YEAR	0.000	0.000

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346
347     SNOW WATER AT START OF YEAR                0.000                0.000                0.00
348
349     SNOW WATER AT END OF YEAR                  0.000                0.000                0.00
350
351     ANNUAL WATER BUDGET BALANCE                0.0004                0.004                0.00
352
353 *****
354 *****
355
356             MONTHLY TOTALS (MM) FOR YEAR 1971
357 -----
358
359             JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
360             -----  -----  -----  -----  -----  -----
361
362     PRECIPITATION                84.6      89.1      26.5      22.0      15.5      8.2
363                                15.8      75.8      36.1      31.6      59.8     116.7
364
365     RUNOFF                      19.04     38.09      2.57      2.13      3.71      0.14
366                                0.25     27.93      3.69     11.84     12.50     53.94
367
368     POTENTIAL EVAPOTRANSPIRATION  166.79   134.69   129.98    80.18    52.54    39.41
369                                42.11    60.23    85.62   135.21   135.07   166.98
370
371     ACTUAL EVAPOTRANSPIRATION     58.64     60.69     11.92     11.61     19.29      8.25
372                                5.57     23.24     38.97     28.22     27.80     59.65
373
374     LATERAL DRAINAGE COLLECTED     0.204     0.344     0.465     0.067     0.658     0.128
375     FROM LAYER 3                  0.218     0.168     1.112     0.280     0.165     1.157
376
377     LATERAL DRAINAGE RECIRCULATED  0.000     0.000     0.000     0.000     0.000     0.000
378     FROM LAYER 3 INTO L. 3        0.000     0.000     0.000     0.000     0.000     0.000
379
380     PERCOLATION/LEAKAGE THROUGH     0.000     0.000     0.000     0.000     0.000     0.000
381     LAYER 5                      0.000     0.000     0.000     0.000     0.000     0.000
382
383     LATERAL DRAINAGE COLLECTED     0.000     0.000     0.000     0.000     0.000     0.000
384     FROM LAYER 6                  0.000     0.000     0.000     0.000     0.000     0.000
385
386     LATERAL DRAINAGE RECIRCULATED  0.000     0.000     0.000     0.000     0.000     0.000
387     FROM LAYER 6 INTO L. 6        0.000     0.000     0.000     0.000     0.000     0.000
388
389     PERCOLATION/LEAKAGE THROUGH     0.000     0.000     0.000     0.000     0.000     0.000
390     LAYER 8                      0.000     0.000     0.000     0.000     0.000     0.000
391
392 *****
393
394             ANNUAL TOTALS FOR YEAR 1971
395 -----
396
397                                MM                CU. METERS                PERCENT
398                                -----  -----  -----
399     PRECIPITATION                581.70                5817.001                100.00
400
401     RUNOFF                      175.835                1758.347                30.23
402
403     POTENTIAL EVAPOTRANSPIRATION  1228.806                12288.061
404
405     ACTUAL EVAPOTRANSPIRATION     353.841                3538.409                60.83
406
407     DRAINAGE COLLECTED FROM LAYER 3    4.9640                49.640                0.85
408
409     RECIRC. FROM LAYER 3 INTO L. 3    0.000000                0.000                0.00
410
411     PERC./LEAKAGE THROUGH LAYER 5    0.000048                0.000                0.00
412
413     AVG. HEAD ON TOP OF LAYER 4      0.0218
414

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415	DRAINAGE COLLECTED FROM LAYER 6	0.0000	0.000	0.00
416				
417	RECIRC. FROM LAYER 6 INTO L. 6	0.000000	0.000	0.00
418				
419	PERC./LEAKAGE THROUGH LAYER 8	0.000006	0.000	0.00
420				
421	AVG. HEAD ON TOP OF LAYER 7	0.0000		
422				
423	CHANGE IN WATER STORAGE	47.060	470.605	8.09
424				
425	SOIL WATER AT START OF YEAR	729.657	7296.568	
426				
427	SOIL WATER AT END OF YEAR	776.717	7767.173	
428				
429	INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
430				
431	INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
432				
433	SNOW WATER AT START OF YEAR	0.000	0.000	0.00
434				
435	SNOW WATER AT END OF YEAR	0.000	0.000	0.00
436				
437	ANNUAL WATER BUDGET BALANCE	0.0000	0.000	0.00

MONTHLY TOTALS (MM) FOR YEAR 1972

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
PRECIPITATION	137.8	37.3	23.4	57.9	22.4	10.9
	12.5	75.7	19.9	90.2	48.5	5.8
RUNOFF	68.27	4.83	2.52	22.57	2.36	0.46
	0.13	22.31	4.65	35.23	5.76	0.00
POTENTIAL EVAPOTRANSPIRATION	155.73	142.26	133.40	78.85	55.80	40.22
	47.25	63.29	98.41	124.94	151.74	194.09
ACTUAL EVAPOTRANSPIRATION	68.21	39.11	15.03	26.19	26.63	2.98
	9.71	40.84	23.75	42.16	55.60	7.46
LATERAL DRAINAGE COLLECTED FROM LAYER 3	0.838	0.058	0.351	1.702	1.922	1.868
	1.264	2.512	2.684	0.562	1.344	2.435
LATERAL DRAINAGE RECIRCULATED FROM LAYER 3 INTO L. 3	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE COLLECTED FROM LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE RECIRCULATED FROM LAYER 6 INTO L. 6	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 1972

MM	CU. METERS	PERCENT
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484				
485	PRECIPITATION	542.30	5423.000	100.00
486				
487	RUNOFF	169.093	1690.926	31.18
488				
489	POTENTIAL EVAPOTRANSPIRATION	1285.984	12859.844	
490				
491	ACTUAL EVAPOTRANSPIRATION	357.672	3576.717	65.95
492				
493	DRAINAGE COLLECTED FROM LAYER 3	17.5385	175.385	3.23
494				
495	RECIRC. FROM LAYER 3 INTO L. 3	0.000000	0.000	0.00
496				
497	PERC./LEAKAGE THROUGH LAYER 5	0.000074	0.001	0.00
498				
499	AVG. HEAD ON TOP OF LAYER 4	0.0770		
500				
501	DRAINAGE COLLECTED FROM LAYER 6	0.0001	0.001	0.00
502				
503	RECIRC. FROM LAYER 6 INTO L. 6	0.000000	0.000	0.00
504				
505	PERC./LEAKAGE THROUGH LAYER 8	0.000008	0.000	0.00
506				
507	AVG. HEAD ON TOP OF LAYER 7	0.0000		
508				
509	CHANGE IN WATER STORAGE	-2.003	-20.029	-0.37
510				
511	SOIL WATER AT START OF YEAR	776.717	7767.173	
512				
513	SOIL WATER AT END OF YEAR	774.714	7747.144	
514				
515	INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
516				
517	INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
518				
519	SNOW WATER AT START OF YEAR	0.000	0.000	0.00
520				
521	SNOW WATER AT END OF YEAR	0.000	0.000	0.00
522				
523	ANNUAL WATER BUDGET BALANCE	0.0001	0.001	0.00
524				
525	*****			
526	*****			
527				
528	MONTHLY TOTALS (MM) FOR YEAR 1973			
529	-----			
530				
531		JAN/JUL	FEB/AUG	MAR/SEP
532		-----	-----	-----
533				
534	PRECIPITATION	58.3	133.1	41.2
535		74.7	84.4	38.8
536				
537	RUNOFF	23.11	59.27	7.91
538		27.17	26.88	7.01
539				
540	POTENTIAL EVAPOTRANSPIRATION	197.17	134.95	135.62
541		47.93	61.19	92.26
542				
543	ACTUAL EVAPOTRANSPIRATION	15.08	76.17	27.79
544		47.90	41.40	42.85
545				
546	LATERAL DRAINAGE COLLECTED	3.774	3.586	2.566
547	FROM LAYER 3	2.551	1.679	1.641
548				
549	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000
550	FROM LAYER 3 INTO L. 3	0.000	0.000	0.000
551				
552	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000

553	LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
554							
555	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
556	FROM LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
557							
558	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
559	FROM LAYER 6 INTO L. 6	0.000	0.000	0.000	0.000	0.000	0.000
560							
561	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
562	LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
563	*****						

564

565 ANNUAL TOTALS FOR YEAR 1973

566 -----

568		MM	CU. METERS	PERCENT
569		-----	-----	-----
570	PRECIPITATION	801.70	8017.001	100.00
571				
572	RUNOFF	276.647	2766.473	34.51
573				
574	POTENTIAL EVAPOTRANSPIRATION	1286.999	12869.994	
575				
576	ACTUAL EVAPOTRANSPIRATION	470.061	4700.606	58.63
577				
578	DRAINAGE COLLECTED FROM LAYER 3	25.7872	257.872	3.22
579				
580	RECIRC. FROM LAYER 3 INTO L. 3	0.000000	0.000	0.00
581				
582	PERC./LEAKAGE THROUGH LAYER 5	0.000083	0.001	0.00
583				
584	AVG. HEAD ON TOP OF LAYER 4	0.1140		
585				
586	DRAINAGE COLLECTED FROM LAYER 6	0.0001	0.001	0.00
587				
588	RECIRC. FROM LAYER 6 INTO L. 6	0.000000	0.000	0.00
589				
590	PERC./LEAKAGE THROUGH LAYER 8	0.000009	0.000	0.00
591				
592	AVG. HEAD ON TOP OF LAYER 7	0.0000		
593				
594	CHANGE IN WATER STORAGE	29.205	292.049	3.64
595				
596	SOIL WATER AT START OF YEAR	774.714	7747.144	
597				
598	SOIL WATER AT END OF YEAR	803.919	8039.192	
599				
600	INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
601				
602	INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
603				
604	SNOW WATER AT START OF YEAR	0.000	0.000	0.00
605				
606	SNOW WATER AT END OF YEAR	0.000	0.000	0.00
607				
608	ANNUAL WATER BUDGET BALANCE	0.0001	0.001	0.00
609				
610	*****			
611	*****			

612

613 MONTHLY TOTALS (MM) FOR YEAR 1974

614 -----

616		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
617		-----	-----	-----	-----	-----	-----
618							
619	PRECIPITATION	103.0	82.6	65.1	199.0	90.3	30.0
620		74.7	200.0	103.2	133.1	86.9	0.3
621							

622	RUNOFF	61.90	58.38	24.84	110.05	53.63	1.11
623		26.88	152.24	47.68	51.39	36.17	0.00
624							
625	POTENTIAL EVAPOTRANSPIRATION	165.50	142.63	131.99	69.29	54.27	39.83
626		45.27	59.37	78.66	116.83	137.48	191.44
627							
628	ACTUAL EVAPOTRANSPIRATION	47.87	29.74	19.19	68.87	35.63	31.21
629		42.32	37.05	51.52	78.78	51.30	12.10
630							
631	LATERAL DRAINAGE COLLECTED	4.126	3.805	4.957	4.491	2.763	1.609
632	FROM LAYER 3	0.128	3.594	2.987	3.392	1.171	3.590
633							
634	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
635	FROM LAYER 3 INTO L. 3	0.000	0.000	0.000	0.000	0.000	0.000
636							
637	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
638	LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
639							
640	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
641	FROM LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
642							
643	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
644	FROM LAYER 6 INTO L. 6	0.000	0.000	0.000	0.000	0.000	0.000
645							
646	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
647	LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
648							

ANNUAL TOTALS FOR YEAR 1974

	MM	CU. METERS	PERCENT
	-----	-----	-----
PRECIPITATION	1168.20	11682.002	100.00
RUNOFF	624.271	6242.707	53.44
POTENTIAL EVAPOTRANSPIRATION	1232.550	12325.504	
ACTUAL EVAPOTRANSPIRATION	505.586	5055.864	43.28
DRAINAGE COLLECTED FROM LAYER 3	36.6118	366.118	3.13
RECIRC. FROM LAYER 3 INTO L. 3	0.000000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 5	0.000091	0.001	0.00
AVG. HEAD ON TOP OF LAYER 4	0.1616		
DRAINAGE COLLECTED FROM LAYER 6	0.0001	0.001	0.00
RECIRC. FROM LAYER 6 INTO L. 6	0.000000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 8	0.000009	0.000	0.00
AVG. HEAD ON TOP OF LAYER 7	0.0000		
CHANGE IN WATER STORAGE	1.731	17.308	0.15
SOIL WATER AT START OF YEAR	803.919	8039.192	
SOIL WATER AT END OF YEAR	805.650	8056.500	
INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00

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691
692     SNOW WATER AT END OF YEAR                0.000                0.000                0.00
693
694     ANNUAL WATER BUDGET BALANCE                0.0004                0.004                0.00
695
696     *****
697     *****
698
699             MONTHLY TOTALS (MM) FOR YEAR 1975
700     -----
701
702             JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
703             -----
704
705     PRECIPITATION                37.2        76.6        65.1        72.8        19.9        152.6
706                106.2        46.0        98.4        110.3        35.0        35.2
707
708     RUNOFF                14.21        31.21        25.96        30.57        0.04        113.89
709                63.06        8.38        31.40        40.31        5.77        7.78
710
711     POTENTIAL EVAPOTRANSPIRATION    194.28    144.64    127.61    75.66    54.47    40.62
712                48.92    61.86    82.37    115.71    160.78    170.07
713
714     ACTUAL EVAPOTRANSPIRATION        8.34    39.00    36.36    40.40    17.26    17.30
715                35.65    30.84    54.63    77.39    33.00    21.71
716
717     LATERAL DRAINAGE COLLECTED        5.174    5.025    4.830    0.875    3.941    2.000
718     FROM LAYER 3                5.603    2.073    2.683    6.922    7.505    7.415
719
720     LATERAL DRAINAGE RECIRCULATED    0.000    0.000    0.000    0.000    0.000    0.000
721     FROM LAYER 3 INTO L. 3        0.000    0.000    0.000    0.000    0.000    0.000
722
723     PERCOLATION/LEAKAGE THROUGH        0.000    0.000    0.000    0.000    0.000    0.000
724     LAYER 5                0.000    0.000    0.000    0.000    0.000    0.000
725
726     LATERAL DRAINAGE COLLECTED        0.000    0.000    0.000    0.000    0.000    0.000
727     FROM LAYER 6                0.000    0.000    0.000    0.000    0.000    0.000
728
729     LATERAL DRAINAGE RECIRCULATED    0.000    0.000    0.000    0.000    0.000    0.000
730     FROM LAYER 6 INTO L. 6        0.000    0.000    0.000    0.000    0.000    0.000
731
732     PERCOLATION/LEAKAGE THROUGH        0.000    0.000    0.000    0.000    0.000    0.000
733     LAYER 8                0.000    0.000    0.000    0.000    0.000    0.000
734     *****
735
736             ANNUAL TOTALS FOR YEAR 1975
737     -----
738
739             MM                CU. METERS                PERCENT
740             -----
741     PRECIPITATION                855.30                8553.000                100.00
742
743     RUNOFF                372.594                3725.936                43.56
744
745     POTENTIAL EVAPOTRANSPIRATION    1277.003                12770.027
746
747     ACTUAL EVAPOTRANSPIRATION        411.866                4118.665                48.15
748
749     DRAINAGE COLLECTED FROM LAYER 3        54.0449                540.449                6.32
750
751     RECIRC. FROM LAYER 3 INTO L. 3        0.000000                0.000                0.00
752
753     PERC./LEAKAGE THROUGH LAYER 5        0.000105                0.001                0.00
754
755     AVG. HEAD ON TOP OF LAYER 4        0.2380
756
757     DRAINAGE COLLECTED FROM LAYER 6        0.0001                0.001                0.00
758
759     RECIRC. FROM LAYER 6 INTO L. 6        0.000000                0.000                0.00

```

760				
761	PERC./LEAKAGE THROUGH LAYER 8	0.000009	0.000	0.00
762				
763	AVG. HEAD ON TOP OF LAYER 7	0.0000		
764				
765	CHANGE IN WATER STORAGE	16.795	167.950	1.96
766				
767	SOIL WATER AT START OF YEAR	805.650	8056.500	
768				
769	SOIL WATER AT END OF YEAR	822.445	8224.449	
770				
771	INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
772				
773	INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
774				
775	SNOW WATER AT START OF YEAR	0.000	0.000	0.00
776				
777	SNOW WATER AT END OF YEAR	0.000	0.000	0.00
778				
779	ANNUAL WATER BUDGET BALANCE	0.0000	0.000	0.00

MONTHLY TOTALS (MM) FOR YEAR 1976

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	130.3 46.0	65.4 26.3	41.1 65.1	19.6 205.5	8.1 52.0	61.0 22.6
RUNOFF	63.58 7.15	10.79 0.36	7.46 26.48	0.42 121.07	0.00 7.47	10.00 3.31
POTENTIAL EVAPOTRANSPIRATION	165.28 45.58	136.88 63.82	127.35 83.46	78.16 108.33	55.50 147.77	40.88 192.22
ACTUAL EVAPOTRANSPIRATION	64.21 45.12	46.78 26.64	28.60 40.69	15.37 63.45	12.47 34.21	31.57 30.30
LATERAL DRAINAGE COLLECTED FROM LAYER 3	7.391 5.678	5.669 1.478	2.945 4.518	2.823 3.435	5.181 2.852	5.502 1.991
LATERAL DRAINAGE RECIRCULATED FROM LAYER 3 INTO L. 3	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000
LATERAL DRAINAGE COLLECTED FROM LAYER 6	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000
LATERAL DRAINAGE RECIRCULATED FROM LAYER 6 INTO L. 6	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000

ANNUAL TOTALS FOR YEAR 1976

	MM	CU. METERS	PERCENT
PRECIPITATION	743.00	7430.004	100.00
RUNOFF	258.088	2580.884	34.74

829				
830	POTENTIAL EVAPOTRANSPIRATION	1245.230	12452.299	
831				
832	ACTUAL EVAPOTRANSPIRATION	439.419	4394.189	59.14
833				
834	DRAINAGE COLLECTED FROM LAYER 3	49.4626	494.626	6.66
835				
836	RECIRC. FROM LAYER 3 INTO L. 3	0.000000	0.000	0.00
837				
838	PERC./LEAKAGE THROUGH LAYER 5	0.000102	0.001	0.00
839				
840	AVG. HEAD ON TOP OF LAYER 4	0.2179		
841				
842	DRAINAGE COLLECTED FROM LAYER 6	0.0001	0.001	0.00
843				
844	RECIRC. FROM LAYER 6 INTO L. 6	0.000000	0.000	0.00
845				
846	PERC./LEAKAGE THROUGH LAYER 8	0.000009	0.000	0.00
847				
848	AVG. HEAD ON TOP OF LAYER 7	0.0000		
849				
850	CHANGE IN WATER STORAGE	-3.970	-39.699	-0.53
851				
852	SOIL WATER AT START OF YEAR	822.445	8224.449	
853				
854	SOIL WATER AT END OF YEAR	818.475	8184.750	
855				
856	INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
857				
858	INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
859				
860	SNOW WATER AT START OF YEAR	0.000	0.000	0.00
861				
862	SNOW WATER AT END OF YEAR	0.000	0.000	0.00
863				
864	ANNUAL WATER BUDGET BALANCE	0.0003	0.003	0.00

MONTHLY TOTALS (MM) FOR YEAR 1977

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
875	PRECIPITATION	37.4	207.5	37.0	30.6	63.3
876		10.7	26.5	112.9	2.6	1.8
877						25.7
878	RUNOFF	7.52	162.80	3.94	13.66	18.57
879		0.01	7.97	43.39	0.00	0.00
880						6.98
881	POTENTIAL EVAPOTRANSPIRATION	193.88	153.53	133.46	83.64	52.37
882		45.23	68.18	86.19	145.61	165.02
883						39.74
884	ACTUAL EVAPOTRANSPIRATION	36.14	31.53	35.18	20.52	12.84
885		20.67	22.05	55.52	9.34	2.76
886						8.02
887	LATERAL DRAINAGE COLLECTED	3.654	4.786	5.722	4.637	3.591
888	FROM LAYER 3	0.681	3.158	5.950	2.986	4.056
889						5.136
890	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000
891	FROM LAYER 3 INTO L. 3	0.000	0.000	0.000	0.000	0.000
892						
893	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000
894	LAYER 5	0.000	0.000	0.000	0.000	0.000
895						
896	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000
897	FROM LAYER 6	0.000	0.000	0.000	0.000	0.000

898							
899	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
900	FROM LAYER 6 INTO L. 6	0.000	0.000	0.000	0.000	0.000	0.000
901							
902	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
903	LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
904	*****						

ANNUAL TOTALS FOR YEAR 1977

	MM	CU. METERS	PERCENT
PRECIPITATION	605.10	6051.000	100.00
RUNOFF	269.398	2693.983	44.52
POTENTIAL EVAPOTRANSPIRATION	1363.835	13638.352	
ACTUAL EVAPOTRANSPIRATION	294.261	2942.611	48.63
DRAINAGE COLLECTED FROM LAYER 3	48.9257	489.257	8.09
RECIRC. FROM LAYER 3 INTO L. 3	0.000000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 5	0.000100	0.001	0.00
AVG. HEAD ON TOP OF LAYER 4	0.2166		
DRAINAGE COLLECTED FROM LAYER 6	0.0001	0.001	0.00
RECIRC. FROM LAYER 6 INTO L. 6	0.000000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 8	0.000009	0.000	0.00
AVG. HEAD ON TOP OF LAYER 7	0.0000		
CHANGE IN WATER STORAGE	-7.485	-74.853	-1.24
SOIL WATER AT START OF YEAR	818.475	8184.750	
SOIL WATER AT END OF YEAR	810.990	8109.897	
INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0001	0.001	0.00

MONTHLY TOTALS (MM) FOR YEAR 1978

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	195.8	12.9	170.2	30.5	84.4	89.5
	57.2	26.3	123.2	51.7	68.5	42.7
RUNOFF	126.10	0.15	106.99	5.80	30.62	35.65
	19.90	3.86	69.19	18.48	30.40	5.30
POTENTIAL EVAPOTRANSPIRATION	168.37	166.15	136.63	81.37	56.68	39.00

967		45.24	61.17	80.58	126.77	147.93	163.03
968							
969	ACTUAL EVAPOTRANSPIRATION	54.95	15.89	47.02	31.98	24.38	38.98
970		38.27	22.95	43.33	23.27	42.16	29.67
971							
972	LATERAL DRAINAGE COLLECTED	5.586	4.240	0.805	3.452	0.698	5.463
973	FROM LAYER 3	2.951	1.421	9.873	6.957	8.418	8.309
974							
975	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
976	FROM LAYER 3 INTO L. 3	0.000	0.000	0.000	0.000	0.000	0.000
977							
978	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
979	LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
980							
981	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
982	FROM LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
983							
984	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
985	FROM LAYER 6 INTO L. 6	0.000	0.000	0.000	0.000	0.000	0.000
986							
987	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
988	LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
989	*****						
990							
991	ANNUAL TOTALS FOR YEAR 1978						
992	-----						
993							
994		MM		CU. METERS		PERCENT	
995		-----		-----		-----	
996	PRECIPITATION	952.90		9528.998		100.00	
997							
998	RUNOFF	452.447		4524.471		47.48	
999							
1000	POTENTIAL EVAPOTRANSPIRATION	1272.909		12729.087			
1001							
1002	ACTUAL EVAPOTRANSPIRATION	412.856		4128.559		43.33	
1003							
1004	DRAINAGE COLLECTED FROM LAYER 3	58.1732		581.732		6.10	
1005							
1006	RECIRC. FROM LAYER 3 INTO L. 3	0.000000		0.000		0.00	
1007							
1008	PERC./LEAKAGE THROUGH LAYER 5	0.000104		0.001		0.00	
1009							
1010	AVG. HEAD ON TOP OF LAYER 4	0.2575					
1011							
1012	DRAINAGE COLLECTED FROM LAYER 6	0.0001		0.001		0.00	
1013							
1014	RECIRC. FROM LAYER 6 INTO L. 6	0.000000		0.000		0.00	
1015							
1016	PERC./LEAKAGE THROUGH LAYER 8	0.000009		0.000		0.00	
1017							
1018	AVG. HEAD ON TOP OF LAYER 7	0.0000					
1019							
1020	CHANGE IN WATER STORAGE	29.424		294.239		3.09	
1021							
1022	SOIL WATER AT START OF YEAR	810.990		8109.897			
1023							
1024	SOIL WATER AT END OF YEAR	840.414		8404.137			
1025							
1026	INTERCEPTION WATER AT START OF YEAR	0.000		0.000			
1027							
1028	INTERCEPTION WATER AT END OF YEAR	0.000		0.000			
1029							
1030	SNOW WATER AT START OF YEAR	0.000		0.000		0.00	
1031							
1032	SNOW WATER AT END OF YEAR	0.000		0.000		0.00	
1033							
1034	ANNUAL WATER BUDGET BALANCE	-0.0003		-0.003		0.00	
1035							

1036	*****						
1037	*****						
1038							
1039		MONTHLY TOTALS (MM) FOR YEAR 1979					
1040		-----					
1041							
1042		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
1043		-----	-----	-----	-----	-----	-----
1044							
1045	PRECIPITATION	0.5	9.0	118.1	78.2	22.7	12.6
1046		24.7	46.0	33.7	56.7	52.2	0.4
1047							
1048	RUNOFF	0.00	0.00	66.32	34.21	1.56	0.03
1049		3.38	10.97	1.40	16.48	26.24	0.00
1050							
1051	POTENTIAL EVAPOTRANSPIRATION	207.64	163.65	133.24	78.35	51.24	41.70
1052		46.59	59.75	83.69	129.67	156.32	202.90
1053							
1054	ACTUAL EVAPOTRANSPIRATION	10.33	6.90	49.37	35.05	28.19	8.38
1055		13.14	28.04	36.69	40.37	32.00	0.40
1056							
1057	LATERAL DRAINAGE COLLECTED	7.001	5.081	6.528	5.949	5.933	5.019
1058	FROM LAYER 3	5.119	5.301	4.535	2.501	1.762	2.920
1059							
1060	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1061	FROM LAYER 3 INTO L. 3	0.000	0.000	0.000	0.000	0.000	0.000
1062							
1063	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
1064	LAYER 5	0.000	0.000	0.000	0.000	0.000	0.000
1065							
1066	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
1067	FROM LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
1068							
1069	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1070	FROM LAYER 6 INTO L. 6	0.000	0.000	0.000	0.000	0.000	0.000
1071							
1072	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
1073	LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
1074	*****						
1075							
1076		ANNUAL TOTALS FOR YEAR 1979					
1077		-----					
1078							
1079			MM		CU. METERS		PERCENT
1080			-----		-----		-----
1081	PRECIPITATION		454.80		4548.001		100.00
1082							
1083	RUNOFF		160.589		1605.887		35.31
1084							
1085	POTENTIAL EVAPOTRANSPIRATION		1354.731		13547.312		
1086							
1087	ACTUAL EVAPOTRANSPIRATION		288.868		2888.676		63.52
1088							
1089	DRAINAGE COLLECTED FROM LAYER 3		57.6499		576.499		12.68
1090							
1091	RECIRC. FROM LAYER 3 INTO L. 3		0.000000		0.000		0.00
1092							
1093	PERC./LEAKAGE THROUGH LAYER 5		0.000108		0.001		0.00
1094							
1095	AVG. HEAD ON TOP OF LAYER 4		0.2542				
1096							
1097	DRAINAGE COLLECTED FROM LAYER 6		0.0001		0.001		0.00
1098							
1099	RECIRC. FROM LAYER 6 INTO L. 6		0.000000		0.000		0.00
1100							
1101	PERC./LEAKAGE THROUGH LAYER 8		0.000009		0.000		0.00
1102							
1103	AVG. HEAD ON TOP OF LAYER 7		0.0000				
1104							

1105	CHANGE IN WATER STORAGE	-52.306	-523.064	-11.50
1106				
1107	SOIL WATER AT START OF YEAR	840.414	8404.137	
1108				
1109	SOIL WATER AT END OF YEAR	788.107	7881.072	
1110				
1111	INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
1112				
1113	INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
1114				
1115	SNOW WATER AT START OF YEAR	0.000	0.000	0.00
1116				
1117	SNOW WATER AT END OF YEAR	0.000	0.000	0.00
1118				
1119	ANNUAL WATER BUDGET BALANCE	0.0002	0.002	0.00

PEAK DAILY VALUES FOR YEARS 1969 THROUGH 2001

	(MM)	(CU. METERS)
PRECIPITATION	151.70	1517.000
RUNOFF	143.644	1436.4358
DRAINAGE COLLECTED FROM LAYER 3	0.59772	5.97721
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.000001	0.00001
AVERAGE HEAD ON TOP OF LAYER 4	0.962	
MAXIMUM HEAD ON TOP OF LAYER 4	1.895	
LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN)	0.3 METERS	
DRAINAGE COLLECTED FROM LAYER 6	0.10000	1.00000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 7	0.030	
MAXIMUM HEAD ON TOP OF LAYER 7	0.010	
LOCATION OF MAXIMUM HEAD IN LAYER 6 (DISTANCE FROM DRAIN)	0.0 METERS	
SNOW WATER	0.80	8.0000
MAXIMUM VEG. SOIL WATER (VOL/VOL)		0.4180
MINIMUM VEG. SOIL WATER (VOL/VOL)		0.2030

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

1174	*****						
1175							
1176		AVERAGE MONTHLY VALUES (MM) FOR YEARS 1969 THROUGH 2001					
1177	-----						
1178							
1179		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
1180		-----	-----	-----	-----	-----	-----
1181	PRECIPITATION						
1182	-----						
1183	TOTALS	70.51	58.12	59.57	55.89	51.84	52.75
1184		56.92	59.65	65.63	79.27	67.37	50.27
1185							
1186	STD. DEVIATIONS	48.81	44.60	50.18	50.36	35.61	40.40
1187		37.80	38.92	33.22	51.48	34.17	40.74
1188							
1189	RUNOFF						
1190	-----						
1191	TOTALS	32.455	27.676	27.845	26.089	21.093	20.420
1192		21.232	20.240	22.068	35.357	23.809	18.800
1193							
1194	STD. DEVIATIONS	31.293	32.512	36.307	32.952	23.713	31.106
1195		24.118	28.125	19.129	37.620	18.527	23.738
1196							
1197	POTENTIAL EVAPOTRANSPIRATION						
1198	-----						
1199	TOTALS	184.505	152.974	135.909	79.883	54.529	40.254
1200		45.737	62.622	86.743	127.504	148.714	178.757
1201							
1202	STD. DEVIATIONS	14.872	10.214	6.918	4.840	1.717	1.075
1203		1.581	3.291	6.026	8.658	11.930	12.665
1204							
1205	ACTUAL EVAPOTRANSPIRATION						
1206	-----						
1207	TOTALS	35.267	28.363	28.818	24.309	23.410	25.808
1208		31.106	35.364	42.958	41.576	41.039	28.931
1209							
1210	STD. DEVIATIONS	19.805	18.462	16.817	15.790	12.088	11.446
1211		13.240	13.948	13.406	18.270	18.903	20.061
1212							
1213	LATERAL DRAINAGE COLLECTED FROM LAYER 3						
1214	-----						
1215	TOTALS	4.0675	3.4092	3.2614	2.9305	3.2179	3.1107
1216		2.8068	2.5242	3.0479	3.6332	3.7363	4.1985
1217							
1218	STD. DEVIATIONS	2.2927	1.8807	1.9562	1.6579	1.5708	1.7825
1219		1.6527	1.6226	2.2461	2.5170	2.6301	2.3588
1220							
1221	LATERAL DRAINAGE RECIRCULATED FROM LAYER 3 INTO L. 3						
1222	-----						
1223	TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1224		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1225							
1226	STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1227		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1228							
1229	PERCOLATION/LEAKAGE THROUGH LAYER 5						
1230	-----						
1231	TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1232		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1233							
1234	STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1235		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1236							
1237	LATERAL DRAINAGE COLLECTED FROM LAYER 6						
1238	-----						
1239	TOTALS	0.0030	0.0000	0.0000	0.0000	0.0000	0.0000
1240		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1241							
1242	STD. DEVIATIONS	0.0174	0.0000	0.0000	0.0000	0.0000	0.0000

1243		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1244							
1245	LATERAL DRAINAGE RECIRCULATED FROM LAYER 6 INTO L. 6						
1246	-----						
1247	TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1248		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1249							
1250	STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1251		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1252							
1253	PERCOLATION/LEAKAGE THROUGH LAYER 8						
1254	-----						
1255	TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1256		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1257							
1258	STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1259		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1260							
1261							
1262	-----						
1263	AVERAGES OF MONTHLY AVERAGED DAILY HEADS (CM)						
1264	-----						
1265							
1266							
1267	DAILY AVERAGE HEAD ON TOP OF LAYER 4						
1268	-----						
1269	AVERAGES	0.0211	0.0194	0.0169	0.0157	0.0167	0.0167
1270		0.0146	0.0131	0.0163	0.0189	0.0200	0.0218
1271							
1272	STD. DEVIATIONS	0.0119	0.0107	0.0102	0.0089	0.0082	0.0096
1273		0.0086	0.0084	0.0120	0.0131	0.0141	0.0122
1274							
1275	DAILY AVERAGE HEAD ON TOP OF LAYER 7						
1276	-----						
1277	AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1278		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1279							
1280	STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1281		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1282							
1283	*****						
1284							
1285							
1286							
1287	*****						
1288							
1289	AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1969 THROUGH 2001						
1290	-----						
1291							
1292		MM		CU. METERS		PERCENT	
1293		-----		-----		-----	
1294	PRECIPITATION	727.79	(176.538)	7277.9		100.00	
1295							
1296	RUNOFF	297.085	(115.9547)	2970.85		40.820	
1297							
1298	POTENTIAL EVAPOTRANSPIRATION	1298.131	(41.9938)	12981.31			
1299							
1300	ACTUAL EVAPOTRANSPIRATION	386.948	(68.7673)	3869.48		53.168	
1301							
1302	LATERAL DRAINAGE COLLECTED	39.94414	(16.74795)	399.441		5.48845	
1303	FROM LAYER 3						
1304							
1305	DRAINAGE RECIRCULATED	0.00000	(0.00000)	0.000		0.00000	
1306	FROM LAYER 3 INTO L. 3						
1307							
1308	PERCOLATION/LEAKAGE THROUGH	0.00009	(0.00002)	0.001		0.00001	
1309	LAYER 5						
1310							
1311	AVERAGE HEAD ON TOP	0.176	(0.074)				

1312	OF LAYER 4				
1313					
1314	LATERAL DRAINAGE COLLECTED	0.00311	(0.01739)	0.031	0.00043
1315	FROM LAYER 6				
1316					
1317	DRAINAGE RECIRCULATED	0.00000	(0.00000)	0.000	0.00000
1318	FROM LAYER 6 INTO L. 6				
1319					
1320	PERCOLATION/LEAKAGE THROUGH	0.00001	(0.00000)	0.000	0.00000
1321	LAYER 8				
1322					
1323	AVERAGE HEAD ON TOP	0.000	(0.000)		
1324	OF LAYER 7				
1325					
1326	CHANGE IN WATER STORAGE	3.805	(0.8549)	38.05	0.523
1327					
1328	*****				
1329	*****				
1330					
1331					

Final Cover

LAYER DATA 1

VALID FOR 33 YEARS

NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER
WERE SPECIFIED BY THE USER.

LAYER 1

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 7

THICKNESS	=	20.00	CM
POROSITY	=	0.4730	VOL/VOL
FIELD CAPACITY	=	0.2220	VOL/VOL
WILTING POINT	=	0.1040	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1389	VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.	=	0.5200E-03	CM/SEC

NOTE: SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY 4.63
FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 7

THICKNESS	=	80.00	CM
POROSITY	=	0.4730	VOL/VOL
FIELD CAPACITY	=	0.2220	VOL/VOL
WILTING POINT	=	0.1040	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1389	VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.	=	0.5200E-03	CM/SEC

LAYER 3

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 20

THICKNESS	=	0.50	CM
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0300	VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.	=	10.00	CM/SEC
SLOPE	=	20.00	PERCENT
DRAINAGE LENGTH	=	70.0	METERS

LAYER 4

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.00	CM
EFFECTIVE SAT. HYD. CONDUCT.	=	0.2000E-12	CM/SEC
FML PINHOLE DENSITY	=	2.00	HOLES/HECTARE

FML INSTALLATION DEFECTS = 2.00 HOLES/HECTARE
FML PLACEMENT QUALITY = 4 - POOR

LAYER 5

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS = 0.60 CM
POROSITY = 0.7500 VOL/VOL
FIELD CAPACITY = 0.7470 VOL/VOL
WILTING POINT = 0.4000 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.7500 VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.= 0.3000E-08 CM/SEC

LAYER 6

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 27

THICKNESS = 30.00 CM
POROSITY = 0.4000 VOL/VOL
FIELD CAPACITY = 0.3660 VOL/VOL
WILTING POINT = 0.2880 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3000 VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.= 0.7800E-06 CM/SEC

LAYER 7

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 32

THICKNESS = 1000.00 CM
POROSITY = 0.4500 VOL/VOL
FIELD CAPACITY = 0.1160 VOL/VOL
WILTING POINT = 0.0490 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.1160 VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.= 0.1000E-01 CM/SEC

LAYER 8

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 21

THICKNESS = 30.00 CM
POROSITY = 0.3970 VOL/VOL
FIELD CAPACITY = 0.0320 VOL/VOL
WILTING POINT = 0.0130 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.0300 VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.= 0.3000 CM/SEC
SLOPE = 3.00 PERCENT
DRAINAGE LENGTH = 25.0 METERS

LAYER 9

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS = 0.10 CM

139 EFFECTIVE SAT. HYD. CONDUCT.= 0.2000E-12 CM/SEC
140 FML PINHOLE DENSITY = 2.00 HOLES/HECTARE
141 FML INSTALLATION DEFECTS = 2.00 HOLES/HECTARE
142 FML PLACEMENT QUALITY = 4 - POOR
143
144

145
146 LAYER 10
147 -----

148
149 TYPE 3 - BARRIER SOIL LINER
150 MATERIAL TEXTURE NUMBER 17

151 THICKNESS = 0.60 CM
152 POROSITY = 0.7500 VOL/VOL
153 FIELD CAPACITY = 0.7470 VOL/VOL
154 WILTING POINT = 0.4000 VOL/VOL
155 INITIAL SOIL WATER CONTENT = 0.7500 VOL/VOL
156 EFFECTIVE SAT. HYD. CONDUCT.= 0.3000E-08 CM/SEC
157
158

159
160 LAYER 11
161 -----

162
163 TYPE 2 - LATERAL DRAINAGE LAYER
164 MATERIAL TEXTURE NUMBER 20

165 THICKNESS = 0.50 CM
166 POROSITY = 0.8500 VOL/VOL
167 FIELD CAPACITY = 0.0100 VOL/VOL
168 WILTING POINT = 0.0050 VOL/VOL
169 INITIAL SOIL WATER CONTENT = 0.0300 VOL/VOL
170 EFFECTIVE SAT. HYD. CONDUCT.= 10.00 CM/SEC
171 SLOPE = 3.00 PERCENT
172 DRAINAGE LENGTH = 25.0 METERS
173
174

175
176 LAYER 12
177 -----

178
179 TYPE 4 - FLEXIBLE MEMBRANE LINER
180 MATERIAL TEXTURE NUMBER 35

181 THICKNESS = 0.10 CM
182 EFFECTIVE SAT. HYD. CONDUCT.= 0.2000E-12 CM/SEC
183 FML PINHOLE DENSITY = 2.00 HOLES/HECTARE
184 FML INSTALLATION DEFECTS = 2.00 HOLES/HECTARE
185 FML PLACEMENT QUALITY = 4 - POOR
186
187

188
189 LAYER 13
190 -----

191
192 TYPE 3 - BARRIER SOIL LINER
193 MATERIAL TEXTURE NUMBER 17

194 THICKNESS = 0.60 CM
195 POROSITY = 0.7500 VOL/VOL
196 FIELD CAPACITY = 0.7470 VOL/VOL
197 WILTING POINT = 0.4000 VOL/VOL
198 INITIAL SOIL WATER CONTENT = 0.7500 VOL/VOL
199 EFFECTIVE SAT. HYD. CONDUCT.= 0.3000E-08 CM/SEC
200
201

202
203 *****
204

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
 SOIL DATA BASE USING SOIL TEXTURE # 7 WITH A
 GOOD STAND OF GRASS, A SURFACE SLOPE OF 20.%
 AND A SLOPE LENGTH OF 150. METERS.

SCS RUNOFF CURVE NUMBER	=	68.14	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	10.0000	HECTARES
EVAPORATIVE ZONE DEPTH	=	20.0	CM
INITIAL WATER IN EVAPORATIVE ZONE	=	2.778	CM
UPPER LIMIT OF EVAPORATIVE STORAGE	=	9.460	CM
FIELD CAPACITY OF EVAPORATIVE ZONE	=	4.440	CM
LOWER LIMIT OF EVAPORATIVE STORAGE	=	2.080	CM
SOIL EVAPORATION ZONE DEPTH	=	20.0	CM
INITIAL SNOW WATER	=	0.000	CM
INITIAL INTERCEPTION WATER	=	0.000	CM
INITIAL WATER IN LAYER MATERIALS	=	141.170	CM
TOTAL INITIAL WATER	=	141.170	CM
TOTAL SUBSURFACE INFLOW	=	0.00	MM/YR

EVAPOTRANSPIRATION DATA 1

VALID FOR 33 YEARS

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
 Woodlawn NSW

STATION LATITUDE	=	-35.00	DEGREES
MAXIMUM LEAF AREA INDEX	=	3.50	
START OF GROWING SEASON (JULIAN DATE)	=	181	
END OF GROWING SEASON (JULIAN DATE)	=	151	
EVAPORATIVE ZONE DEPTH	=	20.0	CM
AVERAGE ANNUAL WIND SPEED	=	19.00	KPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	69.2	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	78.0	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	76.4	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	72.8	%

MONTHLY TOTALS (MM) FOR YEAR 1969

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	30.3	116.9	89.4	108.9	63.5	45.5
	45.8	56.1	50.9	226.4	97.0	46.3
RUNOFF	0.00	0.00	0.00	4.53	0.00	0.00
	0.00	0.00	0.00	21.59	0.00	0.00
POTENTIAL EVAPOTRANSPIRATION	200.96	146.54	134.82	82.83	51.02	38.94
	45.78	64.03	77.70	118.44	138.19	176.66
ACTUAL EVAPOTRANSPIRATION	37.28	62.06	58.31	44.85	26.63	20.71
	27.50	43.08	58.09	63.66	109.44	46.98
LATERAL DRAINAGE COLLECTED	0.100	0.000	0.000	24.199	25.133	22.405
FROM LAYER 3	32.027	17.181	11.221	10.788	117.684	17.943

277							
278	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
279	FROM LAYER 3 INTO L. 3	0.000	0.000	0.000	0.000	0.000	0.000
280							
281	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.029	0.081	0.056
282	LAYER 5	0.081	0.081	0.074	0.079	0.078	0.081
283							
284	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
285	FROM LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
286							
287	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
288	FROM LAYER 8 INTO L. 8	0.000	0.000	0.000	0.000	0.000	0.000
289							
290	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
291	LAYER 10	0.000	0.000	0.000	0.000	0.000	0.000
292							
293	LATERAL DRAINAGE COLLECTED	0.100	0.000	0.000	0.000	0.000	0.000
294	FROM LAYER 11	0.000	0.000	0.000	0.000	0.000	0.000
295							
296	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
297	FROM LAYER 11 INTO L. 11	0.000	0.000	0.000	0.000	0.000	0.000
298							
299	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
300	LAYER 13	0.000	0.000	0.000	0.000	0.000	0.000
301	*****						

ANNUAL TOTALS FOR YEAR 1969

	MM	CU. METERS	PERCENT
	-----	-----	-----
304			
305			
306			
307			
308	PRECIPITATION	977.00	97700.023
309			100.00
310	RUNOFF	26.121	2612.084
311			2.67
312	POTENTIAL EVAPOTRANSPIRATION	1275.914	127591.359
313			
314	ACTUAL EVAPOTRANSPIRATION	598.606	59860.633
315			61.27
316	DRAINAGE COLLECTED FROM LAYER 3	278.6804	27868.043
317			28.52
318	RECIRC. FROM LAYER 3 INTO L. 3	0.000000	0.000
319			0.00
320	PERC./LEAKAGE THROUGH LAYER 5	0.639100	63.910
321			0.07
322	AVG. HEAD ON TOP OF LAYER 4	0.0161	
323			
324	DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.000
325			0.00
326	RECIRC. FROM LAYER 8 INTO L. 8	0.000000	0.000
327			0.00
328	PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000
329			0.00
330	AVG. HEAD ON TOP OF LAYER 9	0.0000	
331			
332	DRAINAGE COLLECTED FROM LAYER 11	0.1000	10.000
333			0.01
334	RECIRC. FROM LAYER 11 INTO L. 11	0.000000	0.000
335			0.00
336	PERC./LEAKAGE THROUGH LAYER 13	0.000000	0.000
337			0.00
338	AVG. HEAD ON TOP OF LAYER 12	0.0001	
339			
340	CHANGE IN WATER STORAGE	73.493	7349.251
341			7.52
342	SOIL WATER AT START OF YEAR	1411.699	141169.922
343			
344	SOIL WATER AT END OF YEAR	1485.192	148519.172
345			

346	INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
347				
348	INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
349				
350	SNOW WATER AT START OF YEAR	0.000	0.000	0.00
351				
352	SNOW WATER AT END OF YEAR	0.000	0.000	0.00
353				
354	ANNUAL WATER BUDGET BALANCE	0.0001	0.009	0.00

MONTHLY TOTALS (MM) FOR YEAR 1970

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
PRECIPITATION	90.5	59.7	65.1	102.3	96.4	27.2
	3.0	49.3	134.0	43.0	64.1	93.4
RUNOFF	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00
POTENTIAL EVAPOTRANSPIRATION	158.72	150.68	131.02	80.17	50.80	40.66
	46.49	57.86	75.10	131.09	140.82	171.65
ACTUAL EVAPOTRANSPIRATION	74.96	52.20	56.24	58.63	32.56	11.91
	9.07	27.08	47.03	67.99	64.10	67.83
LATERAL DRAINAGE COLLECTED	9.376	8.632	8.458	10.637	16.325	50.501
FROM LAYER 3	22.365	11.222	20.450	65.664	12.895	6.348
LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
FROM LAYER 3 INTO L. 3	0.000	0.000	0.000	0.000	0.000	0.000
PERCOLATION/LEAKAGE THROUGH	0.065	0.070	0.080	0.059	0.076	0.077
LAYER 5	0.081	0.080	0.030	0.081	0.078	0.056
LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
FROM LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
FROM LAYER 8 INTO L. 8	0.000	0.000	0.000	0.000	0.000	0.000
PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
LAYER 10	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
FROM LAYER 11	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
FROM LAYER 11 INTO L. 11	0.000	0.000	0.000	0.000	0.000	0.000
PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
LAYER 13	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 1970

	MM	CU. METERS	PERCENT
	-----	-----	-----
PRECIPITATION	828.00	82800.000	100.00
RUNOFF	0.001	0.075	0.00
POTENTIAL EVAPOTRANSPIRATION	1235.073	123507.336	

415						
416	ACTUAL EVAPOTRANSPIRATION	569.592	56959.203	68.79		
417						
418	DRAINAGE COLLECTED FROM LAYER 3	242.8727	24287.266	29.33		
419						
420	RECIRC. FROM LAYER 3 INTO L. 3	0.000000	0.000	0.00		
421						
422	PERC./LEAKAGE THROUGH LAYER 5	0.832856	83.286	0.10		
423						
424	AVG. HEAD ON TOP OF LAYER 4	0.0140				
425						
426	DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.000	0.00		
427						
428	RECIRC. FROM LAYER 8 INTO L. 8	0.000000	0.000	0.00		
429						
430	PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00		
431						
432	AVG. HEAD ON TOP OF LAYER 9	0.0000				
433						
434	DRAINAGE COLLECTED FROM LAYER 11	0.0000	0.000	0.00		
435						
436	RECIRC. FROM LAYER 11 INTO L. 11	0.000000	0.000	0.00		
437						
438	PERC./LEAKAGE THROUGH LAYER 13	0.000000	0.000	0.00		
439						
440	AVG. HEAD ON TOP OF LAYER 12	0.0000				
441						
442	CHANGE IN WATER STORAGE	15.534	1553.442	1.88		
443						
444	SOIL WATER AT START OF YEAR	1485.192	148519.172			
445						
446	SOIL WATER AT END OF YEAR	1500.726	150072.609			
447						
448	INTERCEPTION WATER AT START OF YEAR	0.000	0.000			
449						
450	INTERCEPTION WATER AT END OF YEAR	0.000	0.000			
451						
452	SNOW WATER AT START OF YEAR	0.000	0.000	0.00		
453						
454	SNOW WATER AT END OF YEAR	0.000	0.000	0.00		
455						
456	ANNUAL WATER BUDGET BALANCE	0.0002	0.017	0.00		
457						
458	*****					
459	*****					
460						
461	MONTHLY TOTALS (MM) FOR YEAR 1971					
462	-----					
463						
464		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV
465		-----	-----	-----	-----	-----
466						
467	PRECIPITATION	84.6	89.1	26.5	22.0	15.5
468		15.8	75.8	36.1	31.6	59.8
469						
470	RUNOFF	0.00	0.00	0.00	0.00	0.00
471		0.00	0.00	0.00	0.00	0.00
472						
473	POTENTIAL EVAPOTRANSPIRATION	166.79	134.69	129.98	80.18	52.54
474		42.11	60.23	85.62	135.21	135.07
475						
476	ACTUAL EVAPOTRANSPIRATION	73.77	82.48	26.47	15.02	17.40
477		13.24	30.04	47.70	44.06	51.99
478						
479	LATERAL DRAINAGE COLLECTED	12.882	6.497	13.451	8.437	4.080
480	FROM LAYER 3	0.000	0.176	8.653	12.456	6.935
481						
482	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000
483	FROM LAYER 3 INTO L. 3	0.000	0.000	0.000	0.000	0.000

484							
485	PERCOLATION/LEAKAGE THROUGH	0.080	0.052	0.080	0.078	0.072	0.000
486	LAYER 5	0.000	0.004	0.048	0.080	0.078	0.051
487							
488	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
489	FROM LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
490							
491	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
492	FROM LAYER 8 INTO L. 8	0.000	0.000	0.000	0.000	0.000	0.000
493							
494	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
495	LAYER 10	0.000	0.000	0.000	0.000	0.000	0.000
496							
497	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
498	FROM LAYER 11	0.000	0.000	0.000	0.000	0.000	0.000
499							
500	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
501	FROM LAYER 11 INTO L. 11	0.000	0.000	0.000	0.000	0.000	0.000
502							
503	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
504	LAYER 13	0.000	0.000	0.000	0.000	0.000	0.000
505	*****						

	MM	CU. METERS	PERCENT
	-----	-----	-----
506			
507	ANNUAL TOTALS FOR YEAR 1971		
508	-----		
509			
510			
511			
512	PRECIPITATION	581.70	58170.008
513			100.00
514	RUNOFF	0.000	0.00
515			
516	POTENTIAL EVAPOTRANSPIRATION	1228.806	122880.602
517			
518	ACTUAL EVAPOTRANSPIRATION	505.374	50537.375
519			86.88
520	DRAINAGE COLLECTED FROM LAYER 3	76.2844	7628.436
521			13.11
522	RECIRC. FROM LAYER 3 INTO L. 3	0.000000	0.00
523			
524	PERC./LEAKAGE THROUGH LAYER 5	0.624621	62.462
525			0.11
526	AVG. HEAD ON TOP OF LAYER 4	0.0044	
527			
528	DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.00
529			
530	RECIRC. FROM LAYER 8 INTO L. 8	0.000000	0.00
531			
532	PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.00
533			
534	AVG. HEAD ON TOP OF LAYER 9	0.0000	
535			
536	DRAINAGE COLLECTED FROM LAYER 11	0.0000	0.00
537			
538	RECIRC. FROM LAYER 11 INTO L. 11	0.000000	0.00
539			
540	PERC./LEAKAGE THROUGH LAYER 13	0.000000	0.00
541			
542	AVG. HEAD ON TOP OF LAYER 12	0.0000	
543			
544	CHANGE IN WATER STORAGE	0.042	4.195
545			0.01
546	SOIL WATER AT START OF YEAR	1500.726	150072.609
547			
548	SOIL WATER AT END OF YEAR	1500.768	150076.812
549			
550	INTERCEPTION WATER AT START OF YEAR	0.000	0.000
551			
552	INTERCEPTION WATER AT END OF YEAR	0.000	0.000

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553
554     SNOW WATER AT START OF YEAR                0.000          0.000          0.00
555
556     SNOW WATER AT END OF YEAR                  0.000          0.000          0.00
557
558     ANNUAL WATER BUDGET BALANCE                0.0000         -0.001          0.00
559
560     *****
561     *****
562
563             MONTHLY TOTALS (MM) FOR YEAR 1972
564     -----
565
566             JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
567             -----
568
569     PRECIPITATION                137.8    37.3    23.4    57.9    22.4    10.9
570                                12.5    75.7    19.9    90.2    48.5     5.8
571
572     RUNOFF                      0.00    0.00    0.00    0.00    0.00    0.00
573                                0.00    0.00    0.00    0.00    0.00    0.00
574
575     POTENTIAL EVAPOTRANSPIRATION  155.73  142.26  133.40   78.85   55.80   40.22
576                                47.25   63.29   98.41  124.94  151.74  194.09
577
578     ACTUAL EVAPOTRANSPIRATION    133.27   37.54   23.42   49.83   25.24    5.44
579                                11.94   33.99   42.74   48.85   75.03    5.80
580
581     LATERAL DRAINAGE COLLECTED     3.103   14.491    9.350    4.494    0.486    0.000
582     FROM LAYER 3                  0.000    0.155    6.555   12.328    6.870   10.636
583
584     LATERAL DRAINAGE RECIRCULATED  0.000    0.000    0.000    0.000    0.000    0.000
585     FROM LAYER 3 INTO L. 3        0.000    0.000    0.000    0.000    0.000    0.000
586
587     PERCOLATION/LEAKAGE THROUGH    0.028    0.075    0.080    0.078    0.010    0.000
588     LAYER 5                      0.000    0.004    0.047    0.080    0.058    0.080
589
590     LATERAL DRAINAGE COLLECTED     0.000    0.000    0.000    0.000    0.000    0.000
591     FROM LAYER 8                  0.000    0.000    0.000    0.000    0.000    0.000
592
593     LATERAL DRAINAGE RECIRCULATED  0.000    0.000    0.000    0.000    0.000    0.000
594     FROM LAYER 8 INTO L. 8        0.000    0.000    0.000    0.000    0.000    0.000
595
596     PERCOLATION/LEAKAGE THROUGH    0.000    0.000    0.000    0.000    0.000    0.000
597     LAYER 10                     0.000    0.000    0.000    0.000    0.000    0.000
598
599     LATERAL DRAINAGE COLLECTED     0.000    0.000    0.000    0.000    0.000    0.000
600     FROM LAYER 11                 0.000    0.000    0.000    0.000    0.000    0.000
601
602     LATERAL DRAINAGE RECIRCULATED  0.000    0.000    0.000    0.000    0.000    0.000
603     FROM LAYER 11 INTO L. 11      0.000    0.000    0.000    0.000    0.000    0.000
604
605     PERCOLATION/LEAKAGE THROUGH    0.000    0.000    0.000    0.000    0.000    0.000
606     LAYER 13                     0.000    0.000    0.000    0.000    0.000    0.000
607     *****
608
609             ANNUAL TOTALS FOR YEAR 1972
610     -----
611
612                                MM              CU. METERS      PERCENT
613                                -----
614     PRECIPITATION                542.30              54230.004      100.00
615
616     RUNOFF                      0.000              0.000          0.00
617
618     POTENTIAL EVAPOTRANSPIRATION  1285.984            128598.438
619
620     ACTUAL EVAPOTRANSPIRATION     493.070            49306.988      90.92
621

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622	DRAINAGE COLLECTED FROM LAYER 3	68.4681	6846.810	12.63			
623							
624	RECIRC. FROM LAYER 3 INTO L. 3	0.000000	0.000	0.00			
625							
626	PERC./LEAKAGE THROUGH LAYER 5	0.542737	54.274	0.10			
627							
628	AVG. HEAD ON TOP OF LAYER 4	0.0040					
629							
630	DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.000	0.00			
631							
632	RECIRC. FROM LAYER 8 INTO L. 8	0.000000	0.000	0.00			
633							
634	PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00			
635							
636	AVG. HEAD ON TOP OF LAYER 9	0.0000					
637							
638	DRAINAGE COLLECTED FROM LAYER 11	0.0000	0.000	0.00			
639							
640	RECIRC. FROM LAYER 11 INTO L. 11	0.000000	0.000	0.00			
641							
642	PERC./LEAKAGE THROUGH LAYER 13	0.000000	0.000	0.00			
643							
644	AVG. HEAD ON TOP OF LAYER 12	0.0000					
645							
646	CHANGE IN WATER STORAGE	-19.238	-1923.807	-3.55			
647							
648	SOIL WATER AT START OF YEAR	1500.768	150076.812				
649							
650	SOIL WATER AT END OF YEAR	1481.530	148153.000				
651							
652	INTERCEPTION WATER AT START OF YEAR	0.000	0.000				
653							
654	INTERCEPTION WATER AT END OF YEAR	0.000	0.000				
655							
656	SNOW WATER AT START OF YEAR	0.000	0.000	0.00			
657							
658	SNOW WATER AT END OF YEAR	0.000	0.000	0.00			
659							
660	ANNUAL WATER BUDGET BALANCE	0.0002	0.016	0.00			
661							
662	*****						
663	*****						
664							
665	MONTHLY TOTALS (MM) FOR YEAR 1973						
666	-----						
667							
668		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
669		-----	-----	-----	-----	-----	-----
670							
671	PRECIPITATION	58.3	133.1	41.2	15.2	31.2	45.6
672		74.7	84.4	38.8	110.4	118.6	50.2
673							
674	RUNOFF	0.00	0.00	0.00	0.00	0.00	0.00
675		0.00	0.00	0.00	0.00	0.00	0.00
676							
677	POTENTIAL EVAPOTRANSPIRATION	197.17	134.95	135.62	81.62	57.01	39.99
678		47.93	61.19	92.26	118.35	143.84	177.07
679							
680	ACTUAL EVAPOTRANSPIRATION	53.10	108.03	26.55	21.85	20.77	25.86
681		32.55	44.58	52.40	79.12	106.35	41.01
682							
683	LATERAL DRAINAGE COLLECTED	6.126	2.853	12.731	8.358	1.926	4.857
684	FROM LAYER 3	17.568	21.552	41.506	15.233	19.703	14.697
685							
686	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
687	FROM LAYER 3 INTO L. 3	0.000	0.000	0.000	0.000	0.000	0.000
688							
689	PERCOLATION/LEAKAGE THROUGH	0.080	0.041	0.080	0.078	0.043	0.066
690	LAYER 5	0.052	0.074	0.076	0.068	0.066	0.080

691							
692	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
693	FROM LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
694							
695	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
696	FROM LAYER 8 INTO L. 8	0.000	0.000	0.000	0.000	0.000	0.000
697							
698	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
699	LAYER 10	0.000	0.000	0.000	0.000	0.000	0.000
700							
701	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
702	FROM LAYER 11	0.000	0.000	0.000	0.000	0.000	0.000
703							
704	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
705	FROM LAYER 11 INTO L. 11	0.000	0.000	0.000	0.000	0.000	0.000
706							
707	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
708	LAYER 13	0.000	0.000	0.000	0.000	0.000	0.000
709	*****						

ANNUAL TOTALS FOR YEAR 1973

	MM	CU. METERS	PERCENT
	-----	-----	-----
713			
714			
715			
716	PRECIPITATION	801.70	80170.016
717			100.00
718	RUNOFF	0.000	0.000
719			0.00
720	POTENTIAL EVAPOTRANSPIRATION	1286.999	128699.938
721			
722	ACTUAL EVAPOTRANSPIRATION	612.172	61217.156
723			76.36
724	DRAINAGE COLLECTED FROM LAYER 3	167.1103	16711.033
725			20.84
726	RECIRC. FROM LAYER 3 INTO L. 3	0.000000	0.000
727			0.00
728	PERC./LEAKAGE THROUGH LAYER 5	0.805871	80.587
729			0.10
730	AVG. HEAD ON TOP OF LAYER 4	0.0096	
731			
732	DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.000
733			0.00
734	RECIRC. FROM LAYER 8 INTO L. 8	0.000000	0.000
735			0.00
736	PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000
737			0.00
738	AVG. HEAD ON TOP OF LAYER 9	0.0000	
739			
740	DRAINAGE COLLECTED FROM LAYER 11	0.0000	0.000
741			0.00
742	RECIRC. FROM LAYER 11 INTO L. 11	0.000000	0.000
743			0.00
744	PERC./LEAKAGE THROUGH LAYER 13	0.000000	0.000
745			0.00
746	AVG. HEAD ON TOP OF LAYER 12	0.0000	
747			
748	CHANGE IN WATER STORAGE	22.418	2241.801
749			2.80
750	SOIL WATER AT START OF YEAR	1481.530	148153.000
751			
752	SOIL WATER AT END OF YEAR	1503.948	150394.797
753			
754	INTERCEPTION WATER AT START OF YEAR	0.000	0.000
755			
756	INTERCEPTION WATER AT END OF YEAR	0.000	0.000
757			
758	SNOW WATER AT START OF YEAR	0.000	0.000
759			0.00

760	SNOW WATER AT END OF YEAR	0.000		0.000		0.00	
761							
762	ANNUAL WATER BUDGET BALANCE	0.0002		0.019		0.00	
763							
764	*****						
765	*****						
766							
767	MONTHLY TOTALS (MM) FOR YEAR 1974						
768	-----						
769							
770		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
771		-----	-----	-----	-----	-----	-----
772							
773	PRECIPITATION	103.0	82.6	65.1	199.0	90.3	30.0
774		74.7	200.0	103.2	133.1	86.9	0.3
775							
776	RUNOFF	0.28	0.39	0.00	0.40	0.02	0.00
777		0.00	19.07	0.00	0.00	0.00	0.00
778							
779	POTENTIAL EVAPOTRANSPIRATION	165.50	142.63	131.99	69.29	54.27	39.83
780		45.27	59.37	78.66	116.83	137.48	191.44
781							
782	ACTUAL EVAPOTRANSPIRATION	85.23	41.39	53.40	42.34	18.16	18.69
783		28.68	36.45	53.48	91.19	65.09	24.60
784							
785	LATERAL DRAINAGE COLLECTED	16.926	21.098	30.961	99.038	62.000	51.766
786	FROM LAYER 3	33.019	98.278	98.655	60.289	25.354	9.423
787							
788	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
789	FROM LAYER 3 INTO L. 3	0.000	0.000	0.000	0.000	0.000	0.000
790							
791	PERCOLATION/LEAKAGE THROUGH	0.065	0.064	0.081	0.072	0.077	0.078
792	LAYER 5	0.070	0.079	0.076	0.064	0.078	0.080
793							
794	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
795	FROM LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
796							
797	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
798	FROM LAYER 8 INTO L. 8	0.000	0.000	0.000	0.000	0.000	0.000
799							
800	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
801	LAYER 10	0.000	0.000	0.000	0.000	0.000	0.000
802							
803	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
804	FROM LAYER 11	0.000	0.000	0.000	0.000	0.000	0.000
805							
806	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
807	FROM LAYER 11 INTO L. 11	0.000	0.000	0.000	0.000	0.000	0.000
808							
809	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
810	LAYER 13	0.000	0.000	0.000	0.000	0.000	0.000
811	*****						
812							
813	ANNUAL TOTALS FOR YEAR 1974						
814	-----						
815							
816		MM		CU. METERS		PERCENT	
817		-----		-----		-----	
818	PRECIPITATION	1168.20		116820.016		100.00	
819							
820	RUNOFF	20.158		2015.809		1.73	
821							
822	POTENTIAL EVAPOTRANSPIRATION	1232.550		123255.039			
823							
824	ACTUAL EVAPOTRANSPIRATION	558.700		55870.027		47.83	
825							
826	DRAINAGE COLLECTED FROM LAYER 3	606.8059		60680.590		51.94	
827							
828	RECIRC. FROM LAYER 3 INTO L. 3	0.000000		0.000		0.00	

829				
830	PERC./LEAKAGE THROUGH LAYER 5	0.884578	88.458	0.08
831				
832	AVG. HEAD ON TOP OF LAYER 4	0.0350		
833				
834	DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.000	0.00
835				
836	RECIRC. FROM LAYER 8 INTO L. 8	0.000000	0.000	0.00
837				
838	PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
839				
840	AVG. HEAD ON TOP OF LAYER 9	0.0000		
841				
842	DRAINAGE COLLECTED FROM LAYER 11	0.0000	0.000	0.00
843				
844	RECIRC. FROM LAYER 11 INTO L. 11	0.000000	0.000	0.00
845				
846	PERC./LEAKAGE THROUGH LAYER 13	0.000000	0.000	0.00
847				
848	AVG. HEAD ON TOP OF LAYER 12	0.0000		
849				
850	CHANGE IN WATER STORAGE	-17.464	-1746.405	-1.49
851				
852	SOIL WATER AT START OF YEAR	1503.948	150394.797	
853				
854	SOIL WATER AT END OF YEAR	1486.484	148648.406	
855				
856	INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
857				
858	INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
859				
860	SNOW WATER AT START OF YEAR	0.000	0.000	0.00
861				
862	SNOW WATER AT END OF YEAR	0.000	0.000	0.00
863				
864	ANNUAL WATER BUDGET BALANCE	0.0000	0.005	0.00

MONTHLY TOTALS (MM) FOR YEAR 1975

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
871						
872						
873						
874						
875	PRECIPITATION	37.2	76.6	65.1	72.8	19.9
876		106.2	46.0	98.4	110.3	35.0
877						35.2
878	RUNOFF	0.00	0.00	0.00	0.00	0.00
879		0.00	0.00	0.00	0.00	4.09
880						0.00
881	POTENTIAL EVAPOTRANSPIRATION	194.28	144.64	127.61	75.66	54.47
882		48.92	61.86	82.37	115.71	160.78
883						40.62
884	ACTUAL EVAPOTRANSPIRATION	37.20	71.62	50.14	47.33	28.62
885		24.19	36.54	56.93	103.09	62.02
886						17.30
887	LATERAL DRAINAGE COLLECTED	7.809	2.641	3.147	0.012	9.131
888	FROM LAYER 3	128.136	20.971	13.009	22.029	11.236
889						57.922
890	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000
891	FROM LAYER 3 INTO L. 3	0.000	0.000	0.000	0.000	0.000
892						0.000
893	PERCOLATION/LEAKAGE THROUGH	0.080	0.051	0.075	0.001	0.063
894	LAYER 5	0.076	0.080	0.061	0.081	0.076
895						0.072
896	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000
897	FROM LAYER 8	0.000	0.000	0.000	0.000	0.000

898							
899	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
900	FROM LAYER 8 INTO L. 8	0.000	0.000	0.000	0.000	0.000	0.000
901							
902	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
903	LAYER 10	0.000	0.000	0.000	0.000	0.000	0.000
904							
905	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
906	FROM LAYER 11	0.000	0.000	0.000	0.000	0.000	0.000
907							
908	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
909	FROM LAYER 11 INTO L. 11	0.000	0.000	0.000	0.000	0.000	0.000
910							
911	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
912	LAYER 13	0.000	0.000	0.000	0.000	0.000	0.000
913							
914	*****						
915							
916	ANNUAL TOTALS FOR YEAR 1975						
917	-----						
918							
919		MM		CU. METERS		PERCENT	
920		-----		-----		-----	
921	PRECIPITATION	855.30		85530.000		100.00	
922							
923	RUNOFF	4.090		409.024		0.48	
924							
925	POTENTIAL EVAPOTRANSPIRATION	1277.003		127700.266			
926							
927	ACTUAL EVAPOTRANSPIRATION	560.341		56034.102		65.51	
928							
929	DRAINAGE COLLECTED FROM LAYER 3	285.7692		28576.920		33.41	
930							
931	RECIRC. FROM LAYER 3 INTO L. 3	0.000000		0.000		0.00	
932							
933	PERC./LEAKAGE THROUGH LAYER 5	0.796467		79.647		0.09	
934							
935	AVG. HEAD ON TOP OF LAYER 4	0.0164					
936							
937	DRAINAGE COLLECTED FROM LAYER 8	0.0000		0.000		0.00	
938							
939	RECIRC. FROM LAYER 8 INTO L. 8	0.000000		0.000		0.00	
940							
941	PERC./LEAKAGE THROUGH LAYER 10	0.000000		0.000		0.00	
942							
943	AVG. HEAD ON TOP OF LAYER 9	0.0000					
944							
945	DRAINAGE COLLECTED FROM LAYER 11	0.0000		0.000		0.00	
946							
947	RECIRC. FROM LAYER 11 INTO L. 11	0.000000		0.000		0.00	
948							
949	PERC./LEAKAGE THROUGH LAYER 13	0.000000		0.000		0.00	
950							
951	AVG. HEAD ON TOP OF LAYER 12	0.0000					
952							
953	CHANGE IN WATER STORAGE	5.099		509.949		0.60	
954							
955	SOIL WATER AT START OF YEAR	1486.484		148648.406			
956							
957	SOIL WATER AT END OF YEAR	1491.583		149158.344			
958							
959	INTERCEPTION WATER AT START OF YEAR	0.000		0.000			
960							
961	INTERCEPTION WATER AT END OF YEAR	0.000		0.000			
962							
963	SNOW WATER AT START OF YEAR	0.000		0.000		0.00	
964							
965	SNOW WATER AT END OF YEAR	0.000		0.000		0.00	
966							

967	ANNUAL WATER BUDGET BALANCE	0.0001	0.010	0.00
968				
969	*****			
970	*****			
971				
972	MONTHLY TOTALS (MM) FOR YEAR 1976			
973	-----			
974				
975		JAN/JUL	FEB/AUG	MAR/SEP
976		APR/OCT	MAY/NOV	JUN/DEC
977		-----	-----	-----
978	PRECIPITATION	130.3	65.4	41.1
979		46.0	26.3	65.1
980				19.6
981	RUNOFF	0.01	0.00	0.00
982		0.00	0.00	0.00
983				4.89
984	POTENTIAL EVAPOTRANSPIRATION	165.28	136.88	127.35
985		45.58	63.82	83.46
986				78.16
987	ACTUAL EVAPOTRANSPIRATION	95.88	59.94	39.79
988		26.80	37.76	52.75
989				21.62
990	LATERAL DRAINAGE COLLECTED	4.770	26.142	11.587
991	FROM LAYER 3	1.705	13.813	12.449
992				5.634
993	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000
994	FROM LAYER 3 INTO L. 3	0.000	0.000	0.000
995				0.000
996	PERCOLATION/LEAKAGE THROUGH	0.064	0.075	0.080
997	LAYER 5	0.019	0.066	0.077
998				0.078
999	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000
1000	FROM LAYER 8	0.000	0.000	0.000
1001				0.000
1002	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000
1003	FROM LAYER 8 INTO L. 8	0.000	0.000	0.000
1004				0.000
1005	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000
1006	LAYER 10	0.000	0.000	0.000
1007				0.000
1008	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000
1009	FROM LAYER 11	0.000	0.000	0.000
1010				0.000
1011	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000
1012	FROM LAYER 11 INTO L. 11	0.000	0.000	0.000
1013				0.000
1014	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000
1015	LAYER 13	0.000	0.000	0.000
1016				0.000
1017	*****			
1018				
1019	ANNUAL TOTALS FOR YEAR 1976			
1020	-----			
1021				
1022		MM	CU. METERS	PERCENT
1023		-----	-----	-----
1024	PRECIPITATION	743.00	74300.039	100.00
1025				
1026	RUNOFF	4.896	489.638	0.66
1027				
1028	POTENTIAL EVAPOTRANSPIRATION	1245.230	124522.984	
1029				
1030	ACTUAL EVAPOTRANSPIRATION	533.988	53398.805	71.87
1031				
1032	DRAINAGE COLLECTED FROM LAYER 3	213.2148	21321.480	28.70
1033				
1034	RECIRC. FROM LAYER 3 INTO L. 3	0.000000	0.000	0.00
1035				

1036	PERC./LEAKAGE THROUGH LAYER 5	0.715428	71.543	0.10			
1037							
1038	AVG. HEAD ON TOP OF LAYER 4	0.0123					
1039							
1040	DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.000	0.00			
1041							
1042	RECIRC. FROM LAYER 8 INTO L. 8	0.000000	0.000	0.00			
1043							
1044	PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00			
1045							
1046	AVG. HEAD ON TOP OF LAYER 9	0.0000					
1047							
1048	DRAINAGE COLLECTED FROM LAYER 11	0.0000	0.000	0.00			
1049							
1050	RECIRC. FROM LAYER 11 INTO L. 11	0.000000	0.000	0.00			
1051							
1052	PERC./LEAKAGE THROUGH LAYER 13	0.000000	0.000	0.00			
1053							
1054	AVG. HEAD ON TOP OF LAYER 12	0.0000					
1055							
1056	CHANGE IN WATER STORAGE	-9.099	-909.877	-1.22			
1057							
1058	SOIL WATER AT START OF YEAR	1491.583	149158.344				
1059							
1060	SOIL WATER AT END OF YEAR	1482.485	148248.469				
1061							
1062	INTERCEPTION WATER AT START OF YEAR	0.000	0.000				
1063							
1064	INTERCEPTION WATER AT END OF YEAR	0.000	0.000				
1065							
1066	SNOW WATER AT START OF YEAR	0.000	0.000	0.00			
1067							
1068	SNOW WATER AT END OF YEAR	0.000	0.000	0.00			
1069							
1070	ANNUAL WATER BUDGET BALANCE	0.0000	0.000	0.00			
1071							
1072	*****						
1073	*****						
1074							
1075	MONTHLY TOTALS (MM) FOR YEAR 1977						
1076	-----						
1077							
1078		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
1079		-----	-----	-----	-----	-----	-----
1080							
1081	PRECIPITATION	37.4	207.5	37.0	30.6	63.3	49.1
1082		10.7	26.5	112.9	2.6	1.8	25.7
1083							
1084	RUNOFF	0.00	5.21	0.00	0.00	0.00	0.00
1085		0.00	0.00	0.00	0.00	0.00	0.00
1086							
1087	POTENTIAL EVAPOTRANSPIRATION	193.88	153.53	133.46	83.64	52.37	39.74
1088		45.23	68.18	86.19	145.61	165.02	196.98
1089							
1090	ACTUAL EVAPOTRANSPIRATION	37.40	61.41	56.80	30.60	23.54	20.67
1091		22.88	37.35	61.78	20.21	2.38	25.69
1092							
1093	LATERAL DRAINAGE COLLECTED	5.086	31.808	68.374	12.526	6.509	3.052
1094	FROM LAYER 3	19.458	13.335	11.354	18.347	9.226	4.802
1095							
1096	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1097	FROM LAYER 3 INTO L. 3	0.000	0.000	0.000	0.000	0.000	0.000
1098							
1099	PERCOLATION/LEAKAGE THROUGH	0.080	0.026	0.081	0.078	0.080	0.034
1100	LAYER 5	0.070	0.080	0.055	0.081	0.078	0.080
1101							
1102	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
1103	FROM LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
1104							

1105	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1106	FROM LAYER 8 INTO L. 8	0.000	0.000	0.000	0.000	0.000	0.000
1107							
1108	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
1109	LAYER 10	0.000	0.000	0.000	0.000	0.000	0.000
1110							
1111	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
1112	FROM LAYER 11	0.000	0.000	0.000	0.000	0.000	0.000
1113							
1114	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1115	FROM LAYER 11 INTO L. 11	0.000	0.000	0.000	0.000	0.000	0.000
1116							
1117	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
1118	LAYER 13	0.000	0.000	0.000	0.000	0.000	0.000
1119	*****						

ANNUAL TOTALS FOR YEAR 1977

	MM	CU. METERS	PERCENT
	-----	-----	-----
PRECIPITATION	605.10	60509.996	100.00
RUNOFF	5.210	520.956	0.86
POTENTIAL EVAPOTRANSPIRATION	1363.835	136383.516	
ACTUAL EVAPOTRANSPIRATION	400.729	40072.906	66.23
DRAINAGE COLLECTED FROM LAYER 3	203.8785	20387.846	33.69
RECIRC. FROM LAYER 3 INTO L. 3	0.000000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 5	0.824744	82.474	0.14
AVG. HEAD ON TOP OF LAYER 4	0.0118		
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.000	0.00
RECIRC. FROM LAYER 8 INTO L. 8	0.000000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
DRAINAGE COLLECTED FROM LAYER 11	0.0000	0.000	0.00
RECIRC. FROM LAYER 11 INTO L. 11	0.000000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 13	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 12	0.0000		
CHANGE IN WATER STORAGE	-4.717	-471.706	-0.78
SOIL WATER AT START OF YEAR	1482.485	148248.469	
SOIL WATER AT END OF YEAR	1477.768	147776.766	
INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	-0.0001	-0.007	0.00

1174	*****						
1175	*****						
1176							
1177		MONTHLY TOTALS (MM) FOR YEAR 1978					
1178		-----					
1179							
1180		JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
1181		-----	-----	-----	-----	-----	-----
1182							
1183	PRECIPITATION	195.8	12.9	170.2	30.5	84.4	89.5
1184		57.2	26.3	123.2	51.7	68.5	42.7
1185							
1186	RUNOFF	4.22	0.00	2.55	0.00	0.00	0.00
1187		0.00	0.00	0.00	0.00	0.00	0.00
1188							
1189	POTENTIAL EVAPOTRANSPIRATION	168.37	166.15	136.63	81.37	56.68	39.00
1190		45.24	61.17	80.58	126.77	147.93	163.03
1191							
1192	ACTUAL EVAPOTRANSPIRATION	87.87	35.67	45.59	41.26	22.37	29.98
1193		33.41	41.18	56.15	28.68	72.62	48.41
1194							
1195	LATERAL DRAINAGE COLLECTED	0.125	57.004	59.047	49.661	14.430	60.774
1196	FROM LAYER 3	52.111	16.247	43.468	17.971	10.650	12.052
1197							
1198	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1199	FROM LAYER 3 INTO L. 3	0.000	0.000	0.000	0.000	0.000	0.000
1200							
1201	PERCOLATION/LEAKAGE THROUGH	0.003	0.072	0.077	0.078	0.079	0.064
1202	LAYER 5	0.076	0.081	0.071	0.081	0.060	0.080
1203							
1204	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
1205	FROM LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
1206							
1207	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1208	FROM LAYER 8 INTO L. 8	0.000	0.000	0.000	0.000	0.000	0.000
1209							
1210	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
1211	LAYER 10	0.000	0.000	0.000	0.000	0.000	0.000
1212							
1213	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
1214	FROM LAYER 11	0.000	0.000	0.000	0.000	0.000	0.000
1215							
1216	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1217	FROM LAYER 11 INTO L. 11	0.000	0.000	0.000	0.000	0.000	0.000
1218							
1219	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
1220	LAYER 13	0.000	0.000	0.000	0.000	0.000	0.000
1221							
1222	*****						
1223							
1224		ANNUAL TOTALS FOR YEAR 1978					
1225		-----					
1226							
1227			MM		CU. METERS		PERCENT
1228			-----		-----		-----
1229	PRECIPITATION		952.90		95289.977		100.00
1230							
1231	RUNOFF		6.771		677.069		0.71
1232							
1233	POTENTIAL EVAPOTRANSPIRATION		1272.909		127290.867		
1234							
1235	ACTUAL EVAPOTRANSPIRATION		543.189		54318.867		57.00
1236							
1237	DRAINAGE COLLECTED FROM LAYER 3		393.5414		39354.145		41.30
1238							
1239	RECIRC. FROM LAYER 3 INTO L. 3		0.000000		0.000		0.00
1240							
1241	PERC./LEAKAGE THROUGH LAYER 5		0.820855		82.085		0.09
1242							

1312							
1313	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
1314	LAYER 10	0.000	0.000	0.000	0.000	0.000	0.000
1315							
1316	LATERAL DRAINAGE COLLECTED	0.000	0.000	0.000	0.000	0.000	0.000
1317	FROM LAYER 11	0.000	0.000	0.000	0.000	0.000	0.000
1318							
1319	LATERAL DRAINAGE RECIRCULATED	0.000	0.000	0.000	0.000	0.000	0.000
1320	FROM LAYER 11 INTO L. 11	0.000	0.000	0.000	0.000	0.000	0.000
1321							
1322	PERCOLATION/LEAKAGE THROUGH	0.000	0.000	0.000	0.000	0.000	0.000
1323	LAYER 13	0.000	0.000	0.000	0.000	0.000	0.000
1324	*****						
1325							
1326	ANNUAL TOTALS FOR YEAR 1979						
1327	-----						
1328							
1329		MM		CU. METERS		PERCENT	
1330		-----		-----		-----	
1331	PRECIPITATION	454.80		45480.016		100.00	
1332							
1333	RUNOFF	0.000		0.000		0.00	
1334							
1335	POTENTIAL EVAPOTRANSPIRATION	1354.731		135473.125			
1336							
1337	ACTUAL EVAPOTRANSPIRATION	405.490		40548.988		89.16	
1338							
1339	DRAINAGE COLLECTED FROM LAYER 3	57.3702		5737.022		12.61	
1340							
1341	RECIRC. FROM LAYER 3 INTO L. 3	0.000000		0.000		0.00	
1342							
1343	PERC./LEAKAGE THROUGH LAYER 5	0.620634		62.063		0.14	
1344							
1345	AVG. HEAD ON TOP OF LAYER 4	0.0033					
1346							
1347	DRAINAGE COLLECTED FROM LAYER 8	0.0000		0.000		0.00	
1348							
1349	RECIRC. FROM LAYER 8 INTO L. 8	0.000000		0.000		0.00	
1350							
1351	PERC./LEAKAGE THROUGH LAYER 10	0.000000		0.000		0.00	
1352							
1353	AVG. HEAD ON TOP OF LAYER 9	0.0000					
1354							
1355	DRAINAGE COLLECTED FROM LAYER 11	0.0000		0.000		0.00	
1356							
1357	RECIRC. FROM LAYER 11 INTO L. 11	0.000000		0.000		0.00	
1358							
1359	PERC./LEAKAGE THROUGH LAYER 13	0.000000		0.000		0.00	
1360							
1361	AVG. HEAD ON TOP OF LAYER 12	0.0000					
1362							
1363	CHANGE IN WATER STORAGE	-8.060		-806.007		-1.77	
1364							
1365	SOIL WATER AT START OF YEAR	1487.167		148716.656			
1366							
1367	SOIL WATER AT END OF YEAR	1479.107		147910.656			
1368							
1369	INTERCEPTION WATER AT START OF YEAR	0.000		0.000			
1370							
1371	INTERCEPTION WATER AT END OF YEAR	0.000		0.000			
1372							
1373	SNOW WATER AT START OF YEAR	0.000		0.000		0.00	
1374							
1375	SNOW WATER AT END OF YEAR	0.000		0.000		0.00	
1376							
1377	ANNUAL WATER BUDGET BALANCE	0.0001		0.008		0.00	
1378							
1379	*****						
1380	*****						

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PEAK DAILY VALUES FOR YEARS 1969 THROUGH 2001

		(MM)	(CU. METERS)
		-----	-----
PRECIPITATION		151.70	15170.000
RUNOFF		48.074	4807.4395
DRAINAGE COLLECTED FROM LAYER	3	38.16315	3816.31470
PERCOLATION/LEAKAGE THROUGH LAYER	5	0.002939	0.29393
AVERAGE HEAD ON TOP OF LAYER	4	0.804	
MAXIMUM HEAD ON TOP OF LAYER	4	2.647	
LOCATION OF MAXIMUM HEAD IN LAYER	3		
(DISTANCE FROM DRAIN)		0.0 METERS	
DRAINAGE COLLECTED FROM LAYER	8	0.00267	0.26657
PERCOLATION/LEAKAGE THROUGH LAYER	10	0.000000	0.00002
AVERAGE HEAD ON TOP OF LAYER	9	0.004	
MAXIMUM HEAD ON TOP OF LAYER	9	0.130	
LOCATION OF MAXIMUM HEAD IN LAYER	8		
(DISTANCE FROM DRAIN)		0.0 METERS	
DRAINAGE COLLECTED FROM LAYER	11	0.10000	10.00000
PERCOLATION/LEAKAGE THROUGH LAYER	13	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER	12	0.030	
MAXIMUM HEAD ON TOP OF LAYER	12	0.010	
LOCATION OF MAXIMUM HEAD IN LAYER	11		
(DISTANCE FROM DRAIN)		0.0 METERS	
SNOW WATER		0.80	80.0000
MAXIMUM VEG. SOIL WATER (VOL/VOL)			0.3610
MINIMUM VEG. SOIL WATER (VOL/VOL)			0.1040

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

AVERAGE MONTHLY VALUES (MM) FOR YEARS 1969 THROUGH 2001

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
-----	-----	-----	-----	-----	-----

1450	PRECIPITATION						
1451	-----						
1452	TOTALS	70.51	58.12	59.57	55.89	51.84	52.75
1453		56.92	59.65	65.63	79.27	67.37	50.27
1454							
1455	STD. DEVIATIONS	48.81	44.60	50.18	50.36	35.61	40.40
1456		37.80	38.92	33.22	51.48	34.17	40.74
1457							
1458	RUNOFF						
1459	-----						
1460	TOTALS	0.161	0.175	1.534	0.363	0.056	0.473
1461		0.004	0.594	0.000	0.882	0.005	0.000
1462							
1463	STD. DEVIATIONS	0.742	0.907	8.367	1.025	0.243	2.009
1464		0.017	3.318	0.000	3.838	0.029	0.000
1465							
1466	POTENTIAL EVAPOTRANSPIRATION						
1467	-----						
1468	TOTALS	184.505	152.974	135.909	79.883	54.529	40.254
1469		45.737	62.622	86.743	127.504	148.714	178.757
1470							
1471	STD. DEVIATIONS	14.872	10.214	6.918	4.840	1.717	1.075
1472		1.581	3.291	6.026	8.658	11.930	12.665
1473							
1474	ACTUAL EVAPOTRANSPIRATION						
1475	-----						
1476	TOTALS	60.972	47.847	43.046	29.009	21.920	18.853
1477		24.635	35.841	50.154	65.183	62.149	45.513
1478							
1479	STD. DEVIATIONS	32.971	28.811	23.630	14.656	7.743	7.327
1480		8.379	9.126	12.166	22.663	26.506	30.254
1481							
1482	LATERAL DRAINAGE COLLECTED FROM LAYER 3						
1483	-----						
1484	TOTALS	8.1807	9.3322	12.3523	16.0485	15.4699	22.9697
1485		30.6168	28.4771	22.5575	22.8790	16.8455	10.0614
1486							
1487	STD. DEVIATIONS	8.4828	12.1068	20.0910	28.1017	19.9225	24.2974
1488		31.2192	29.3887	20.9392	22.0925	20.5184	8.1141
1489							
1490	LATERAL DRAINAGE RECIRCULATED FROM LAYER 3 INTO L. 3						
1491	-----						
1492	TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1493		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1494							
1495	STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1496		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1497							
1498	PERCOLATION/LEAKAGE THROUGH LAYER 5						
1499	-----						
1500	TOTALS	0.0570	0.0462	0.0543	0.0509	0.0533	0.0504
1501		0.0578	0.0659	0.0658	0.0742	0.0685	0.0683
1502							
1503	STD. DEVIATIONS	0.0303	0.0282	0.0343	0.0301	0.0309	0.0266
1504		0.0229	0.0249	0.0180	0.0101	0.0196	0.0204
1505							
1506	LATERAL DRAINAGE COLLECTED FROM LAYER 8						
1507	-----						
1508	TOTALS	0.0092	0.0057	0.0049	0.0040	0.0058	0.0043
1509		0.0054	0.0095	0.0114	0.0111	0.0109	0.0121
1510							
1511	STD. DEVIATIONS	0.0253	0.0189	0.0195	0.0152	0.0190	0.0149
1512		0.0168	0.0234	0.0275	0.0268	0.0265	0.0290
1513							
1514	LATERAL DRAINAGE RECIRCULATED FROM LAYER 8 INTO L. 8						
1515	-----						
1516	TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1517		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1518							

1519	STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1520		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1521							
1522	PERCOLATION/LEAKAGE THROUGH LAYER 10						
1523	-----						
1524	TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1525		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1526							
1527	STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1528		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1529							
1530	LATERAL DRAINAGE COLLECTED FROM LAYER 11						
1531	-----						
1532	TOTALS	0.0030	0.0000	0.0000	0.0000	0.0000	0.0000
1533		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1534							
1535	STD. DEVIATIONS	0.0174	0.0000	0.0000	0.0000	0.0000	0.0000
1536		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1537							
1538	LATERAL DRAINAGE RECIRCULATED FROM LAYER 11 INTO L. 11						
1539	-----						
1540	TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1541		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1542							
1543	STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1544		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1545							
1546	PERCOLATION/LEAKAGE THROUGH LAYER 13						
1547	-----						
1548	TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1549		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1550							
1551	STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1552		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1553							
1554							
1555	-----						
1556	AVERAGES OF MONTHLY AVERAGED DAILY HEADS (CM)						
1557	-----						
1558							
1559							
1560	DAILY AVERAGE HEAD ON TOP OF LAYER 4						
1561	-----						
1562	AVERAGES	0.0006	0.0007	0.0008	0.0011	0.0011	0.0016
1563		0.0021	0.0019	0.0016	0.0016	0.0012	0.0007
1564							
1565	STD. DEVIATIONS	0.0006	0.0009	0.0014	0.0020	0.0014	0.0017
1566		0.0021	0.0020	0.0015	0.0015	0.0014	0.0006
1567							
1568	DAILY AVERAGE HEAD ON TOP OF LAYER 9						
1569	-----						
1570	AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1571		0.0000	0.0000	0.0001	0.0001	0.0001	0.0001
1572							
1573	STD. DEVIATIONS	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
1574		0.0001	0.0001	0.0001	0.0001	0.0001	0.0002
1575							
1576	DAILY AVERAGE HEAD ON TOP OF LAYER 12						
1577	-----						
1578	AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1579		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1580							
1581	STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1582		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1583							
1584	*****						
1585							
1586							
1587							

```

1588 *****
1589
1590 AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1969 THROUGH 2001
1591 -----
1592
1593                MM                CU. METERS                PERCENT
1594                -----                -----                -----
1595 PRECIPITATION                727.79      ( 176.538)                72778.5      100.00
1596
1597 RUNOFF                4.247      ( 9.7926)                424.68      0.584
1598
1599 POTENTIAL EVAPOTRANSPIRATION 1298.131      ( 41.9938)                129813.09
1600
1601 ACTUAL EVAPOTRANSPIRATION    505.123      ( 85.0607)                50512.30      69.406
1602
1603 LATERAL DRAINAGE COLLECTED    215.79053 (125.41930)                21579.053      29.65031
1604 FROM LAYER 3
1605
1606 DRAINAGE RECIRCULATED        0.00000 ( 0.00000)                0.000      0.00000
1607 FROM LAYER 3 INTO L. 3
1608
1609 PERCOLATION/LEAKAGE THROUGH    0.71265 ( 0.13121)                71.265      0.09792
1610 LAYER 5
1611
1612 AVERAGE HEAD ON TOP          0.012      ( 0.007)
1613 OF LAYER 4
1614
1615 LATERAL DRAINAGE COLLECTED    0.09441 ( 0.23414)                9.441      0.01297
1616 FROM LAYER 8
1617
1618 DRAINAGE RECIRCULATED        0.00000 ( 0.00000)                0.000      0.00000
1619 FROM LAYER 8 INTO L. 8
1620
1621 PERCOLATION/LEAKAGE THROUGH    0.00001 ( 0.00002)                0.001      0.00000
1622 LAYER 10
1623
1624 AVERAGE HEAD ON TOP          0.000      ( 0.001)
1625 OF LAYER 9
1626
1627 LATERAL DRAINAGE COLLECTED    0.00304 ( 0.01741)                0.304      0.00042
1628 FROM LAYER 11
1629
1630 DRAINAGE RECIRCULATED        0.00000 ( 0.00000)                0.000      0.00000
1631 FROM LAYER 11 INTO L. 11
1632
1633 PERCOLATION/LEAKAGE THROUGH    0.00000 ( 0.00000)                0.000      0.00000
1634 LAYER 13
1635
1636 AVERAGE HEAD ON TOP          0.000      ( 0.000)
1637 OF LAYER 12
1638
1639 CHANGE IN WATER STORAGE        2.527      ( 1.0486)                252.71      0.347
1640
1641 *****
1642 *****
1643
1644

```

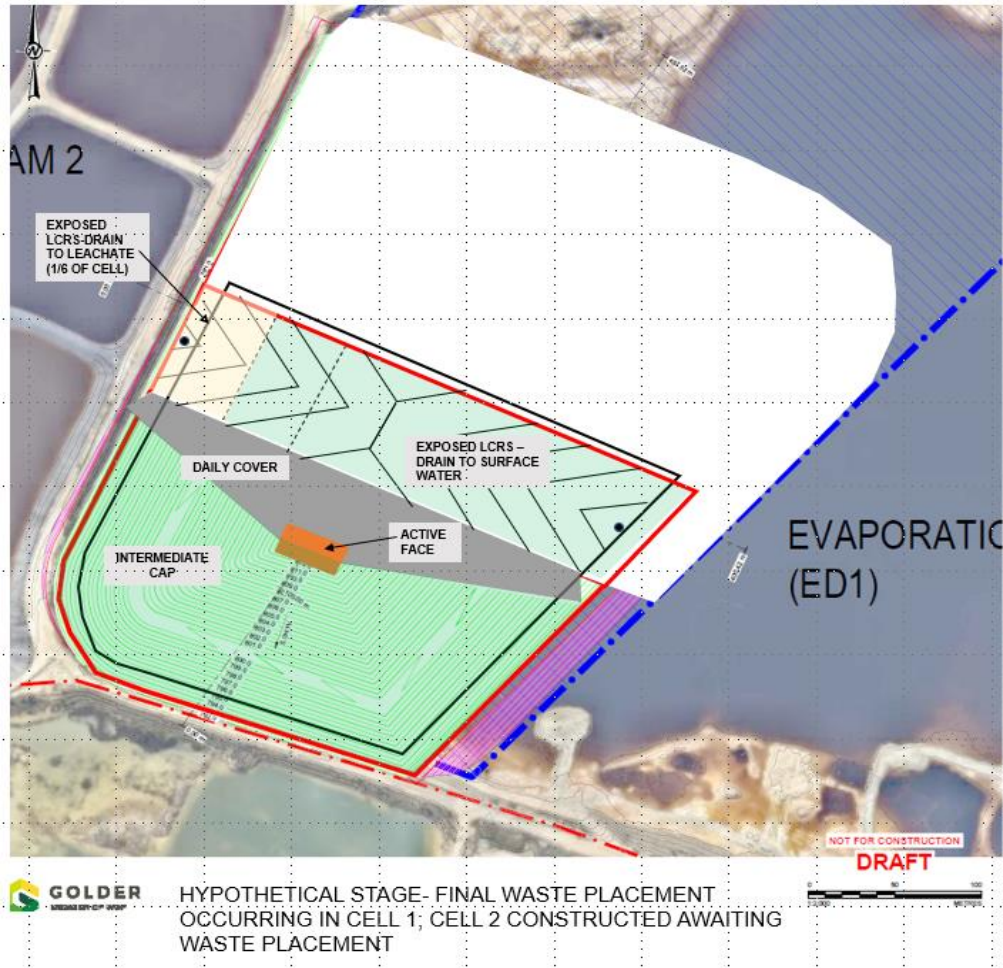
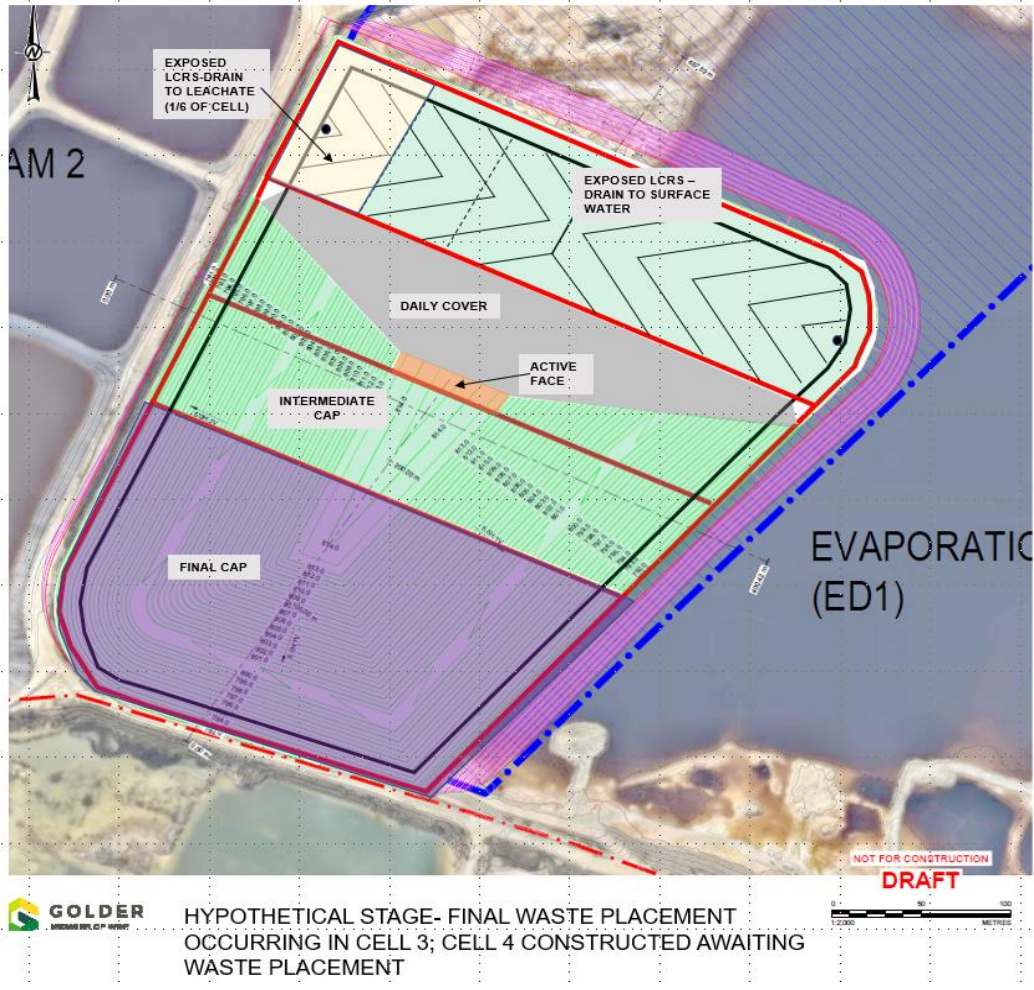
ATTACHMENT C

Leachate Generation Calculation

[illegible]

16	175	July	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	12%	5%	25%	58%	0%	100%	0%	0%	0%	0%	0%	0%	2835	1181	5906	35078	41250	86,250
	176	August	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	9%	5%	25%	61%	0%	100%	0%	0%	0%	0%	0%	0%	2126	1181	5906	35786	41250	86,250
	177	September	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	6%	5%	25%	64%	0%	100%	0%	0%	0%	0%	0%	0%	1418	1181	5906	36495	41250	86,250
	178	October	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	3%	5%	25%	67%	0%	100%	0%	0%	0%	0%	0%	0%	709	1181	5906	37204	41250	86,250
	179	November	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	1%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	180	December	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	181	January	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	182	February	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	183	March	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	184	April	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	185	May	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	186	June	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	187	July	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	188	August	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	189	September	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	190	October	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
17	191	November	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	192	December	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	193	January	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	194	February	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	195	March	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	196	April	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	197	May	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	198	June	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	199	July	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	200	August	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	201	September	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	1%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	202	October	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	203	November	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	204	December	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	205	January	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	206	February	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
18	207	March	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	208	April	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	209	May	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	210	June	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	211	July	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	212	August	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	1%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	213	September	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	214	October	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	215	November	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	216	December	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	5%	25%	70%	0%	100%	0%	0%	0%	0%	0%	0%	0	1181	5906	37913	41250	86,250
	CELL 4	19	217	January	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	0%	25%	75%	0%	100%	13%	4%	0%	0%	17%	3744	1152	5906	39094	41250	91,146	CELL 4
	218	February	0%	0%	0%	0%	100%	100%	0%	0%	0%	90%	10%	100%	0%	0%	21%	79%	0%	100%	9%	4%	4%	0%	17%	2592	1152	6113	37901	43388	91,146	
	219	March	0%	0%	0%	0%	100%	100%	0%	0%	0%	80%	20%	100%	0%	0%	17%	83%	0%	100%	6%	4%	7%	0%	17%	1728	1152	6032	36709	45525	91,146	
	220	April	0%	0%	0%	0%	100%	100%	0%	0%	0%	70%	30%	100%	0%	0%	13%	87%	0%	100%	3%	4%	10%	0%	17%	864	1152	5951	35516	47663	91,146	
	221	May	0%	0%	0%	0%	100%	100%	0%	0%	0%	60%	40%	100%	0%	0%	9%	91%	0%	100%	0%	4%	13%	0%	17%	0	1152	5870	34324	49800	91,146	
	222	June	0%	0%	0%	0%	100%	100%	0%	0%	0%	50%	50%	100%	0%	0%	5%	95%	0%	100%	0%	4%	13%	0%	17%	0	1152	4925	33131	51938	91,146	
223	July	0%	0%	0%	0%	100%	100%	0%	0%	0%	40%	60%	100%	0%	0%	0%	100%	0%	100%	13%	4%	16%	0%	33%	3744	1152	4608	32175	54075	95,754		
224	August	0%	0%	0%	0%	100%	100%	0%	0%	0%	30%	70%	100%	0%	0%	0%	100%	0%	100%	9%	4%	20%	0%	33%	2592	1152	5760	30038	56213	95,754		
225	September	0%	0%	0%	0%	100%	100%	0%	0%	0%	20%	80%	100%	0%	0%	0%	100%	0%	100%	6%	4%	20%	3%	33%	1728	1152	5760	28764	58350	95,754		
226	October	0%	0%	0%	0%	100%	100%	0%	0%	0%	10%	90%	100%	0%	0%	0%	100%	0%	100%	3%	4%	20%	6%	33%	864	1152	5760	27491	60488	95,754		
227	November	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	9%	33%	0	1152	5760	26217	62625	95,754		
228	December	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	9%	33%	0	1152	5760	26217	62625	95		

22	244	April	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	3%	4%	20%	56%	0%	83%	864	1152	5760	39753	62625	110,154	
	245	May	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	59%	0%	83%	0	1152	5760	40617	62625	110,154	
	246	June	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	59%	0%	83%	0	1152	5760	40617	62625	110,154	
	247	July	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	13%	4%	20%	63%	0%	100%	3744	1152	5760	41769	62625	115,050	
	248	August	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	9%	4%	20%	67%	0%	100%	2592	1152	5760	42921	62625	115,050	
	249	September	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	6%	4%	20%	70%	0%	100%	1728	1152	5760	43785	62625	115,050	
	250	October	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	3%	4%	20%	73%	0%	100%	864	1152	5760	44649	62625	115,050	
	251	November	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	252	December	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	253	January	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	254	February	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	255	March	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	256	April	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	257	May	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	258	June	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	259	July	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	260	August	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	261	September	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	262	October	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	263	November	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	264	December	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	23	265	January	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050
		266	February	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050
		267	March	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050
268		April	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
269		May	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
270		June	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
271		July	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
272		August	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
273		September	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
274		October	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
275		November	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
276		December	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
24	277	January	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	278	February	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	279	March	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	280	April	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	281	May	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	282	June	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	283	July	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	284	August	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	285	September	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	286	October	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	287	November	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	288	December	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
25	289	January	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	290	February	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	291	March	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	292	April	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	293	May	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	294	June	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	295	July	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76%	0%	100%	0	1152	5760	45513	62625	115,050	
	296	August	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	20%	76									



4 cells - 11.5 Ha total

	L (m)	W (m)	A (ha)
Cell 1	165	250	4.13
Cell 2	75	285	2.14
Cell 3	75	315	2.36
Cell 4	90	320	2.88
			11.51 sum

Sequence/Rules used

Cell 1

Active placement area: remain approx 1000 m2 for entire cell life

No Waste area: Rainflaps used to restrict no waste area that is reporting to leachate

such that the sum of: (i) the area with no waste and (ii) the active placement area is no more than 1/6 of the cell area (17%)

This works out that the maximum no waste area for Cell 1 is approx 6000 m2.

At a high waste placement rate of 40,000 m3/year, a 6000 m2 area can be covered to 2m thickness in approx 3.6 months. Therefore - the no waste area is assumed to reduce to zero over 6 months (through offsetting daily cover placement) and then remain at zero for 2 months until the next No Waste area is opened.

This cycle occurs 6 times over the initial years of cell life to cover the entire cell floor in 6 x 8 months = 4 years

Daily Cover: Daily cover is applied to No Waste areas to balance the rate of reduction in No Waste area as indicated above.

Once a value of approx. 6,000 m2 is reached, then daily cover areas are replaced with intermediate cover at a rate to maintain the daily cover area at approx. 6,000 m2.

The daily cover area is subsequently reduced to zero (replaced by intermediate cover) during the first 6 months after the next cell is opened

Intermediate Cover: Intermediate Cover is used to replace daily cover.

Intermediate cover placement begins when daily cover reaches 6,000 m2.

The rate of placement is as indicated above

Area increases up to the full proportion needed to sum with the daily cover and active area to reach coverage of the entire cell at the end of year 4 (ie 83% of cell area)

Area remains constant until the next cell is opened and then increases to 100% of the cell area during the first 6 months after the next cell is opened

Final Cover: Final cover is used to replace intermediate cover. Placement occurs

over the first 10 months after the 2nd subsequent cell is opened

Cell 2

Follow same pattern as for Cell 1, with the following differences

- use 6-month (4 +2) cycle for No Waste area instead of 8-month (6+2) cycle.
- This means that full cell coverage is achieved in 3 years

Cell 3

Follow same pattern as for Cell 1, with the following differences

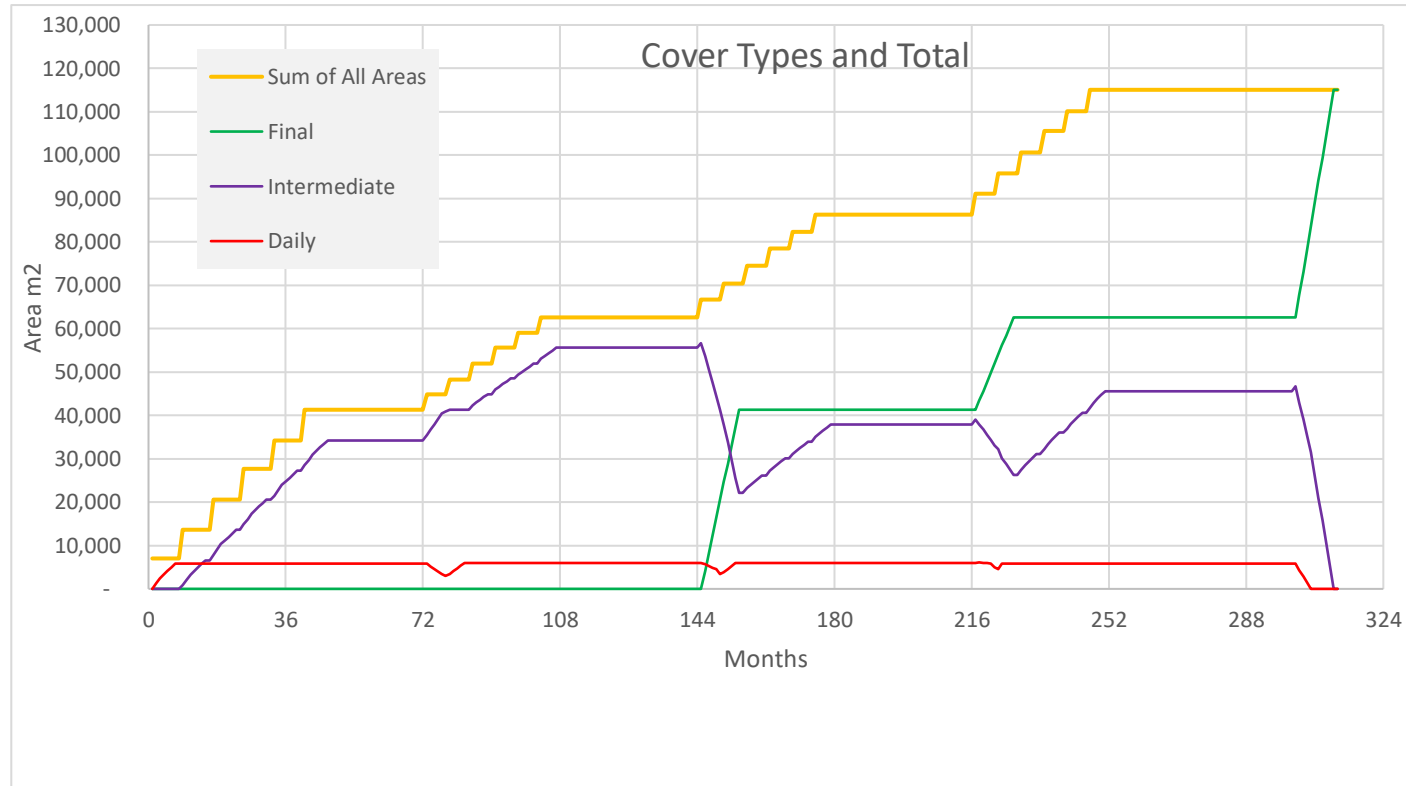
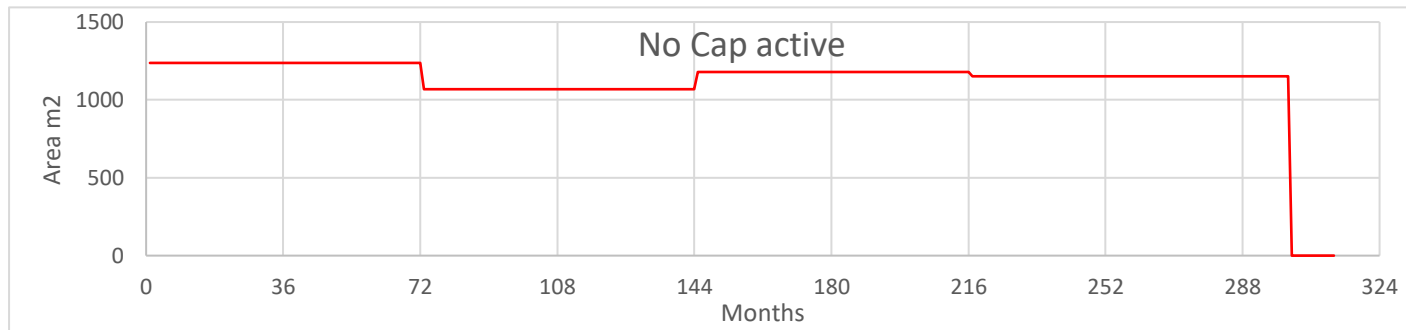
- use 6-month (4 +2) cycle for no waste area instead of 8-month (6+2) cycle.
- This means that full cell coverage is achieved in 3 years

Cell 4

Follow same pattern as for Cell 1, with the following differences

- use 6-month (4 +2) cycle for no waste area instead of 8-month (6+2) cycle.
 - This means that full cell coverage with daily cover is achieved in 3 years
 - As this is the final cell, Final Cover replaces both daily and intermediate cover.
- Placement occurs in the first 10 months after landfilling is complete.

plots to check patterns

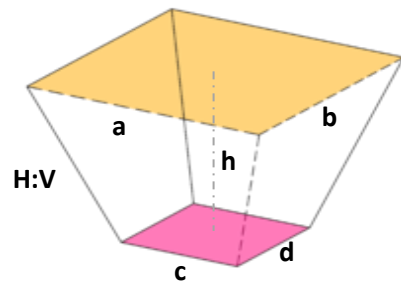


Leachate Generation Calculations

Leachate Pond base footprint
Evaporation pan factor
Leachate Pond top footprint
Pond height (h)

17500 m²
0.7
21693.6 m²
2.5 m

Assume 1:3 batter at all 4 sides with square shape at bottom and top



$$x = \frac{a-b}{2}$$
$$h' = \frac{(a-c)/2x}{1}$$
$$a' = \frac{(5xp + c^2)^{1/2}}{2.5}$$

				Cap Type Area (m ²)					Leachate Generation (m ³ /month)					
Stage	Year	Month	Duration	No waste area	No Cap - Active Tipping Area	Daily Cover	Intermediate Cover	Final Cap	From no waste area (m ² /month)	From active area (m ² /month)	From daily cover area (m ² /month)	From intermediate cover area (m ² /month)	From final cap area (m ² /month)	Total Leachate Generation
CELL 1		1	1 January	5775	1238	0	0	0	133.6	0.1	0.0	0.0	0.0	133.8
			2 February	4538	1238	1238	0	0	397.3	4.0	0.0	0.0	0.0	401.3
			3 March	3300	1238	2475	0	0	198.7	5.0	0.0	0.0	0.0	203.8
			4 April	2475	1238	3300	0	0	264.5	115.0	0.8	0.0	0.0	380.3
			5 May	1650	1238	4125	0	0	59.8	56.6	1.7	0.0	0.0	118.1
			6 June	825	1238	4950	0	0	38.4	37.8	13.3	0.0	0.0	89.4
			7 July	0	1238	5775	0	0	0.0	45.9	59.9	0.0	0.0	105.8
			8 August	0	1238	5775	0	0	0.0	28.5	91.8	0.0	0.0	120.4
			9 September	5775	1238	5775	825	0	110.6	27.5	48.6	0.0	0.0	186.7
			10 October	4538	1238	5775	2063	0	593.5	74.3	87.4	0.0	0.0	755.2
			11 November	3300	1238	5775	3300	0	383.0	164.5	75.1	0.0	0.0	622.6
			12 December	2475	1238	5775	4125	0	87.5	54.9	181.6	0.0	0.0	324.0
		2	13 January	1650	1238	5775	4950	0	105.1	58.5	119.0	0.0	0.0	282.6
			14 February	825	1238	5775	5775	0	31.2	32.7	76.1	0.0	0.0	140.0
			15 March	0	1238	5775	6600	0	0.0	36.1	89.9	4.1	0.0	130.1
			16 April	0	1238	5775	6600	0	0.0	58.6	54.9	7.9	0.0	121.4
			17 May	5775	1238	5775	7838	0	469.7	62.0	135.1	3.2	0.0	670.1
			18 June	4538	1238	5775	9075	0	59.9	76.2	117.9	1.5	0.0	255.5
			19 July	3300	1238	5775	10313	0	0.0	35.7	103.3	9.9	0.0	148.9
			20 August	2475	1238	5775	11138	0	87.5	21.0	77.7	1.9	0.0	188.1
			21 September	1650	1238	5775	11963	0	151.3	12.4	48.7	1.2	0.0	213.5
			22 October	825	1238	5775	12788	0	22.0	73.3	95.6	1.5	0.0	192.4
			23 November	0	1238	5775	13613	0	0.0	40.2	131.3	4.2	0.0	175.7
			24 December	0	1238	5775	13613	0	0.0	57.8	56.0	1.0	0.0	114.7
		3	25 January	5775	1238	5775	14850	0	214.0	38.3	138.9	3.0	0.0	394.2
			26 February	4538	1238	5775	16088	0	263.6	41.0	53.5	5.5	0.0	363.6
			27 March	3300	1238	5775	17325	0	37.8	47.7	144.5	8.0	0.0	237.9
			28 April	2475	1238	5775	18150	0	24.3	21.5	140.2	1.3	0.0	187.3
			29 May	1650	1238	5775	18975	0	14.9	13.4	73.6	12.5	0.0	114.4
			30 June	825	1238	5775	19800	0	3.3	14.1	56.8	2.6	0.0	76.8
			31 July	0	1238	5775	20625	0	0.0	12.4	41.5	4.5	0.0	58.4
			32 August	0	1238	5775	20625	0	0.0	9.6	35.1	3.5	0.0	48.2
			33 September	5775	1238	5775	21450	0	121.6	10.7	24.0	23.8	0.0	180.2
			34 October	4538	1238	5775	22688	0	85.8	27.2	11.8	6.4	0.0	131.2
			35 November	3300	1238	5775	23925	0	77.0	10.7	37.0	4.1	0.0	128.7
			36 December	2475	1238	5775	24750	0	165.7	24.1	42.1	28.7	0.0	260.6
		4	37 January	1650	1238	5775	25575	0	162.8	98.6	19.3	21.5	0.0	303.2
			38 February	825	1238	5775	26400	0	9.1	47.6	135.0	1.6	0.0	192.2
			39 March	0	1238	5775	27225	0	0.0	27.3	107.8	9.5	0.0	144.6
			40 April	0	1238	5775	27225	0	0.0	18.4	74.2	46.3	0.0	138.8
			41 May	5775	1238	5775	28463	0	83.0	19.4	37.4	54.6	0.0	194.5
			42 June	4538	1238	5775	29700	0	0.0	24.5	41.4	55.5	0.0	121.4
			43 July	3300	1238	5775	30938	0	37.9	16.4	40.9	39.0	0.0	134.2
			44 August	2475	1238	5775	31763	0	104.5	9.7	36.6	79.7	0.0	230.5
			45 September	1650	1238	5775	32588	0	27.7	10.1	34.4	87.3	0.0	159.6
			46 October	825	1238	5775	33413	0	35.7	22.9	6.4	18.7	0.0	83.7
			47 November	0	1238	5775	34238	0	0.0	40.2	85.5	56.1	0.0	95.0
			48 December	0	1238	5775	34238	0	0.0	30.3	74.7	83.2	0.0	148.1
5	49 January	0	1238	5775	34238	0	0.0	17.2	54.2	129.1	0.0	200.5		
	50 February	0	1238	5775	34238	0	0.0	23.3	45.4	122.9	0.0	191.6		
	51 March	0	1238	5775	34238	0	0.0	46.6	23.2	88.0	0.0	157.8		
	52 April	0	1238	5775	34238	0	0.0	23.6	63.8	32.5	0.0	120.0		
	53 May	0	1238	5775	34238	0	0.0	23.0	51.7	87.6	0.0	162.4		
	54 June	0	1238	5775	34238	0	0.0	21.3	82.0	50.3	0.0	153.6		
	55 July	0	1238	5775	34238	0	0.0	23.9	53.7	87.3	0.0	164.9		
	56 August	0	1238	5775	34238	0	0.0	32.3	76.9	57.5	0.0	166.7		
	57 September	0	1238	5775	34238	0	0.0	30.8	136.6	56.1	0.0	193.5		
	58 October	0	1238	5775	34238	0	0.0	33.2	106.8	20.2	0.0	180.2		
	59 November	0	1238	5775	34238	0	0.0	63.8	158.4	45.2	0.0	227.4		
	60 December	0	1238	5775	34238	0	0.0	43.8	156.3	106.1	0.0	306.3		
6	61 January	0	1238	5775	34238	0	0.0	69.0	78.9	141.4	0.0	289.2		
	62 February	0	1238	5775	34238	0	0.0	61.8	108.6	130.4	0.0	300.8		
	63 March	0	1238	5775	34238	0	0.0	76.6	100.3	169.8	0.0	346.7		
	64 April	0	1238	5775	34238	0	0.0	126.7	138.0	153.7	0.0	418.5		
	65 May	0	1238	5775	34238	0	0.0	83.7	190.6	94.5	0.0	478.8		
	66 June	0	1238	5775	34238	0	0.0	77.8	149.5	55.1	0.0	282.5		
	67 July	0	1238	5775	34238	0	0.0	30.8	136.6	41.5	0.0	271.6		
	68 August	0	1238	5775	34238	0	0.0	90.1	78.6	122.9	0.0	291.6		
	69 September	0	1238	5775	34238	0	0.0	165.5	106.4	102.4	0.0	374.3		
	70 October	0	1238	5775	34238	0	0.0	90.2	169.8	116.1	0.0	376.0		
	71 November	0	1238	5775	34238	0	0.0	57.2	247.5	40.1	0.0	344.8		
	72 December	0	1238	5775	34238	0	0.0	47.5	102.0	122.9	0.0	272.4		
CELL 2	7	73 January	2565	1069	5179	35475	0	76.3	24.1	120.4	183.4	0.0	404.1	
		74 February	1924	1069	5179	36713	0	77.1	14.2	61.9	184.3	0.0	337.5	
		75 March	1283	1069	4583	37950	0	52.4	29.8	53.3	183.3	0.0	318.8	
		76 April	641	1069	3986	39188	0	38.6	31.5	52.3	34.1	0.0	156.5	
		77 May	0	1069	40425	0	0.0	50.2	158.3	69.1	54.0	0.0	281.5	
		78 June	0	1069	2978	40838	0	0.0	44.2	55.3	81.7	0.0	195.1	
		79 July	2565	1069	3420	41250	0	230.0	146.4	131.8	231.0	0.0	739.1	
		80 August	1924	1069	4061	41250	0	56.8	45.7	176.0	85.4	0.0	363.9	
		81 September	1283	1069	4703	41250	0	67.5	25.7	86.8	110.6	0.0	290.5	
		82 October	641	1069	5344	41250	0	37.2	37.2	97.3	285.5	0.0	457.2	
		83 November	0	1069	5985	41250	0	0.0	53.7	105.8	309.8	0.0	469.2	
		84 December	0	1069	5985	41250	0	0.0	28.1	137.5	305.7	0.0	471.2	
8	85 January	2565	1069	5985	42319	0	254.0	22.2	100.4	312.7	0.0	689.3		
	86 February	1924	1069	5985	42960	0	40.3	59.6	68.2	243.6	0.0	411.7		
	87 March	1283	1069	5985	43604	0	31.4	25.5	119.3	195.2	0.0	366.6		
	88 April	641	1069	5985	44243	0	4.8	18.7	69.7	124.8	0.0	218.0		
	89 May	0	1069	5985	44884	0	0.0	17.8	62.2	232.5	0.0	312.5		
	90 June	0	1069	5985	44884	0	0.0	12.1	53.0	246.9	0.0	311.9		
	91 July	2565	1069	5985	45953	0	72.7	7.5	27.1	261.0	0.0	368.3		
	92 August	1924	1069	5985	46594	0	19.8	14.1	21.5	69.0	0.0	124.5		
	93 September	1283	1069	5985	47235	0	58.0	18.0	33.2	213.5	0.0	322.7		
	94 October	641	1069	5985	47876	0	106.4	122.9	54.1	164.7	0.0	448.1		
	95 November	0	1069	5985	48518	0	0.0	55.8	240.9	138.3	0.0	435.0		
	96 December	0	1069	5985	48518	0	0.0	27.0	126.2	96.5	0.0	247.1		
9	97 January	2565	1069	5985	49373	0	27.9	40.0	85.0	180.2	0.0	303.6		
	98 February	1924	1069	5985	50014	0	354.1	41.1	64.2	239.6	0.0	698.9		
	99 March	1283	1069	5985	50655	0	19.1	124.7	43.0	289.7	0.0	476.6		
	100 April	641	1069	5985	51296	0	14.2	28.3	81.3	238.0	0.0	361.9		
	101 May	0	1069	5985	51938	0	0.0	24.6	92.0	186.5	0.0	303.1		
	102 June	0	1069	5985	51938	0	0.0	22.5	47.6	237.4	0.0	307.5		
	103 July	2565	1069	5985	53006	0	23.0	27.3	111.1	36.0	0.0	197.4		
	104 August	1924	1069	5985	53648	0	38.1	17.5	88.6	169.5	0.0	313.7		
	105 September	1283	1069	5985	54289	0	90.9	34.4	50.5	323.0	0.0	499.7		
	106 October	641	1069	5985	54930	0	6.1	31.3	164.3	164.2	0.0	309.8		
	107 November	0	1069	5985	55571	0	0.0	20.0	86.3	225.6	0.0	331.9		
	108 December	0	1069	5985	55571	0	0.0	11.9	67.9	285.6	0.0	365.4		
10	109 January	0	1069	5985	55571	0	0.0	23.4	58.1	310.6	0.0	392.1		
	110 February	0	1069	5985	55571	0	0.0	81.6	26.9	235.6	0.0	344.2		
	111 March	0	1069	5985	55571	0	0.0	78.2	102.5	44.5	0.0	225.1		
	112 April	0	1069	5985	55571	0	0.0	74.9	82.8	191.7	0.0	349.4		
	113 May	0	10											

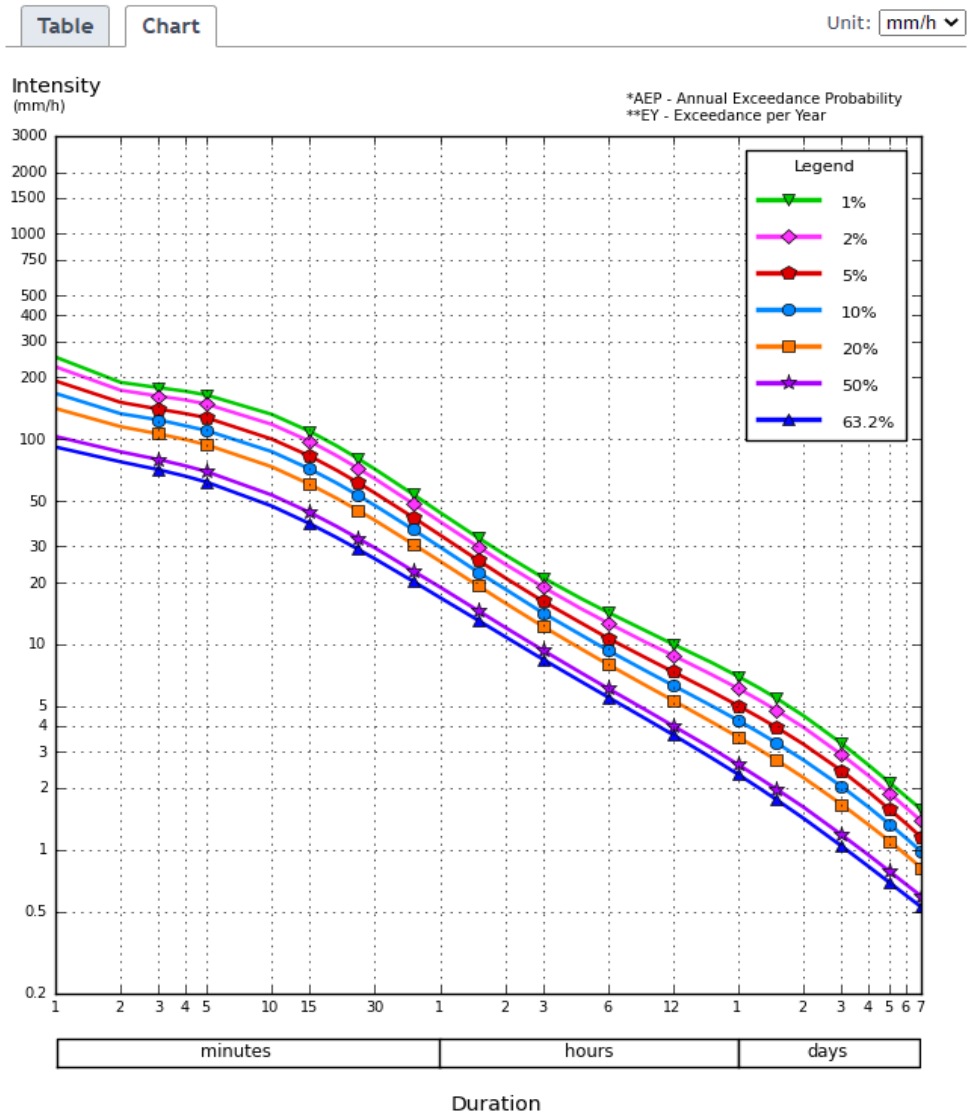
				172	April	709	1181	5906	33188	41250	10.3	48.7	55.9	115.8	0.0	230.7
				173	May	0	1181	5906	33896	41250	0.0	43.1	82.7	75.6	0.0	201.4
				174	June	0	1181	5906	33896	41250	0.0	58.3	142.4	67.1	0.0	267.8
				175	July	2835	1181	5906	35078	41250	60.8	36.0	122.1	94.8	0.0	301.6
				176	August	2126	1181	5906	35786	41250	60.4	26.7	135.0	35.8	0.0	257.9
				177	September	1418	1181	5906	36495	41250	41.8	13.2	67.4	222.3	0.0	344.7
				178	October	709	1181	5906	37204	41250	67.3	36.7	47.0	197.9	0.0	348.9
				179	November	0	1181	5906	37913	41250	0.0	108.5	182.2	245.7	0.0	536.4
				180	December	0	1181	5906	37913	41250	0.0	87.1	241.4	261.6	0.0	590.1
				181	January	0	1181	5906	37913	41250	0.0	69.9	170.6	219.9	0.0	460.4
				182	February	0	1181	5906	37913	41250	0.0	64.2	176.9	168.7	0.0	409.8
				183	March	0	1181	5906	37913	41250	0.0	44.7	131.5	181.2	0.0	357.4
				184	April	0	1181	5906	37913	41250	0.0	50.9	93.5	126.2	0.0	270.6
				185	May	0	1181	5906	37913	41250	0.0	58.9	129.1	188.4	0.0	376.4
				186	June	0	1181	5906	37913	41250	0.0	29.6	116.0	73.6	0.0	219.1
				187	July	0	1181	5906	37913	41250	0.0	31.5	60.7	143.7	0.0	235.9
				188	August	0	1181	5906	37913	41250	0.0	68.5	131.5	203.2	0.0	403.3
				189	September	0	1181	5906	37913	41250	0.0	36.0	146.4	31.8	0.0	214.2
				190	October	0	1181	5906	37913	41250	0.0	31.2	104.9	127.0	0.0	265.1
				191	November	0	1181	5906	37913	41250	0.0	16.9	91.7	186.5	0.0	295.1
				192	December	0	1181	5906	37913	41250	0.0	22.8	76.0	205.5	0.0	304.2
				193	January	0	1181	5906	37913	41250	0.0	13.4	56.5	230.5	0.0	300.5
				194	February	0	1181	5906	37913	41250	0.0	13.5	38.7	127.4	0.0	179.7
				195	March	0	1181	5906	37913	41250	0.0	13.2	37.9	94.4	0.0	145.5
				196	April	0	1181	5906	37913	41250	0.0	8.9	34.2	81.9	0.0	125.0
				197	May	0	1181	5906	37913	41250	0.0	16.9	20.5	137.2	0.0	174.6
				198	June	0	1181	5906	37913	41250	0.0	10.6	20.1	185.8	0.0	216.5
				199	July	0	1181	5906	37913	41250	0.0	20.5	8.3	79.2	0.0	108.0
				200	August	0	1181	5906	37913	41250	0.0	12.6	18.3	84.5	0.0	115.4
				201	September	0	1181	5906	37913	41250	0.0	25.0	17.4	68.2	0.0	110.6
				202	October	0	1181	5906	37913	41250	0.0	38.1	57.1	134.2	0.0	229.4
				203	November	0	1181	5906	37913	41250	0.0	40.6	85.5	85.7	0.0	211.9
				204	December	0	1181	5906	37913	41250	0.0	37.2	69.5	173.3	0.0	280.0
				205	January	0	1181	5906	37913	41250	0.0	27.0	104.4	63.3	0.0	194.7
				206	February	0	1181	5906	37913	41250	0.0	26.4	57.7	97.4	0.0	181.6
				207	March	0	1181	5906	37913	41250	0.0	22.6	84.3	146.3	0.0	253.2
				208	April	0	1181	5906	37913	41250	0.0	14.4	106.4	1310.5	0.0	246.3
				209	May	0	1181	5906	37913	41250	0.0	9.5	46.2	208.9	0.0	264.6
				210	June	0	1181	5906	37913	41250	0.0	20.7	27.5	94.0	0.0	142.2
				211	July	0	1181	5906	37913	41250	0.0	16.1	36.3	67.5	0.0	119.9
				212	August	0	1181	5906	37913	41250	0.0	27.5	20.1	94.4	0.0	142.0
				213	September	0	1181	5906	37913	41250	0.0	36.2	119.0	8.0	0.0	163.1
				214	October	0	1181	5906	37913	41250	0.0	28.2	89.5	116.4	0.0	234.1
				215	November	0	1181	5906	37913	41250	0.0	47.7	73.3	124.7	0.0	245.7
				216	December	0	1181	5906	37913	41250	0.0	59.2	53.6	150.1	0.0	263.0
CELL 4				217	January	3744	1152	5906	39094	41250	129.7	33.8	86.6	180.6	0.0	430.7
				218	February	2592	1152	6113	37901	43388	154.9	22.2	63.2	116.4	0.0	356.7
				219	March	1728	1152	6032	36709	45525	42.5	52.2	47.9	166.3	0.0	308.9
				220	April	864	1152	5951	35516	47663	6.5	26.8	101.5	95.8	0.0	198.2
				221	May	0	1152	5870	34324	49800	0.0	13.5	78.2	104.7	0.0	196.3
				222	June	0	1152	4925	33131	51938	0.0	16.1	38.3	121.9	0.0	176.3
				223	July	3744	1152	4608	32175	54075	85.4	11.4	26.4	138.7	0.0	261.8
				224	August	2592	1152	5760	30038	56213	67.9	16.1	21.4	120.5	0.0	225.8
				225	September	1728	1152	5760	28764	58350	27.0	19.1	60.0	63.3	0.0	169.3
				226	October	864	1152	5760	27491	60488	35.6	16.4	72.1	30.0	0.0	154.0
				227	November	0	1152	5760	26217	62625	0.0	13.5	59.4	72.6	0.0	145.5
				228	December	0	1152	5760	26217	62625	0.0	37.4	15.3	37.2	0.0	89.9
				229	January	3744	1152	5760	27369	62625	66.7	37.0	43.3	64.9	0.0	211.9
				230	February	2592	1152	5760	28521	62625	155.3	55.6	64.7	81.9	0.0	357.5
				231	March	1728	1152	5760	29385	62625	25.5	36.2	82.7	131.1	0.0	257.5
				232	April	864	1152	5760	30249	62625	52.5	39.7	79.8	150.3	0.0	327.3
				233	May	0	1152	5760	31113	62625	0.0	86.0	71.5	95.5	0.0	253.1
				234	June	0	1152	5760	31113	62625	0.0	46.4	103.3	61.6	0.0	211.4
				235	July	3744	1152	5760	32265	62625	324.6	65.3	125.4	46.8	0.0	562.1
				236	August	2592	1152	5760	33417	62625	112.3	38.4	136.3	86.2	0.0	373.1
				237	September	1728	1152	5760	34281	62625	75.8	35.6	94.8	155.6	0.0	361.8
				238	October	864	1152	5760	35145	62625	19.4	40.3	109.6	167.3	0.0	336.5
				239	November	0	1152	5760	36009	62625	0.0	29.8	99.7	175.4	0.0	304.9
				240	December	0	1152	5760	36009	62625	0.0	79.0	73.7	133.7	0.0	346.4
				241	January	3744	1152	5760	36873	62625	43.1	74.9	155.2	95.9	0.0	369.0
				242	February	2592	1152	5760	38025	62625	13.9	27.8	119.5	79.9	0.0	241.0
				243	March	1728	1152	5760	38889	62625	351.9	155.4	84.8	169.6	0.0	761.7
				244	April	864	1152	5760	39753	62625	112.6	149.2	208.6	143.1	0.0	613.5
				245	May	0	1152	5760	40617	62625	0.0	51.1	261.3	54.0	0.0	366.4
				246	June	0	1152	5760	40617	62625	0.0	19.9	106.3	81.2	0.0	207.4
				247	July	3744	1152	5760	41769	62625	179.0	35.4	105.1	167.1	0.0	486.7
				248	August	2592	1152	5760	42921	62625	56.2	43.9	95.5	207.3	0.0	400.9
				249	September	1728	1152	5760	43785	62625	18.5	27.6	102.1	225.1	0.0	373.2
				250	October	864	1152	5760	44649	62625	15.1	18.6	79.9	239.0	0.0	372.5
				251	November	0	1152	5760	45513	62625	0.0	12.9	48.2	274.4	0.0	335.5
				252	December	0	1152	5760	45513	62625	0.0	27.3	54.4	169.3	0.0	251.1
				253	January	0	1152	5760	45513	62625	0.0	21.7	70.6	208.9	0.0	301.2
				254	February	0	1152	5760	45513	62625	0.0	22.8	54.1	167.5	0.0	244.5
				255	March	0	1152	5760	45513	62625	0.0	29.9	28.1	144.7	0.0	202.7
				256	April	0	1152	5760	45513	62625	0.0	33.3	38.1	182.5	0.0	253.9
				257	May	0	1152	5760	45513	62625	0.0	85.3	245.5	288.4	0.0	369.4
				258	June	0	1152	5760	45513	62625	0.0	83.3	168.6	104.2	0.0	356.1
				259	July	0	1152	5760	45513	62625	0.0	39.9	154.9	95.6	0.0	290.4
				260	August	0	1152	5760	45513	62625	0.0	97.6	192.2	116.1	0.0	405.8
				261	September	0	1152	5760	45513	62625	0.0	37.5	141.5	164.4	0.0	295.4
				262	October	0	1152	5760	45513	62625	0.0	29.8	143.0	411.4	0.0	584.2
				263	November	0	1152	5760	45513	62625	0.0	30.9	74.3	360.0	0.0	465.2
				264	December	0	1152	5760	45513	62625	0.0	16.5	8			

Leachate generation for rainfall event - 1 in 25 year ARI for 24 hours duration

Note: There is no 1 in 25 year ARI in new BOM 2016 Design Rainfall System.
1 in 25 year = 4% AEP. A value in between 2-5% AEP is selected from graph below.

1 in 25 year	4% AEP
Rainfall Intensity	6 mm/h
Area of top of the pond	21693.627 m2
Rainfall directly on the pond	130.161762 m3/h

Interpolated From BOM 2016 Design Rainfall Data System



APPENDIX C

Safety in Design

Page 1 of	12	Project Name:	Energy from Waste Facility	Design Construction Element	Encapsulation Cell	Client:	Veolia Environmental Services
Project N°	21455895	Project Stage	Reference Design for input into EIS				
Originator	Ben Caruana		Reviewer:	Gary Schmertmann			Approver Gary Schmertmann

No.	Hazard	Initial (Uncontrolled) Risk Rating			Design measures taken to eliminate or reduce the hazard	Residual Risk Rating			Residual hazard	Further action required [Note: In all cases, Contractor to implement controls sufficient to create a Residual Risk Rating of 9 or less for construction activities.]	
		S	L	RR		S	L	RR			
Construction Phase											
1	Worker exposure to contaminated materials	3	5	15	Reference design report identifies risk of presence of contaminated soils, sediments and groundwater and notes that further assessment required.	3	2	6	Worker exposure to contaminated materials	Assessment of site contamination within area of Encapsulation Cell to be undertaken. Worker exposure to contaminated materials to be further assessed in ongoing design development and additional design measures included as appropriate. Appropriate management plans and controls to be implemented by Contractor based on management plans prepared prior to construction.	
2	Flooding in encapsulation cell footprint	5	2	10	Due to the Encapsulation Cell being located within the footprint of the ED1 pond there is potential for the water level in ED1 pond to inundate the	5	1	5	Flooding in encapsulation cell footprint	Flooding in encapsulation cell footprint during construction should be further assessed in ongoing design development and additional design measures included	

No.	Hazard	Initial (Uncontrolled) Risk Rating			Design measures taken to eliminate or reduce the hazard	Residual Risk Rating			Residual hazard	Further action required [Note: In all cases, Contractor to implement controls sufficient to create a Residual Risk Rating of 9 or less for construction activities.]
		S	L	RR		S	L	RR		
					construction area. This may result in damage to plant and/or risk to personnel exposed to the flooding waters.					as appropriate. Note: Sitewide water balance (WSP, 2021b) as referenced in Reference Design report indicates maximum predicted ED1 water elevation of 786.9 m which is expected to be manageable using minor separation berms. Contractor to design temporary drainage measures to manage surface water during construction. Plant and personnel should be removed from work area if significant rainfall is forecast.
3	Interaction between plant, equipment and workers during construction	5	3	15	Sufficient space expected to be available in extent of works to avoid overcrowding of work area or insufficient space to operate required plant.	5	1	5	Interaction between plant, equipment and workers during construction	Interaction between plant, equipment and workers during construction should be further assessed in ongoing design development and additional design measures included as appropriate. Appropriate controls to be implemented by Contractor based on management plans prepared prior to construction

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		S	L	RR		S	L	RR		
4	Geosynthetic lining system installation	4	3	12	Cell bund slopes are limited to maximum 3H:1V inclination. Final Landform (final cap) Slopes are limited to maximum 4H:1V inclination. Benches nominal 5 m wide provided in final landform will assist with safe access for final cap installation.	5	1	5	Geosynthetic lining system installation	Geosynthetic lining system installation should be further assessed in ongoing design development and additional design measures included as appropriate. Appropriate controls to be implemented by Contractor based on management plans prepared prior to construction. This should include ballasting of liner and identification of maximum allowable wind speeds in which liner work can continue.
5	Material Haulage	4	2	8	Large quantities of materials may be imported by road transport to the site.	5	1	5	Large quantities of materials may be imported by road transport to the site.	Material Haulage should be further assessed in ongoing design development and additional design measures included as appropriate. Appropriate controls to be implemented by Contractor based on management plans prepared prior to construction. This may include limiting allowable haulage working hours on public roads to minimise risk of striking fauna and selecting haulage routes to minimise interaction with public traffic and pedestrians.

No.	Hazard	Initial (Uncontrolled) Risk Rating			Design measures taken to eliminate or reduce the hazard	Residual Risk Rating			Residual hazard	Further action required [Note: In all cases, Contractor to implement controls sufficient to create a Residual Risk Rating of 9 or less for construction activities.]
		S	L	RR		S	L	RR		
6	Batter Slopes/ Slope instability	5	3	15	Batter slopes currently designed at max 1V:3H.	5	1	5	Batter Slopes/ Slope instability	Batter Slopes and slope stability, including for temporary slopes if required, should be further assessed in ongoing design development and additional design measures included as appropriate. Contractor to prepare Construction Work Plan and Health and Safety Management Plan that considers slopes required during construction and potential monitoring of slope surfaces for signs of ground instability during placement or compaction of fill on existing batters and during capping installation
7	Interface with adjoining APCr waste filling operations during cell extensions	5	3	15	Reference design includes internal bund design that remains in place during cell extensions reducing works required at new to old cell interface.	5	1	5	Interface with adjoining APCr waste filling operations during cell extensions	Interface with adjoining APCr waste filling operations during cell extensions should be further assessed in ongoing design development and additional design measures included as appropriate. Appropriate controls to be implemented by Contractor based on management plans prepared prior to construction, including identifying controls to separate the operations and construction
Operational Phase										

No.	Hazard	Initial (Uncontrolled) Risk Rating			Design measures taken to eliminate or reduce the hazard	Residual Risk Rating			Residual hazard	Further action required [Note: In all cases, Contractor to implement controls sufficient to create a Residual Risk Rating of 9 or less for construction activities.]
		S	L	RR		S	L	RR		
8	Release of contaminated material (solid, liquid, gas/dust)	5	3	15	Encapsulation cell sited such that it is expected that a potential release of contaminated liquid would be captured by ED1 pond. Encapsulation cell and leachate pond approx. 200 m from site boundary reducing potential for contaminated gas/dust to impact offsite receptors. Haul route for transportation for waste materials to Encapsulation Cell utilises interior site haul road which is located away from site boundary. Reference Design Report notes that A Landfill Environmental Management Plan (LEMP) should be developed for the Encapsulation Cell and Leachate Pond operation.	5	1	5	Release of contaminated material (solid, liquid, gas/dust)	Release of contaminated material during operational phase should be further assessed in ongoing design development and additional design measures included as appropriate. LEMP to be developed outlining the filling areas, daily cover requirements, haulage processes and other controls to suitably manage risks of Release of contaminated material. Plan to be monitored and updated regularly. Monitoring for release of pollutants to be completed (such as dust and air monitoring)
9	Waste material stability	5	3	15	Reference Design Final Landform slopes limited to max 4H:1V inclination. Current Staging Plan batter slopes limited to max 3H:1V inclination.	5	1	5	Waste material stability	Waste material physical properties and stability should be further assessed in ongoing design development and additional design measures included as appropriate. Detailed filling plan to identify maximum filling heights and batter slope angles

No.	Hazard	Initial (Uncontrolled) Risk Rating			Design measures taken to eliminate or reduce the hazard	Residual Risk Rating			Residual hazard	Further action required [Note: In all cases, Contractor to implement controls sufficient to create a Residual Risk Rating of 9 or less for construction activities.]
		S	L	RR		S	L	RR		
					Filling in accordance with filling plan and verification of conformance Reference Design Report notes that a filling plan and verification of conformance to be implemented for waste filling operations. Reference Design Report notes that a Landfill Environmental Management Plan (LEMP) should be developed for the Encapsulation Cell and Leachate Pond operation.					
10	Worker exposure to contaminated / hazardous material	3	5	15	Reference Design Report notes that operation of the Encapsulation Cell should address Daily and intermediate cover placement. Reference Design Report notes that a Landfill Environmental Management Plan (LEMP) should be developed for the Encapsulation Cell and Leachate Pond operation.	3	2	6	Worker exposure to contaminated / hazardous material	Worker exposure to contaminated / hazardous material should be further assessed in ongoing design development and additional design measures included as appropriate. Appropriate controls to be implemented based on operations plan.
11	Interface with adjoining construction plant during cell extensions	5	3	15	Hazard Noted in Report.	5	1	5	Interface with adjoining construction	Interface with adjoining construction plant during cell extensions should be further assessed in ongoing design development

No.	Hazard	Initial (Uncontrolled) Risk Rating			Design measures taken to eliminate or reduce the hazard	Residual Risk Rating			Residual hazard	Further action required [Note: In all cases, Contractor to implement controls sufficient to create a Residual Risk Rating of 9 or less for construction activities.]
		S	L	RR		S	L	RR		
					Reference design includes internal bund design that remains in place during cell extensions reducing works required at new to old cell interface.				plant during cell extensions	and additional design measures included as appropriate. Appropriate controls to be implemented by Contractor and operations team based on management plans prepared prior to construction and operations plan, including identifying controls to separate the operations and construction. This is to include progressive capping works.
12	Flooding in encapsulation cell footprint	5	2	10	Due to the Encapsulation Cell being located within the footprint of the ED1 pond there is potential for the water level in ED1 pond to inundate the encapsulation cell footprint during operation. This may result in damage to plant, risk to personnel exposed to the flooding waters, and environmental impact.	5	1	5	Flooding in encapsulation cell footprint	Flooding in encapsulation cell footprint during operational phase should be further assessed in ongoing design development and additional design measures included as appropriate. Note: Reference Design report indicates that this risk is expected to be manageable using 1 m high minor separation berms at appropriate locations. Temporary drainage measures to manage surface water during operation to be designed and implemented including consideration of changing landform during fill placement.
13	Ponded water in leachate dams and	3	5	15	Hazard noted in report.	5	2	10	Ponded water in leachate dams and	Ponded water in leachate dams and other water storages during operational phase

No.	Hazard	Initial (Uncontrolled) Risk Rating			Design measures taken to eliminate or reduce the hazard	Residual Risk Rating			Residual hazard	Further action required [Note: In all cases, Contractor to implement controls sufficient to create a Residual Risk Rating of 9 or less for construction activities.]
		S	L	RR		S	L	RR		
	other water storages (drowning risk)				Leachate evaporation pond design limited to 3H:1V side slopes with 2.5 m height.				other water storages (drowning risk)	and allowance for pond egress measures should be further assessed in ongoing design development and additional design measures included as appropriate. Engineered controls such as fencing and egress points may also be considered in ongoing design development.
Closure and Post Closure										
14	Interaction between plant, equipment and workers during final cap construction	Refer to Hazard Number 3								
15	Geosynthetic lining system installation during final cap construction	Refer to Hazard Number 4								
16	Ponded water in leachate dams and other water storages (drowning risk)	3	5	15	Reference Design Report notes that closure plan should be developed for the Encapsulation Cell.	5	2	10	Ponded water in leachate dams and other water storages (drowning risk)	Ponded water in leachate dams and other water storages should be further assessed in ongoing design development and additional design measures included as appropriate.

No.	Hazard	Initial (Uncontrolled) Risk Rating			Design measures taken to eliminate or reduce the hazard	Residual Risk Rating			Residual hazard	Further action required [Note: In all cases, Contractor to implement controls sufficient to create a Residual Risk Rating of 9 or less for construction activities.]
		S	L	RR		S	L	RR		
										Closure plan to be developed.
17	Release of contaminated material (solid, liquid, gas/dust)	4	3	12	Reference design for final capping system in includes capping layers as per requirements of NSW EPA Landfill Guidelines. Reference Design Report notes that closure plan should be developed for the Encapsulation Cell.	4	1	4	Release of contaminated material (solid, liquid, gas/dust)	Release of contaminated material during closure and post closure should be further assessed in ongoing design development and additional design measures included as appropriate. Monitoring to be implemented after closure, inspection and maintenance plan to be developed. Closure plan to be developed.
18	Impact to future site users	5	2	10	Reference Design Report notes that closure plan should be developed for the Encapsulation Cell.	5	1	5	Impact to future site users	Impact to future site users should be further assessed in ongoing design development and additional design measures included as appropriate. Closure plan to be developed.
19	Long term landform stability	4	3	12	Reference design is based on maximum final landform batter slope of 4H:1V. Reference Design Report notes that closure plan should be developed for the Encapsulation Cell.	4	1	4	Long term landform stability	Long term landform stability should be further assessed in ongoing design development and additional design measures included as appropriate. Ongoing design development to further assess these slopes with additional

No.	Hazard	Initial (Uncontrolled) Risk Rating			Design measures taken to eliminate or reduce the hazard	Residual Risk Rating			Residual hazard	Further action required [Note: In all cases, Contractor to implement controls sufficient to create a Residual Risk Rating of 9 or less for construction activities.]
		S	L	RR		S	L	RR		
										reinforcement such as geogrids introduced if required. Closure plan to be developed.

RISK RATING (RR) TOOL

Severity (S) Table

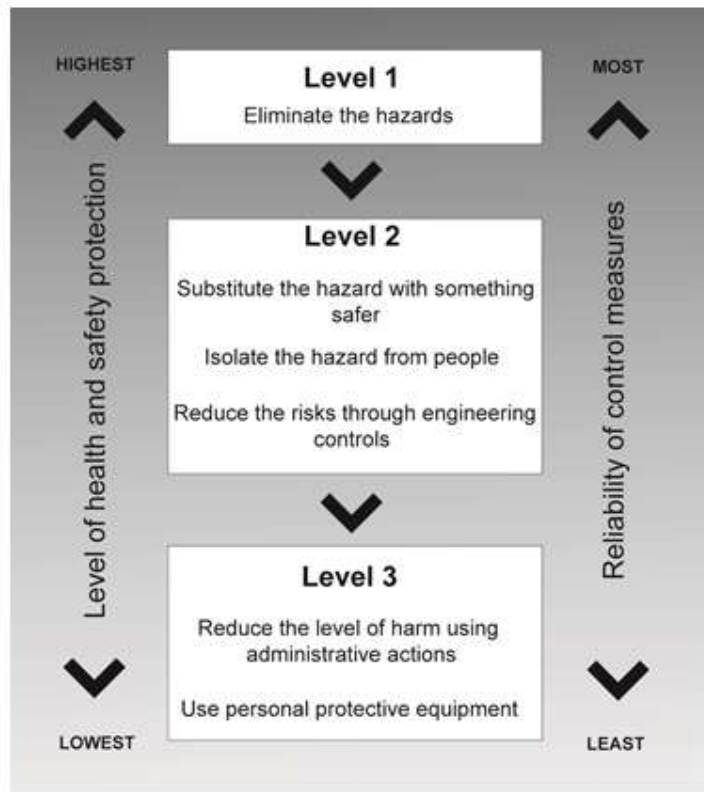
DESCRIPTOR LEVEL	NATURE	DESCRIPTION
Catastrophic 5	People Assets Environment	• Person could be killed. • Damage to property, plant and equipment, finances. Massive financial loss. • Catastrophic event with national impact for more than one year (e.g. habitat destruction).
Major 4	People Assets Environment	• Person could sustain a critical injury. • Damage to property, plant and equipment, finance. Major financial loss. • Major incident with regional impact for more than one year (e.g. creek contamination).
Moderate 3	People Assets Environment	• Person could sustain a serious injury. • Damage to property, plant and equipment, finance. High financial loss. • Major incident with regional impact for between one month and one year (e.g. creek contamination).
Minor 2	People Assets Environment	• Person could sustain a minor injury. • Damage to property, plant and equipment, finance. Minor financial loss. • Minor incident with localised impact for less than one month (e.g. 20 litre oil spill).
Insignificant 1	People Assets Environment	• Person could suffer an insignificant injury. • Damage to property, plant and equipment, finance. Low financial loss. • Negligible incident with localised impact for less than one month (e.g. noise pollution).

Likelihood (L) Table

DESCRIPTOR LEVEL	DESCRIPTION
Almost Certain 5	• Could happen at anytime • Is expected to occur in most circumstances • Occurs annually or more frequently.
Likely 4	• Will probably occur in most circumstances • Has occurred several times or more in the past.
Possible 3	• Has occurred once in the past on a work site, workplace or property. • Might occur under prevailing circumstances.
Unlikely 2	• Could occur at some time on a work site, workplace or property. • Could happen but unlikely.
Rare 1	• May occur in exceptional circumstances • Heard of something like this happening elsewhere • Could happen but probably never will.

SEVERITY					
LIKELIHOOD	Catastrophic	Major	Moderate	Minor	Insignificant
	5	4	3	2	1
Almost Certain 5	E25	E20	E15	H10	M5
Likely 4	E20	E16	H12	M8	L4
Possible 3	E15	H12	M9	M6	L3
Unlikely 2	H10	M8	M6	L4	L2
Rare 1	M5	L4	L3	L2	L1

RISK LEVEL	ACTION YOU SHOULD TAKE
EXTREME (15-25) HIGH (10-12)	UNACCEPTABLE RISK Immediate action required. Eliminate or reduce risk by implementing controls
MODERATE (5-9)	ACCEPTABLE RISK - Work can proceed providing stakeholders understand the residual risk and specified controls have been implemented and communicated to others
LOW (1-4)	REASONABLE RISK - Work can proceed





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