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Wingecarribee Shire Council

# Landfill Closure Plan

Former Welby Landfill

April 2023



# Question today *Imagine tomorrow* Create for the future

## Landfill Closure Plan Former Welby Landfill

Wingecarribee Shire Council

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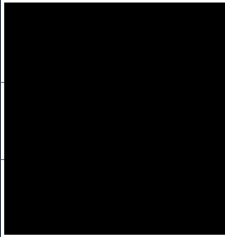
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WSP acknowledges that every project we work on takes place on First Peoples lands.  
We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.





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# 1 Introduction

This Landfill Closure Plan has been prepared to facilitate the construction of infrastructure on the former Welby Landfill located off Colo Street, Welby NSW (hereafter referred to as “the site”) which will allow the site to be considered fully closed as per the definition presented in NSW EPA (2016), *Environmental Guidelines: Solid Waste Landfills* (NSW EPA 2016). The final closure is required to allow for surrender of the sites Environmental Protection Licence (EPL number 20194). The site locality and general layout is presented in Figure 1 of Appendix A1.

The intent of the closure plan is to present a procedure by which Wingecarribee Shire Council can make the site suitable to achieve the following required outcomes (as per NSW EPA 2016):

- *The landfill must continue to be non-polluting and not causing environmental harm after site closure.*
- *The occupier must prepare a closure plan, setting out a program for making sure that the site does not cause environmental harm after closure. The occupier must implement the approved closure plan.*

This closure plan and associated detailed design drawings and technical specification have been prepared based upon the proposal by WSP dated December 2021 (ref. PP134783-CLM-PRP-WSC Rev001) and subsequent approval to proceed by Wingecarribee Shire Council who has overall responsibility for the delivery of the plan.

## 1.1 Project Objectives

This Landfill Closure Plan has been developed to provide a procedure for the final closure and aftercare of the former Welby Landfill. Its purpose is to ensure that adequate landfill closure and rehabilitation measures are implemented, and monitoring procedures continue as necessary until final NSW EPA acceptance of a Statement of Completion for the site.

This Landfill Closure Plan has been prepared with reference to NSW EPA (2016), *Environmental Guidelines – Solid Waste Landfill Guidelines*. The key components of a Landfill Closure Plan required by NSW EPA 2016 is presented in Table 1.1 below as well as the sections in the report where further detail around these components is provided.

Table 1.1 NSW EPA 2016 – Closure Plan Requirements

<b>NSW EPA 2016 Requirements</b>	<b>Relevant Report Section</b>
<i>Specify the steps taken or to be taken in closing and stabilising the landfill, and the time frame for doing so</i>	See Section 4
<i>Specify the detailed design, the materials to be used and the construction quality assurance plan for the final capping, in accordance with the requirements of sections 9 and 11 of these guidelines</i>	See Section 4
<i>Specify post-closure management and monitoring measures (sometimes called aftercare) for leachate, stormwater, landfill gas, odour, dust, litter and final cap integrity</i>	See Section 5
<i>Identify any proposed future use of the site</i>	See Section 3.6
<i>Be consistent with all applicable conditions of the development consent or other planning approvals that apply to the premises</i>	No current consent applicable to the works
<i>Make sure that neighbouring residents are advised of the contact persons for discussing any problems (e.g. odour emissions); records of these complaints should be kept in the same way as during operation</i>	See Section 4.4
<i>Make sure that waste is not received for disposal at the site after landfill operations cease. Wastes intended for use during remediation of the premises should be documented and reported in the same way as for an operating facility; see section 7 of these guidelines</i>	See Section 4.7

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## 1.2 Regulatory Considerations

The closure works and subsequent aftercare and monitoring presented in this Landfill Closure Plan should be conducted in accordance with the following environmental guidelines and legislation:

- ANZG (2018), *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*
- *Environment Protection and Biodiversity Conservation Act 1999*
- HEPA (2020), *PFAS National Environmental Management Plan Version 2*
- NEPC (2013), *National Environment Protection (Assessment of Site Contamination) Measure*
- NSW EPA (2020), *Contaminated Land Guidelines: Consultants Reporting on Contaminated Land*
- NSW EPA (2017), *Contaminated Sites Guidelines: Site Auditor Scheme (3<sup>rd</sup> Edition)*
- NSW EPA (1995), *Contaminated Sites: Sampling Design Guidelines*
- NSW EPA (2016), *Environmental Guidelines: Solid Waste Landfills (2<sup>nd</sup> Edition)*
- NSW EPA (2014), *Waste Classification Guidelines*
- NSW EPA (2014), *Resource Recovery Order Under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014: The Excavated Natural Material Order 2014*
- NSW Government *Contaminated Land Management Act 1997*
- NSW Government *Environmental Planning and Assessment Act 1979*
- NSW Government *Protection of the Environment Operations Act 1997*
- NSW Government *Protection of the Environment Operations (Waste) Regulation 2014*

## 2 Site Description

### 2.1 Site Location and Zoning

The site is a former landfill historically operated by Wingecarribee Shire Council which is located off Colo Street in Welby NSW. Site details are presented in Table 2.1.

Table 2.1 Summary of general site information

Site name	Former Welby Landfill
Site address	Situated off Colo Street, Welby NSW (refer to Figure 1 of Appendix A1 for site locality)
Site area	The total site area is approximately 91,000 m <sup>2</sup> (9.1 ha). The site is shown in Figure 2, Appendix A1.
Legal identification	The site comprises the following lots: <ul style="list-style-type: none"> <li>— Lot 197 in DP 723134 (3,750 m<sup>2</sup>).</li> <li>— Lot 160 in DP 751275 (15,900 m<sup>2</sup>).</li> <li>— Lot 156 in DP 751275 (10,360 m<sup>2</sup>).</li> <li>— Lot 147 in DP 751275 (24,430 m<sup>2</sup>).</li> <li>— Lot 102 in DP 751275 (23,410 m<sup>2</sup>).</li> <li>— Lot 161 in DP 751275 (13,150 m<sup>2</sup>).</li> </ul> <p>Some of the stormwater dams associated with the landfill are also situated on surrounding bushland lots (most notable Lot 7307 of DP 1146411).</p>
Geographic coordinates (approximate centre of site)	Easting: 264,410.46; southing: 6,186,463.33 (MGA 56)
Current site use	The site is a former landfill with access road and a number of stormwater dams. The site is no longer in use but there are a number of stockpiles of material which have been temporarily stored on the cap.
Surrounding land use	The site is surrounded in all directions by bushland which has a number of tracks accessible to the public for hiking and mountain biking. An access road (Colo Street) is situated to the south-west of the landfill.
Local government area	Wingecarribee Shire Council
Zoning information	SP1: Special Activities – Wingecarribee Local Environmental Plan 2010 Site surrounded by E2: Environmental Conservation zoned land
Future proposed use	Recreational open space

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## 2.2 Geology and Hydrogeology

According to the Wollongong 1:250,000 Geological Series Sheet (SI 56-9), the site is underlain by the Liverpool Sub-group of the Wianamatta Group. The Liverpool Sub-group comprises shale with some sandstone beds. The Liverpool Sub-group overlies the Triassic-aged Hawkesbury Sandstone. The Hawkesbury Sandstone generally comprises medium to coarse-grained sandstones with some shale and laminite layers.

The Hawkesbury Sandstone and Wianamatta Group rocks occurring in this region are generally of low permeability.

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## 2.3 Surface Hydrology

Runoff from the site flows into Gibbergunyah Creek which is a tributary of the upper reaches of the Nattai River. The Nattai River is part of the Hawkesbury-Nepean Catchment and thus a source of water for the Sydney Region.

Due to the elevation of the site and the drainage of the area, it is not flood prone to flooding from existing waterways.



# 3 Site Characterisation and Closure Design Justification

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## 3.1 Former Landfill Extent and History

The former Welby Landfill is situated at the end of Colo Street in Welby NSW. The landfill footprint is of irregular shape and elevated above the surrounding topography. The general layout of the landfill is presented in Figure 2 of Appendix A1. The lateral extent of landfilling is generally bounded by stormwater/leachate dams around the toe; most notably DAM 3 in the north, DAM 4 in the north-east, DAM 5 in the south-east, DAM 6 in the south, DAM 1 in the south-west and DAM 2 in the north-west.

According to Woodward-Clyde (1996), *Environmental Audit of Welby Landfill, Mittagong, NSW* (Woodward-Clyde 1996), the former Welby Landfill is situated within the footprint of a sandstone quarry. Landfilling commenced in 1957 when quarrying activities were completed. Between 1957 and 1989 the landfill was operated as a trench and burn tip which was followed by a period of more traditional landfilling. Based upon information provided by Golder Associates, landfilling is understood to have ceased in 2002, at which time it was capped. It is noted however that Woodward Clyde wrote that the site had been capped prior to their investigation in 1996.

Little information is available around the types of waste emplaced within the landfill, however it is assumed that the majority would comprise residential waste and construction and demolition waste based on similar local facilities. There are understood to be no defined individual cells and it is believed that landfilling occurred as a continuous process over the course of the sites life.

It is understood that the former Welby Landfill has been owned and operated by Council for the full span of its life.

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## 3.2 Former Cap and Batter Construction

Limited information is available around cap and batter design for the former Welby Landfill. Woodward-Clyde 1996 postulated that the landfill was capped with soil and formed into a mound with a bulldozer before being seeded to promote vegetation growth. In addition to this it is understood that the batters were covered with shredded tree matter to reduce erosion and a perimeter drain was installed around the toe of the slopes which collects runoff from the cap and batters and feeds into the surrounding dams. According to Woodward-Clyde, it is also understood that leachate discharges into the drains and enters the surrounding dams.

WSP undertook a review of variability of the gradients across the batters and cap of the former landfill. An approximate distribution of gradients (expressed as a percentage) is presented in Figure 3 of Appendix A1. As a general guide, to suitability of gradients across the site WSP has adopted the requirements presented in VIC EPA (2015), *Best Practice Environmental Management: Siting, Design, Operation and Rehabilitation of Landfills*, which states that gradients should be no less than 5% (in order to minimise the potential for ponding of water) and not steeper than 20% to minimise the potential for erosion problems. In summary:

- The central section of the cap was calculated to possess a gradient of less than 5%. This corresponds with observations made during site inspections which identified multiple areas across the cap surface where recent rainfall was allowed to pond.
- Isolated sections in the north-west, north-east and far east of the landfill extent fall within the preferred gradient of between 5% and 20%.
- Sections of batter immediately west, south and south-west of the central cap have been calculated as possessing gradients slightly greater than the preferred maximum slope (between 21% and 30% gradient).

- Sections of batter to the north and south-east of the central cap have been calculated as possessing greater gradients than the preferred maximum slope (between 31% and 40%).
- Thin strips of significantly greater gradients have been identified in the north, north-west, east and south of the batters. These strips of batter possess gradients of greater than 40%. These strips of batter have been identified previously by WSP field staff during recent site inspections.

An assessment of cap thickness and composition was undertaken by Golder in March 2005. This involved the excavation of twelve shallow test pits (GA01 to GA12) across the landfill extent (refer to Figure 2 of Appendix A1 for locations). GA01 to GA05 extended across the northern batter, GA06 to GA09 extended across the southern batter and GA10 to GA12 extended across the south-eastern batter. The Golder 2005 report was not available to WSP in preparing this document, however the results are discussed in Golder (2013), *Report on Closure Plan for Welby Landfill* (Golder 2013). The results as noted in Golder 2013 are as follows:

#### Northern Batter

*Test pit GA1 is located on top of the landfill and a silty clay cover was found to a depth of 1.30 m. The cover material in test pits GA2 to GA5 consisted of 30 - 40 % waste material in a silty clay matrix and a thickness of 0.3 m to 1.2 m above the waste.*

#### Southern Batter

*Test pit GA6 is on top of the slope and exposed approximately 30 % waste in a silty clay matrix. The waste material was predominantly scrap metal and timber, and was encountered between the surface to 1.2 m depth. Test pits GA7 to GA9 on the landfill slope exposed a silty clay cover ranging from 0.1 - 0.4 m above the underlying waste material.*

#### South-eastern Batter

*Test pit GA10 is on top of the slope comprising a 2.2 m thick layer of silty clay with approximately 10% waste material overlying the municipal waste. Test pit GA11 exposed a 1 m thick cover of silty clay and clay, while a clay cover of 0.25 m above the underlying waste material was found at test pit GA12.*

Based upon the above, the cap and batters are of clay composition with some waste inclusions (generally comprising construction and demolition waste). Cap thickness generally ranged from 1.2 metres to 2.2 metres thickness whereas batter cover was considerably thinner.

WSP undertook an inspection of the former Welby Landfill in March 2022 and made the following observations:

- The inspection occurred after an extended period of sustained rainfall. Two potential leachate seeps were identified on the toe of the northern batter (SEEP 03 and SEEP 05) and one was identified in the toe of the south-western batter (SEEP 01). Two further potential leachate seeps were also identified further up the western and north-western batter (SEEP 02 and SEEP 04).
- A failure of the batter was identified on the western boundary of the landfill where the slope was considered to be very steep and waste had been exposed at the surface.
- Sections of the batter appeared hummocky and potentially the result of either differential settlement or poor grading and compaction during the construction of the cap and batter. It is noted that Golder Associates have identified hummocky sections of batter during previous inspections.
- Deeper rooted shrubs and trees have been allowed to grow on the batters which have the potential to degrade capping systems over time.
- Substantial areas of ponded water were identified across the cap extent which demonstrate that runoff on the cap is currently impeded from being shed to the surrounding stormwater system and instead may be infiltrating through the cap and contributing to leachate generation within the waste mass.

The table below presents the coordinates of the seeps and batter failure identified during the WSP site inspection.

Table 3.1 WSP March 2022 Inspection Point Locations

ITEM	LATITUDE (decimal)	LONGITUDE (decimal)
BATTER FAILURE	-34.435953	150.437626
SEEP 01	-34.437875	150.434870
SEEP 02	-34.436269	150.434997
SEEP 03	-34.435106	150.436276
SEEP 04	-34.435893	150.435270
SEEP 05	-34.435381	150.437850

Available information indicates that the landfill does not possess a liner of basal leachate capture system.

## 3.3 Leachate Generation

### 3.3.1 Leachate Levels

Leachate levels within the waste mass has been recorded from a single monitoring well (WELMLEACH-01). According to Golder Associates in their 2013 Closure Plan, monitoring results from 2005 and prior indicate a leachate level of around 11 metres below the top of casing (mTOC). However, the 12 available gauging results collected between April 2016 and April 2022 have indicated a leachate level of between 6.99 mTOC and 9.74 mTOC. The table below presents the variance in leachate level over time as well as correction to mAHD based on the supplied elevation of the top of casing of WELMLEACH-01 (641 mAHD).

Table 3.2 Recorded Leachate Levels (2016-2022)

Monitoring Period	Leachate Level (mTOC)	Adjusted Leachate Level (mAHD)
April 2016	8.15	232.85
May 2016	8.02	232.98
January 2017	8.8	232.2
June 2017	8.32	232.68
June 2018	8.7	232.3
June 2019	9.74	231.26
December 2019	8.74	232.26
March 2020	7.5	233.5
October 2020	8.34	232.66
April 2021	7.33	233.67
November 2021	7.01	233.99
April 2022	6.99	234.01
AVERAGE	8.14	232.86

The results indicate that while heavy rainfall (such as the recent La Nina events) have resulted in noticeable increases in leachate levels, the overall results between 2016 and 2022 were comparable and indicative of a generally stable leachate level.

### 3.3.2 Leachate Composition

The results of the available leachate, groundwater and surface water monitoring are presented in Table D1 in Appendix D.

WSP has been provided data from 13 rounds of groundwater monitoring undertaken by ALS between 2015 and 2021. Works were undertaken as part of the ongoing annual water monitoring program implemented by Council.

Samples were collected from one leachate well (WELM LEACH-01) and eight groundwater wells (WELM-01, WELM-02, WELM-04, WELM-05, WELM-06S, WELM-06D, WELM-07S and WELM-07D). ALS groundwater monitoring between 2015 and 2021 identified regular heavy metals impacts (Cd, Cr, Cu, Pb, Ni, Al, Mn and Zn) and ammonia exceedances across whole groundwater dataset and within the leachate well.

In addition to the above, WSP undertook a round of leachate, surface water and groundwater sampling as well as collection of samples from creek sediments and stockpiled organic waste materials on the landfill cap in March and September 2022. The sampling was undertaken to assess the potential presence of per- and poly-fluoroalkyl substances (PFAS) within the landfill footprint. The results of the PFAS testing are presented in Tables D2, D3 and D4 of Appendix D. The results of the PFAS investigation are as follows:

- The organics waste stockpiles situated on the landfill cap are not considered to present a primary source of PFAS contamination;
- The landfill waste mass is considered to be a primary source of PFAS contamination. Elevated concentrations of PFAS have been identified in the leachate within the waste mass;
- PFAS has been identified in all of the stormwater dams sampled around the landfill, an unnamed creekline draining the southern portion of the landfill and within groundwater monitoring wells, indicating that PFAS from the landfill has impacted surface water and groundwater immediately adjacent to the former Welby Landfill footprint; and
- Detectable concentrations of PFAS were identified in the upstream surface water sampling locations in Gibbergunyah Creek, Chinamans Creek and Iron Mines Creek and in low concentrations in the downstream location. This indicates that the landfill may be having an effect on PFAS concentrations within the creek but upstream sources (most notably from the Mittagong Industrial Area) have also been identified as causing PFAS impacts to the waterway.

### 3.3.3 Leachate Generation

WSP assessed leachate generation through surface precipitation using the techniques presented in the following references:

- US EPA (1975), *Use of the Water Balance Method for Predicting Leachate Generation from Solid Waste Disposal Sites* (US EPA 1975).
- US EPA (2020), *Hydraulic Evaluation of Landfill Performance: HELP 4.0 User Manual* (US EPA 2020).

Both calculations are water balance models which act as budgets of water entering and leaving the system with the surplus contributing to leachate generation. The following sub-sections discuss the rationale, parameters used and findings of the calculations. The calculations were based upon two scenarios:

- Steady State: Inferred current conditions within the landfill.
- Proposed Future State: Inferred future conditions based upon the closure scenario presented in Section 3.7 (i.e. slope of greater than 5% and additional stormwater drainage infrastructure).

### 3.3.3.1 US EPA 1975 Model

The US EPA 1975 calculation is a water balance model which is based on the relationship between precipitation, evapotranspiration, surface runoff and soil moisture storage. Precipitation represents the amount of water added, evapotranspiration represents the transport of water from the earth back to the atmosphere, surface runoff represents water which flows directly off the area of concern and the moisture storage capacity represents water which can be held in the soil.

The water added by precipitation will either evaporate directly back to the atmosphere from the soil surface, be utilised by plants through transpiration, serve to recharge a dried soil to field capacity, or become downward percolation or surface runoff. The relative amounts of each of these depends in large measure on the relationship between precipitation and evapotranspiration.

The key input parameters used to calculate the water balance utilising the US EPA 1975 method are presented in the table below.

Table 3.3 US EPA 1975 Parameter Justification

Parameter	Parameter Source
PET (Potential Evapotranspiration)	Derived from monthly total 2021 Bureau of Meteorology Moss Vale Evapotranspiration calculation (Penman-Monteith Equations from UN FAO56)
P (Precipitation)	Mean monthly rainfall derived from Moss Vale AWS (068239) Climate Statistics
$C_{R/O}$ (Surface Runoff Coefficient)	Derived from Table 3 of US EPA (1975), <i>Use of the Water Balance Method for Predicting Leachate Generation from Solid Waste Disposal Sites</i>
R/O (Surface Runoff)	Precipitation multiplied by Surface Runoff Coefficient
I (Infiltration)	Precipitation minus Surface Runoff
I-PET (Infiltration minus Potential Evapotranspiration)	Infiltration minus Potential Evapotranspiration
NEG (I-PET) (Accumulated Potential Water Loss)	Representing the potential water loss, are summed month by month
ST (Soil Moisture Storage)	Base ST (200mm water per m of soil) derived from Silty Loam Available Water in Table 2 of US EPA (1975), <i>Use of the Water Balance Method for Predicting Leachate Generation from Solid Waste Disposal Sites</i>
$\Delta$ ST (Change in Storage)	Represents the change in soil moisture from month to month
AET (Actual Evapotranspiration)	Represents the actual amount of water loss during a given month. For those months where I-PET is negative, the rate of evapotranspiration is limited by soil moisture availability ( $AET = PET + ((I-PET) - \Delta ST)$ )
PERC (Percolation)	After the soil moisture storage reaches its maximum, any excess infiltration becomes percolation through the cover soil and into underlying solid waste. Represented as mm of water per m <sup>2</sup> .

The calculations are presented in Appendix B of this report. The calculation of the existing surface conditions indicated that annually approximately 37 mm of water per square metre of landfill area percolates into the waste mass. Under the proposed scenario this is modelled to drop to approximately 16 mm of water per square metre of landfill area. This

represents a 57% decrease in potential surface water infiltration into the waste mass (and therefore reduction in leachate production associated with surface infiltration).

### 3.3.3.2 US EPA 2020 HELP Model

The Hydrologic Evaluation of Landfill Performance (HELP) model is a quasi-two-dimensional hydrologic model of water movement across, into, through and out of landfills. The model accepts weather, soil, and design data. It uses solution techniques that account for key factors affecting water movement in a landfill, including: surface storage; snowmelt; runoff; infiltration; evapotranspiration; vegetative growth; soil moisture storage; lateral subsurface drainage; leachate recirculation; unsaturated vertical drainage; and leakage through soil, geomembrane, and composite liners.

Landfill systems including various combinations of vegetation, cover soils, waste cells, lateral drain layers, low permeability barrier soils, and synthetic geomembrane liners may be modelled. The model was developed to conduct water balance analysis of landfills, cover systems, and solid waste disposal and containment facilities. As such, the model facilitates rapid estimation of the amounts of runoff, evapotranspiration, drainage, leachate collection, and liner leakage that may be expected to result from the operation of a wide variety of landfill designs. The model is applicable to open, partially closed and fully closed sites.

The key input parameters used to calculate the water balance utilising the US EPA 1975 method are presented in the table below.

Table 3.4 US EPA 2020 Visual HELP Parameter Justification

Parameter	Parameter Source
Years of Simulation	Based on minimum period of available climatic dataset (i.e. solar radiation)
% of Landfill Subject to Runoff	Percent of batter extent compared to overall landfill area
Precipitation and Temperature	Derived from Moss Vale AWS Weather Station (068239)
Solar Radiation	Derived from NSRDB Database (location 2051109)
Wind Speed and Relative Humidity	Bureau of Meteorology Climatic Data for Moss Vale Weather Stations
Growing Season	Estimated based on anecdotal information
Maximum Leaf Area Index	Derived from Ramirez-Garcia, J., Almendros, P. and Quemada, M. (2012), <i>Plant Soil Environ</i> , “Ground Cover and Leaf Area Index Relationship in a Grass, Legume and Crucifer Crop”, 58, 2012 (8): pp 385-390.
Evaporative Zone Depth and composition	Thickness of inferred cap. Composition based on defaults for silty loam.

The model outputs are presented in Appendix C of this report. The calculation of the existing surface conditions indicated that annually an average of 1,186.1 cubic metres of water percolates into the landfill waste mass annually. Under the proposed scenario of a reprofiled finished surface this is modelled to drop to approximately 589.3 cubic metres of water percolates into the landfill waste mass annually. This represents a 50% decrease in potential surface water infiltration into the waste mass (and therefore reduction in leachate production associated with surface infiltration).

### 3.3.3.3 Discussion of Results

The overall results from both calculations demonstrate that the key design parameters presented in Section 3.7 should result in a reduction of between 50% and 57% contribution from direct surface infiltration through the cap and batters of the landfill. Although there is considered to be reasonable influence from the surrounding groundwater system upon

leachate levels within the landfill (due to the waste mass being placed within the void of a former quarry and the landfill being unlined), it is considered that the reduction in surface contribution will result in a reduction of the existing leachate levels within the waste mass. This in turn should reduce the potential for surface leachate seeps and breakouts and reduce the potential for environmental impact upon groundwater and surface water bodies.

## 3.4 Landfill Gas Generation

### 3.4.1 Gas Monitoring Results

The results of the available surface and sub-surface landfill gas results are presented in Tables E1 and E2 in Appendix E.

Two rounds of surface gas monitoring across the surface of the landfill and immediately adjacent to the landfill footprint were undertaken by ALS in 2015 and 2016. Surface gas monitoring (July 2015 and June 2016) identified no elevated surface methane results indicating diffuse emission through the cap

Up to seven rounds of sub-surface gas monitoring undertaken at multiple groundwater, leachate and gas monitoring well locations across the site by ALS between 2016 and 2021. The results of the monitoring were compared to the modified Wilson and Card risk characterisation method presented in NSW EPA (2020), *Assessment and Management of Hazardous Ground Gases*. Interpretation of the ALS sub-surface monitoring between 2016 and 2021 identified the following:

- Majority of elevated methane results across dataset situated were within waste mass. All other elevated results at off-waste mass point date back to 2016 with no subsequent elevated results.
- Elevated carbon dioxide was generally noted in locations within the waste mass but only occasionally elevated in off-waste mass points.
- Low flow in all wells indicating low production rates within the waste mass and minimal scope for lateral migration through the geology.
- Characteristic gas situation (CS) across dataset generally between CS1 and CS2 when the elevated results from 2016 have been removed.

### 3.4.2 Predicted Future Gas Generation

WSP undertook landfill gas generation modelling as a secondary line of evidence based upon the results of the desktop assessment and review of monitoring well information across the former Welby Landfill area. The indicative gas generation (and subsequent emission) capacity was derived using the LandGEM Landfill Gas Emission Model (Version 3.02). The model was developed by the United States Environmental Protection Agency Clean Air Technology Centre to quantify landfill gas emissions.

LandGEM is a first-order decay model whose purpose is purely to estimate landfill gas production over time within the waste mass. The model uses the decomposition of landfilled waste in municipal solid waste landfills to estimate landfill gas generation. Based on the waste mass, the total lifespan of gas generation is also calculated.

The first-order decomposition rate equation is:

$$Q_{CH_4} = \sum_{i=1}^n \sum_{j=0.1}^1 kL_0 \left(\frac{M_i}{10}\right) e^{-kt_{ij}}$$

Where:

$Q_{CH_4}$  = annual methane generation in the year of the calculation (m3/year)

$i$  = 1-year time increment

$n$  = (year of the calculation) - (initial year of waste acceptance)



$j = 0.1$ -year time increment

$k =$  methane generation rate ( $\text{year}^{-1}$ )

$L_o =$  potential methane generation capacity ( $\text{m}^3/\text{Mg}$ )

$M_i =$  mass of waste accepted in the  $i^{\text{th}}$  year (Mg)

$t_{ij} =$  age of the  $j^{\text{th}}$  section of waste mass  $M_i$  accepted in the  $i^{\text{th}}$  year (decimal years, e.g., 3.2 years)

Using site-specific data, LandGEM can generate realistic estimates of gas generation rates and becomes an effective screening tool. Consequently, limitations in available site-specific data reduces the accuracy in the estimation of the emissions potential of the landfill. Factors such as waste quantity and composition, landfill design and operating practices over time and other variances over time greatly affect the accuracy of the modelling output.

Critical input parameters may be tailored to the specific site using literature and guides prepared for LandGEM. Key parameters include the Methane Generation Rate and Potential Methane Generation Capacity for example. The units for these key parameters vary from other landfill gas models, and as such, the values differ significantly when input to LandGEM compared to GasSim 2.5 or the IPCC 2006 model for example.

For this project, the inferred total waste mass of the landfill was used to calculate gas generation. This approach has been used to account for all possible landfill gas that may be produced by the former Welby Landfill from waste emplaced between 1957 and 2002. LandGEM is particularly suited to this former landfill because of the general nature of information around waste volumes, composition, moisture content and rate of deposition. The majority of other first order decay models often require detailed input parameters to facilitate an understanding of degradation over multiple cells with varying types of wastes. These models are useful for gaining a more accurate representation of gas generation when this data is available but when information relating to a waste mass is limited (such as is the case with this former landfill), they become unnecessarily complex while their accuracy becomes compromised.

Because there are limited primary information sources available for the site and the modelling is intended as a secondary line of evidence to be truthed by the long-term monitoring data, LandGEM has been adopted as the preferred simulation tool.

The overall landfill gas generation curve for the former landfill has been derived through applying two simulations. These simulations represent waste masses that have been laid in different environments which can substantially affect accessibility of degradable organic carbon to anaerobic degradation and therefore, gas generation rate over time. The two separate waste masses include the following:

- SIMULATION 1: Waste which has been emplaced in a non-saturated environment with reasonable levels of moisture to facilitate anaerobic degradation of waste. Based upon available borehole logs and historic aerial photographs this was conservatively inferred to comprise 42% of the waste within the landfill.
- SIMULATION 2: Waste which has been emplaced in a saturated environment with moisture content hindering anaerobic degradation rates over time and thus reducing the rate at which degradable organic carbon is accessed by anaerobes.

The combination of the generation rates of both simulations are inferred to provide the overall gas generation of the waste mass within the former Welby Landfill.

The input parameters used in the LandGEM model are summarised in Table 3.3.

Table 3.5 Project-Specific Input Parameters

Parameter	Input data	Source
Waste acceptance rate	Simulation 1: 6,194 tonnes per year Simulation 2: 8,553 tonnes per year	Based on total area of landfilling (Coffey 2006 landfill extent plan) with approximate area of 79,000 m <sup>2</sup> and maximum thickness of landfill waste being elevation of WELMLEACH-01 (641 mAHD) minus toe of landfill according to Golder in 2013 (620 mAHD) minus inferred cap thickness of 1.5m (i.e. max thickness of 19.5 metres). Assume average fill thickness of 12 metres to account for lesser thickness across batters (i.e. total waste of 948,000 m <sup>3</sup> ). Cubic metres converted to tonnes based on assumption of 0.7 tonnes per cubic metre of waste which was derived from Draft 16 UK Waste Classification Scheme which estimated paper and card at 0.6 T/m <sup>3</sup> and vegetable matter including food and bark at 0.75T/m <sup>3</sup> . Therefore, in total 663,600 tonnes of waste split between moist and saturated zones and then divided by the number of years of operation. Moist and saturated zones based on average depth of leachate level taken from 12 results recorded between 2016 and 2022 (8.2 metres below ground level) compared to maximum thickness of waste mass (19.5m). Therefore 42% of waste in moist section (278,712 tonnes) and 58% in saturated section (384,888 tonnes).  Tonnes of waste were evenly divided by the total years of landfilling between 1957 and 2002 (45 years).
Methane Content	50 %v/v	Default setting noting heavy influence of water within wells and the landfill in dissolving CO <sub>2</sub> into groundwater/leachate
K	Simulation 1: 0.057 year <sup>-1</sup> Simulation 2: 0.02 year <sup>-1</sup>	Default K value for bulk municipal solid waste in a wet and dry climate from US EPA (2010) GHG Emissions Estimation for Selected Biogenic Source Categories - Table 2-1; accessed from <a href="https://www3.epa.gov/ttn/chief/efpac/ghg/GHG_Biogenic_Report_draft_Dec1410.pdf">https://www3.epa.gov/ttn/chief/efpac/ghg/GHG_Biogenic_Report_draft_Dec1410.pdf</a> .
L0	170 m <sup>3</sup> CH <sub>4</sub> /Mg waste	Default setting due to lack of information around putrescible waste emplaced within the landfill
Non-Methane Organic Compound Concentration (NMOC)	4,000 ppmv as hexane	The default LandGEM value.

The gas generation plots for both simulations are presented in Figures 3-1 and 3-2 below. The LandGEM reports for both simulations are presented in Appendix D. They show that the gas production in both the waste mass with the lower moisture content and the saturated waste peak roughly around the same time (around 2000), though production volume is higher in the lower moisture waste mass and quickly drops off as the anaerobes utilise the degradable organic carbon much faster.

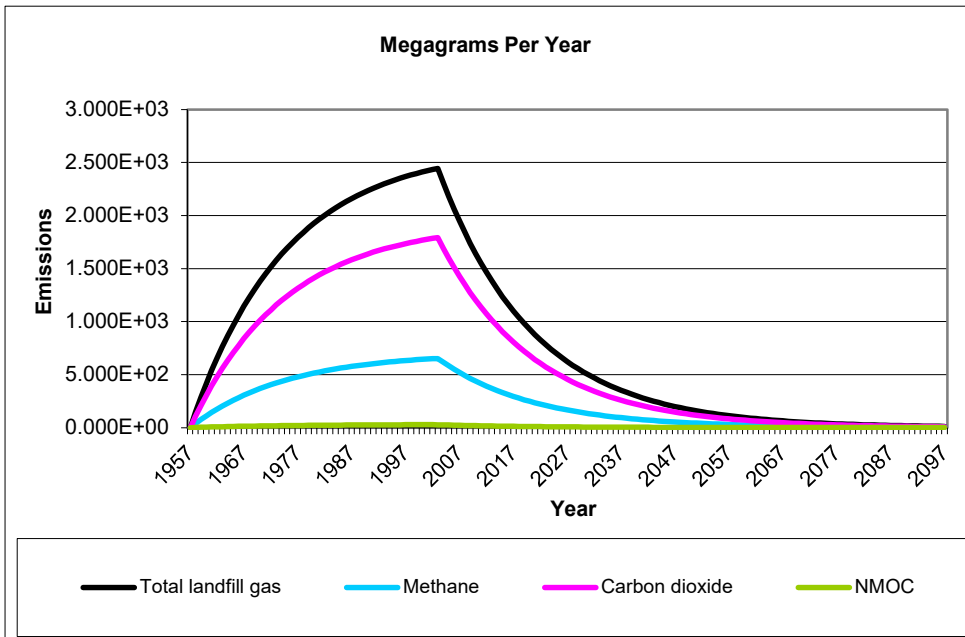


Figure 3-1 Simulation 1 Result

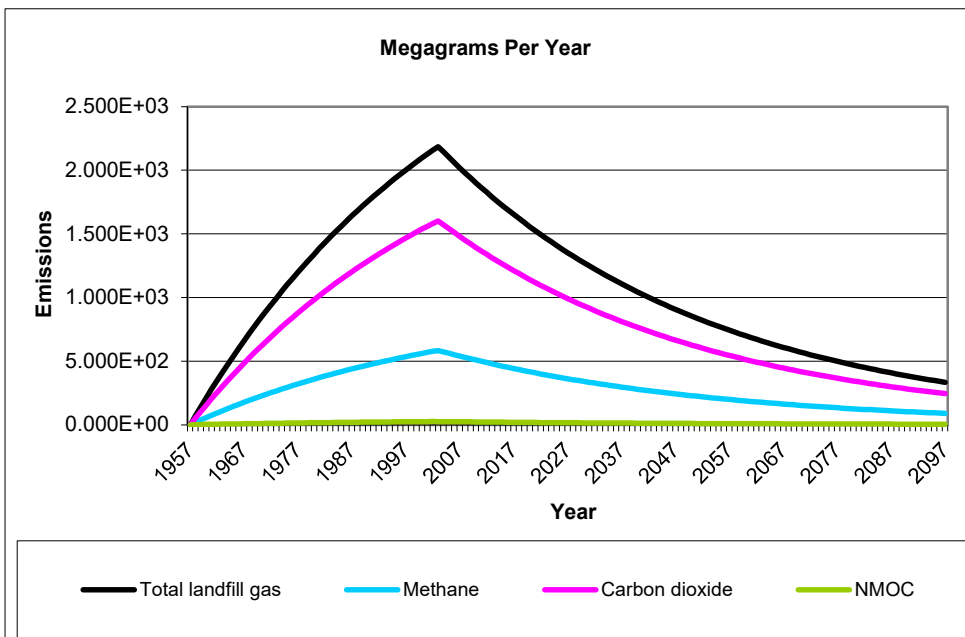


Figure 3-2 Simulation 2 Result

Based upon the modelling, the combined gas production across both simulations indicates that reducing volumes of gas are being produced and will continue to be produced at lower rates into the future. Table 3.4 below presents modelled gas concentrations for the former Welby Landfill for the next 10 years. However, it should be noted that gas production expected to continue beyond the modelled period, albeit at lower mass production (the model extends to 2100). As demonstrated in the above Figures, this extended gas production period is the result of the saturated zone waste mass.

Table 3.6 Combined Gas Volumes Between Simulations 1 and 2 (2022 to 2033) in Tonnes Per Year

Year	Total Landfill Gas	Methane	Carbon Dioxide
2022	2,323	621	1,703
2023	2,248	600	1,647
2024	2,176	581	1,594
2025	2,106	563	1,544
2026	2,040	545	1,495
2027	1,976	528	1,448
2028	1,914	511	1,403
2029	1,856	496	1,360
2030	1,799	481	1,319
2031	1,745	466	1,279
2032	1,693	452	1,240
2033	1,642	439	1,204

### 3.4.3 Interpretation of Ground Gas Risk

Based upon the available surface and subsurface monitoring dataset and subsequent semi-quantitative modelling, WSP consider that ground gas predominantly in the form of methane and carbon dioxide is still being produced within the landfill. However, flow rates within the leachate well and the modelling results indicate that production rates are greatly reduced from the peak production period and will continue to decrease further in the future.

Additionally, monitoring results from the surrounding well network indicate that gas is not migrating laterally in high volumes and is therefore likely to be diffusely venting to the atmosphere through the existing cap and batters. It is considered that large changes to the existing capping system (e.g. increasing thickness and compaction) may result in changes to migration regimes which may affect adjacent receptors in the short term.

In its current condition and under the current landuse scenario it is considered that landfill gases being produced from the waste mass do not present an elevated risk requiring specific management, however any changes to the capping or landuse will need to be assessed on a case-by-case basis.

## 3.5 Potential Receptors

### 3.5.1 Human Receptors

There are currently minimal potential human receptors on or immediately adjacent to the site. The surrounding bushland is used by hikers and mountain bikers but it is anticipated that groundwater, surface water and ground gas hazards identified on the site would present a minimal exposure risk to these human receptors.

The nearest human development to the east is 2.4km away and is unlikely to be affected by potential PFAS pollution from the former landfill. The nearest residential development is upgradient 330 metres to the south-west and is unlikely to be directly impacted by the former landfill. As such it is considered unlikely that existing nearby human developments would be directly affected by potential contamination hazards derived from the former landfill.

Runoff (and inferred groundwater) from the site flows into Gibbergunyah Creek which is a tributary of the upper reaches of the Nattai River. The Nattai River is part of the Hawkesbury-Nepean Catchment and thus a source of water for the

Sydney Region. As such, while forming only a small part of the water contributing to this supply, the landfill presents a potential source of water pollution and any contamination which enters on-site groundwater or surface water systems have the potential to enter the catchment (albeit at highly diluted concentrations).

Based on the information provided, it is understood that the end landuse of the former landfill extent will comprise recreational land which will be publicly accessible (refer to Section 3.6 and Appendix G). In its current form there are potential risks to users of the site being exposed to contaminants from leachate seeps, leachate impacts to surrounding dams and exposure to contaminants in existing organics waste stockpiles situated on the cap. Additionally, current instability of the cap in areas of higher gradient (e.g. the identified slumping in the north-east of the site) could result in site users becoming directly exposed to landfill waste.

Information to date indicates that landfill gas production on the landfill is minimal and is predominantly passively diffusing to the atmosphere through the cap. So long as no structures are constructed upon the cap there is considered to be minimal human health risk associated with gas generation within the landfill. WSP notes however, that the design of the proposed telecommunications tower will need to incorporate landfill gas risk to ensure that it does not result in accumulation within and beneath the tower infrastructure or changes to the existing migration regime. The design should also ensure that works do not interfere with water drainage off the site. If any future change in landuse is proposed which requires construction of on-site structures, a development-specific ground gas risk assessment would be required to assess risk.

### 3.5.2 *Ecological Receptors*

WSP undertook a review of online database sources to establish potential key ecological receptors in the area which may need to be accounted for specifically with regards to contamination derived from the former landfill. A search of the Bionet Atlas of NSW Wildlife (accessed 27 April 2022) identified a sighting of a Koala (*Phascolarctos cinereus*) to the east of Gibbergunyah Creek and a number of endangered species along Colo Street approximately 200 to 300 metres to the south-west (and upgradient) of the former landfill.

No sightings of vulnerable, endangered or critically endangered species or populations were identified between the former landfill and Gibbergunyah Creek. However, considering the prevalence of native vegetation in the immediate vicinity of the site this may just be an indication of the level of local investigation to date rather than actual presence of items of ecological significance.

In addition to the Bionet search WSP undertook a review of the Environmental Protection and Biodiversity Conservation Act Protected Matters Report for land within one kilometre of the former landfill. The report identified three threatened ecological communities and 36 threatened species potentially existing in the vicinity of the site. Based on information supplied by regulators, the three relevant threatened ecological communities tend to exist in residual or colluvial geomorphic units and as such are unlikely to be impacted by contaminated water or leachate running off the landfill through alluvial environments.

A total of the 36 listed threatened species potentially existing in the area have the potential to live in ecosystems which may be impacted by surface water and groundwater impacted by leachate emanating from the site. These species include but are not limited to the Giant Burrowing Frog, Stuttering Frog and Macquarie Perch. WSP note that the Report also indicates that Murray Cod is potentially within the vicinity of the former landfill but available information suggests that the site lies outside of natural distribution of this species.

The NSW Department of Primary Industries Key Fish Habitat Map for Wingecarribee shows that the stretch of Gibbergunyah Creek which flows past the site is listed as key fish habitat.

While there are no listed wetlands or national parks immediately surrounding or downgradient from the former landfill, the review indicates a number of potential ecological receptors which may be affected by hazards associated with historical landfilling (most notably pollution of Gibbergunyah Creek 180 metres to the east by contaminated leachate, surface water or groundwater).

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## 3.6 Proposed Future Landuse

Information relating to intended future landuse of the former Tempe Tip is presented in Appendix G of this report. Based upon this document, Council intends on classifying the site area as “Operational Land” while the closure works are taking place. Under the Local Government Act 1993, Operational Land would ordinarily comprise land held as a temporary asset or as an investment, land which facilitates the carrying out by a council of its functions or land which may not be open to the general public.

It is understood that this land classification is anticipated to only extend to completion of landfill closure works. Following completion of closure works it is Council’s intention to reclassify the land as “Community Land”. Based on discussion with Council it is understood that the site is to be publicly accessible and be used for recreational purposes. It is understood that those recreational purposes are not going to include construction of buildings or similar structures and that the site is to remain effectively open space.

WSP also understand that following completion of closure works the site may also have a telecommunications tower built on it. The location, design and extent of this development is currently unknown. However, it is required that the design and construction of this structure should adequately account for optimisation of the final landform and leachate/runoff management controls to ensure that it does not deleteriously affect the ongoing management of leachate and gas generation or the sustainability of the cap, batters and stormwater controls on the site.

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## 3.7 Spatial Limitations

The former landfill extent and associated roadways are bordered by dense bushland which are administered by Crown Lands. It is WSP’s understanding that any works associated with the closure of the former Welby Landfill do not result in the substantial clearance of the surrounding bushland. As such most of the controls and other infrastructure associated with the final closure works are required to be situated within the existing extent of disturbance associated with the former landfill.

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## 3.8 Key Closure Components

Key design features which will be applied to the landfill surface as part of these closure works are anticipated to comprise the following:

- Off-site disposal of the organics waste stockpiles and where appropriate, on-site emplacement or beneficial off-site reuse of the foundry sands stockpile.
- Recontouring of the cap area so the overall grade slopes towards the batters, allowing surface runoff to shed off the landfill surface and minimise leachate generation.
- Stabilisation of sections of the batter with higher grades to minimise the risk of slope failure and waste exposure into the future.
- Construction of stormwater drainage structures across the landfill extent designed to divert water away from infiltration into the cap and reduce the potential of erosion of caps and batters.
- Removal of deeper-rooted vegetation growing on the cap and batters of the landfill surface to reduce the risk of future degradation of the cap.
- Where they are damaged or destroyed by the closure works, replacement of the monitoring network required for the ongoing aftercare monitoring program.
- Implementation of an aftercare management and monitoring program.

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## 3.9 Justification Summary

Justification presented is based on the summary closure works components and the site characterisation summary presented in Section 3.

Justification of individual closure works is presented below:

- Off-site disposal of organics waste stockpiles and beneficial reuse of foundry sand material: The materials are understood to comprise putrescible material with asbestos and medical waste present. The site is currently not allowed to accept these materials under its Environmental Protection Licence. Based on correspondence with NSW EPA (refer to Appendix H), Wingecarribee Shire Council are required to dispose of the material to an appropriately licenced facility. Foundry sand material was found to be chemically suitable for emplacement on-site within an open landfill cell and can therefore be emplaced during the cap restoration works (as per NSW EPA email dated 10 January 2023).
- Recontouring of the cap area: Based upon the surface water, groundwater and leachate data reviewed, the final landform of the landfill should be constructed to facilitate the shedding of water off the ground surface into stormwater infrastructure and limit the potential for leachate generation within the waste mass. It is considered that the best method of achieving this will be to increase the grade of the cap area to reduce ponding. Currently landfill gas is still being produced within the waste mass. Available information indicates that this gas is not currently laterally migrating through the surrounding geology but is diffusely venting through the cap in low concentrations. In order to continue this passive venting and limit the potential for altered and unpredictable migration regimes it is considered that works should rather focus on regrading than decreasing the permeability of the cap itself. The water balance calculations have demonstrated that a change in cap contour will substantially reduce the generation of leachate within the waste mass over time.
- Stabilisation of higher-grade sections of the batter: There are a number of sections of the batter which are considered to currently be insufficiently protected from slumping or erosion (refer to Figure 3 of Appendix A for sections of batter with greater than 40% slope). In fact, during site inspections a section of steeper batter in the north-east was identified as failing, exposing underground landfill waste. The site is limited in its capacity to expand steeper graded sections of the batter into surrounding protected bushland and as such the capacity for regrading of these areas is highly limited. As such, it is considered that these sections of batter should be artificially stabilised (i.e. through retaining structures), rather than regraded.
- Construction of stormwater drainage structures: Existing stormwaters structures associated with the former landfill are currently limited to a toe drain around the landfill boundary and a number of stormwater ponds. In order to maximise the water shedding capability of the proposed final landform and therefore limit the potential for both erosion of the cap and batter and the potential for leachate generation, stormwater drainage infrastructure is proposed to be constructed at key points across the landfill batters and cap. The primary objective of these structures will be to maximise the potential for water shedding off the cap and batter and divert runoff away from the landfill waste mass.
- Deep-rooted vegetation removal: A number of deeper-rooted trees and shrubs have been allowed to grow on the landfill batter. These have the potential to degrade and damage the existing capping and batters over time. As such as part of the closure works these are recommended to be removed down to the ground surface and leaving the root balls in place to maintain batter stability.
- Aftercare management and monitoring: It is a NSW EPA requirement that an aftercare management and monitoring plan be implemented following completion of closure works. As such, this has been included in Section 5. The aftercare management and monitoring plan will be implemented until a Statement of Completion is approved by NSW EPA. Details of the Statement of Completion requirements is presented in Section 6 of this Closure Plan.



# 4 Key Closure Works

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## 4.1 Roles and Responsibilities

The following outlines the general responsibilities of individual parties within the context of this Landfill Closure Plan.

### Wingecarribee Shire Council

- Contract Administrator for the project.
- Engagement of the Principal Contractor, Validating Consultant and Ongoing Monitoring Consultant.
- Arrangement of site access and provision of services and space for plant and equipment storage and ancillary infrastructure.
- Facilitation of ongoing monitoring and maintenance program.

### Principal Contractor

- Liaison with Wingecarribee Shire Council.
- Ensuring environmental and worker health and safety monitoring and controls are maintained throughout the project (and following completion where required).
- Procuring of all necessary plant, materials and equipment for installation in accordance with this technical specification and detailed design.
- Oversight of full earthworks and installation program.
- Implementation of this Landfill Closure Plan.
- Oversight of safety and environmental protection during the project.
- Engagement of Specialist Contractors for specific items of the project.
- Detailed survey of the completed infrastructure.
- As built drawings including written justification for any departures from the approved design.

### Specialist Subcontractors

- Arrangement of necessary approvals for dewatering and discharge of groundwater.
- Implementation of specialist items within this Landfill Closure Plan.
- Compliance with the site management and health and safety requirements of the Principal Contractor.
- Collection of specialist validation data for submission into final compliance report.

### Validating Consultant

- Inspection of works at specific points within the works program.
- Undertaking periodic review of design and validation documentation on behalf of Wingecarribee Shire Council and provision of commentary as required.

### Validating Consultant (to be engaged by Wingecarribee Shire Council)

- Implementation of the post-closure ongoing monitoring program and preparation of annual reports.
- Assessment of compliance of monitoring results against the adopted criteria and provision of recommendations to Wingecarribee Shire Council around potential contingency measures to be implemented.

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## 4.2 Preliminaries

The following shall be undertaken by the Principal Contractor prior to commencement of works:

- A Dial Before You Dig search (Note: if services pass through the intended disturbance areas then amendment to this specification will be needed outlining requirements or otherwise services be isolated and relocated).
- Clearance of all excavation areas by a suitably qualified and experienced underground services locator (note that the design and technical specification may require amendment if services are identified and an offset is required. Distance of offsets will be based upon individual service providers requirements).
- Prepare all relevant plans for the works, including but not be limited to:
  - Site management plan.
  - Erosion and sediment control plan.
  - Waste management plan.
  - Dewatering plan (as required).
  - Construction health and safety plan including landfill gas monitoring plan.
  - Health and safety and occupational hygiene management plans.
  - Construction Environmental management plan including soil management provisions.

The Principal Contractor may also be required to identify and obtain approvals from the relevant authority for specific aspects of the works. These will include as a minimum:

- NSW Office of Water approval/licence to dewater groundwater.
- Council water discharge permit if discharging to stormwater.

WSP note that investigations carried out to date as well as existing groundwater records indicate no shallow inflow across the intended disturbance extent. As such dewatering due to inflow of groundwater during construction is not considered to be required. Dewatering of open trenches and excavations due to surface runoff from rainfall events entering the works area may be periodically required. This is to be managed by pump out of water as needed and containment in an on-site tank or dam prior to either discharge as stormwater (based on Council testing and discharge requirements), or off-site disposal to a licenced liquid waste disposal facility.

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## 4.3 Worker Health and Safety Management and Occupational Hygiene Risk

The Principal Contractor will be responsible for the implementation of worker health and safety (WHS) protocols on the site during installation works. This may include (but not be limited to) the preparation and implementation of worker health and safety management plans, safe work method statements, inductions and regular, proactive WHS risk monitoring and mitigation. The Principal Contractor will also prepare a Construction Environmental Management Plan (CEMP) for the works prior to commencement.

In addition to standard risks associated with excavation and construction projects, this project involves excavation into soil proximal to discharging contaminated leachate and subsequent potential gas risks. Therefore, there is a potential exposure risk for workers. WHS and occupational hygiene protocols during excavation and other earthworks and construction should therefore be designed specifically for the risks associated with the site. These should include (but not be limited to) the following:

- Excavation stability.

- Explosive and hazardous atmospheres.
- Confined spaces.
- Exposure to waste and potentially contaminated soils.
- Exposure to potentially contaminated groundwater and leachate.

All WHS plans and procedures being implemented on the site should be in compliance with all relevant New South Wales and Commonwealth WHS legislation.

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## 4.4 Community Consultation

Prior to commencing the closure works presented in this document (excluding the post closure monitoring and maintenance component presented in Section 5), Wingecarribee Shire Council will develop a community consultation plan which will be implemented during the works. The community consultation plan will be prepared in accordance and with reference to the following:

- Wingecarribee Shire Council (adopted 10 April 2019), *Community Engagement Policy*.
- Wingecarribee Shire Council (July 2020), *Community Engagement Strategy (Incorporating Community Participation Plan)*.
- Wingecarribee Shire Council (2014), *Communications Strategy*.

Once finalised, the community consultation plan will be implemented for the duration of the closure works presented in this plan.

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## 4.5 Existing Surface Features

There are three existing surface features on the former Welby Landfill extent which require specific management as part of the closure works. These include:

- Residual infrastructure from the former waste oil management area in the north of the cap.
- A stockpile of foundry sand with an approximate volume of 3,031 m<sup>3</sup>.
- Multiple stockpiles of organic waste totalling an approximate volume of 8,911 m<sup>3</sup>.

Each of these items are discussed in the following sections.

### 4.5.1 Residual Infrastructure

Based on a recent site inspection, the residual infrastructure associated with the waste oil disposal area comprise concrete structures situated in the north of the landfill. As part of the closure works, these structures are to be removed and where depressions or irregularities in the cap level occur, these are to be levelled out to meet the design requirements of the greater closure works. The concrete materials are to be disposed off-site.

The materials can be disposed off-site to a waste facility able to accept construction and demolition waste (assuming no asbestos containing materials are present on the materials). Otherwise, prior to disposal the material can be processed and validated against the NSW EPA (2014), *The Recovered Aggregate Order 2014*. If the materials are identified as compliant with the Order they may be beneficially reused as per the requirements of the order. Once processed, concrete materials may also be beneficially reused on-site if deemed chemically and geotechnically suitable (e.g. as a recovered aggregate on a roadway or around a works depot or pad).

#### 4.5.2 Foundry Sand Stockpile

In 2019 WSP undertook sampling of the foundry sand stockpile in order to characterise for either beneficial reuse on-site or off-site disposal. In total, 20 samples were collected for analysis from across the stockpile. For more detail relating to material composition, refer to the waste characterisation report presented in Appendix H. Based upon the results the material was considered suitable to be beneficially reused on-site if the material was used in such a way that it is not directly in connectivity with ecological receptors (e.g. emplaced at depth and overlain by topsoil and plants whose root zones can't reach the foundry sand materials).

Based on the field observations and the analytical data collected, if the materials are to be disposed off-site it is suitable to be disposed of as General Solid Waste (non-putrescible).

WSP also concluded that if Council intend on disposing the material off-site there is potential that the material may be beneficially reused off-site under the *Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 – The Processed Foundry Sand Order 2014*. However, this would require further testing in accordance with the Order and there is possibility that it won't meet the suitability criteria based upon chromium results collected during this investigation.

Based upon the available information and as discussed with NSW EPA (as per email dated 10 January 2023), the material situated within the foundry sand stockpile may be disposed on-site within an open cell during cap restoration works. If the material is managed on-site in this manner, no further characterisation of the materials under *The Processed Foundry Sand Order 2014* would be required. It is noted that material within the foundry sand stockpile would need to be emplaced under permanent capping as part of the overall cap restoration works.

#### 4.5.3 Organics Waste Stockpiles

WSP undertook stockpile waste characterisation works in 2019. The report detailing the characterisation works findings is presented in Appendix H of this letter. As part of these characterisation works, multiple stockpiles of organic waste including three large stockpiles and multiple smaller stockpiles were sampled. WSP collected a total of 44 primary samples for laboratory analysis from the organic waste stockpiles along with relevant quality assurance samples. Key observations from the organic waste stockpiles sampling included the following:

- Material comprised predominantly fibrous, dried organic matter with occasional faint organic odour. Surface and near surface materials within stockpiles were generally slightly moist to dry during sampling but moisture content increased with depth;
- Deeper materials were found to be considerably warmer than shallow materials indicating biological decomposition of the material;
- Field pH screening undertaken across all 44 samples demonstrated a range of between 5.5 and 7.5 pH units with an average of 6 pH units;
- A number of inclusions were identified in the organic waste materials including plastics, paper, gravel, rubber/plastic tubing, glass and other debris;
- A fragment of fibre cement sheeting was identified in one stockpile sample; and
- Potential medical waste including possible syringes were identified at a number of locations and depths within the organic waste stockpiles. The photographs below show these materials.

The organic waste material was compared to the CT1 criteria presented in the *Waste Classification Guidelines*. All results met the adopted criteria for CT1 General Solid Waste with the exception of the following:

- One CT1 exceedance for benzo(a)pyrene.
- Ten CT1 exceedances for chromium.
- Five CT1 exceedances for lead.

- Six CT1 exceedances for nickel.
- One detectable asbestos concentration.

Further leachability (TCLP) testing of selected samples identified that the chemical results met the SCC1 and TCLP1 criteria. This meant that the material was able to be classified as Special Waste (asbestos and clinical and related waste) in a matrix of General Solid Waste.

WSP collected a further three samples from the organic waste stockpiles in March 2022 for analysis of PFAS and PFAS leachability (ASLP and TCLP). The laboratory certificates for these samples are presented in Attachment B of this report. Some detectable concentrations of total and leachable PFAS compounds were identified, however all total and TCLP concentrations were below the waste classification criteria. As a result the PFAS concentrations do not change the existing off-site disposal classification identified during the 2019 characterisation works.

As discussed in Sections 3.8 and 3.9 and presented in the NSW EPA letter in Appendix H, the material comprising the organics waste stockpile is required to be disposed off-site to an appropriately licenced facility as part of the final closure works.

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## 4.6 Capping and Batters

### 4.6.1 Cap Regrading Works

The approximate area of proposed cap regrading works is presented in Figure 4 of Appendix A1. For the purposes of this closure plan the cap regrading areas can be split into three separate sections:

- Cap 1: The main landfill cap area situated across Lot 147, C 3434-2041 and Lot 102, C 3747-2041.
- Cap 2: The smaller cap area situated to the north-west of the main landfill cap situated on Lot 156, C 3860-2041.

Both capped areas are to be regraded to ensure that a minimum 5 percent slope is present which direct surface runoff away from the capped area and towards the batters and stormwater systems. Two cross-sections are presented in Figure 5 of Appendix A1 to demonstrate the intended change in landform across the two capped areas. Both capped areas are proposed to be constructed into a ridge which will run in a roughly north-east to south-west orientation in the centre of each caps and then radiate out to the edge of the capped extent so that a minimum 5 percent grade is achieved in all directions from the central ridge in both caps.

Material comprising the regrading material will be sourced from off-site Virgin Excavated Natural Material, Excavated Natural Material or commercially quarried product. The method for validation of chemical suitability of off-site sourced materials is presented in Section 4.12. All imported materials are to be of suitable quality and consistency to facilitate compaction sufficient to achieve a hydraulic conductivity no more than  $1 \times 10^{-7}$  m/s. Materials are to be compacted to achieve an indicative placement density is 90% of maximum dry density.

Part of the additional regrading materials will form a revegetation layer of a minimum thickness of 100mm. In order to ensure that the material is suitable as a growing medium a landscape architect or other individual with sufficient expertise should be consulted before selecting the media. Details on revegetation are presented in Section 4.9.

### 4.6.2 Batter Improvements

Figure 3 of Appendix A1 presents the approximate location of sections of the landfill batter with slopes of greater than 40 percent. As identified by the slope failure in the north-east of the landfill batter (discussed in Section 3.2), these sections of the batter will require targeted protection to provide acceptable levels of long term stability and protection from erosion.

For this purpose the preferred approach will be to construct retaining structures along the affected areas. A number of technologies and materials are available to achieve the desired outcome and it is understood that Wingecarribee Shire Council wish to research ideal source materials prior to arriving at the preferred approach to slope protection. As such

this section does not present a prescriptive approach to managing stability issues on high slope sections of the batter. However, it is considered that possible solutions may include (but not be limited to) gravity, cantilever, big block, channel block or gabion walls with a range of potential construction materials.

Any structures will be required to be properly designed prior to implementation and appropriately keyed to the slope (e.g. through buttressing) so that they remain stable over time. Construction materials should also be generally non-reactive so that they are resistant to chemical weathering (e.g. through contact with landfill leachate).

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## 4.7 Proposed Stormwater Management

Design of stormwater management infrastructure is to be undertaken in accordance with the following guidance documents:

- Landcom (2004), *Managing Urban Stormwater – Soils and Construction (Volume 1)*.
- NSW Department of Environment and Climate Change (2008), *Managing Urban Stormwater – Soils and Construction (Volume 2B Waste Landfills)*.

The proposed approach to management of stormwater and runoff generated from the landfill surface comprises the following:

- An inspection of existing stormwater features (most notably the existing dams and the perimeter drain) and survey of the location of the perimeter drain. Based upon information provided to date and presented in Figure 6 of Appendix A1 (derived from Golder 2013), the perimeter drain extends approximately across the northern, western and southern boundaries of the former landfill but is not present in the east. If this is correct, it is recommended that further sections of the perimeter drain be installed at the toe of the south-east batter for drainage into DAM 5 and the currently decommissioned DAM 4 be repaired and perimeter drains be constructed flowing into this location along the eastern landfill boundary. An approximate location of this proposed additional drain installation is presented in Figure 6 of Appendix A1.
- Where the dams and perimeter drain are found to be damaged, clogged with vegetation, sediment and/or refuse, or are not keyed into the proposed additional stormwater management system, undertake relevant repairs, gross pollutant removal and upgrades to allow the existing system to be keyed into the proposed additions.
- Construction of a series of concentrated flow drains extending from the edge of the cap to the toe of the batter and flowing directly into the perimeter drain network or directly into the dams (refer to Figure 6 for proposed approximate layout based on existing batter topography, orientation of existing perimeter drains and operational dams). Key features of the drains will comprise the following:
  - The drains are to be trapezoidal in nature and be a minimum of one metre width at the base with a wall slope of 1:1.
  - To minimise risk of erosion of the walls and base concentrated flow drains are to be lined with a low permeability material which will be keyed into the walls of the drain or on the edges of rock check dams. These materials may comprise a geotextile, geosynthetic clay liner concrete or other such materials capable of providing a long-term protective barrier for the drains. Any such materials are to be installed to manufacturer specifications.
  - In order to reduce flow velocity, at regular intervals along the concentrated flow drains, construct rock check dams or similar. Rock check dams can be constructed from commercially quarried product or appropriately validated recovered aggregate. Rock check dams should be keyed 200 mm into the underlying batter materials and should not exceed the height of the drain. Where applicable, the rock check dams should be spaced so the toe of the upstream dam is level with the spillway of the next downstream dam.

- Where the concentrated flow drains terminate in a stormwater dam or other unlined stormwater feature outlet protection will be required through construction of an energy dissipator which may be constructed from riprap, grouted riprap, concrete, gabions or validated recycled aggregate.

WSP notes that following the initial inspection, this stormwater plan may require amendment. Following the inspection a detailed design and technical specification should be prepared for the stormwater and runoff control infrastructure for the site.

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## 4.8 Deep-Rooted Vegetation Management

All identified trees, shrubs and other deep-rooted vegetation found growing on the caps or batters of the former landfill are to be removed down to the ground surface as part of the closure works. Where possible, the root ball is to be retained in-situ to maintain stability of the cap or batter material. Where the removal works result in damage to the existing cap or batter (e.g. through tracking of vehicles or removal works leaving a void), the affected sections of the cap or batter are to be repaired by laying of a compacted layer of imported ENM, VENM or commercially quarried product which is to be validated prior to emplacement (refer to Section 4.12 for procedure). As a minimum, material compaction should be sufficient to ensure a hydraulic conductivity of no more than  $1 \times 10^{-7}$  m/s.

Prior to any deep-rooted vegetation removal, the Principal Contractor will be required to gain any approvals (e.g. Council exemption for tree removal) required for removal.

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## 4.9 Finished Surface Revegetation

Revegetation of the capped landfill will be required to assist in achieving the objectives of this Closure Plan and NSW EPA (2016), *Environmental Guidelines: Solid Waste Landfills* and to stabilise the cap and batters of the former landfill. Prior to commencement of closure works landscape architect or other suitably experienced personnel will prepare a Revegetation Plan. The objectives of the plan will be to:

- Provide a plant selection which allows for rapid establishment and long term coverage with minimal upkeep.
- Improve stability of the capping system by supporting topsoils and reducing erosion.
- Reduce the quantity of surface water requiring management at the site through absorption and subsequent evapotranspiration by vegetation.
- Improve the visual amenity of the rehabilitated landfill.
- Minimise the potential for establishment of deeper rooted vegetation which may damage the finished ground surface, cap and batters over time.

The Revegetation Plan will be required to ensure that capping system is revegetated as soon as possible after its construction, preferably within 6 months of capping, however this timing will be dependent on seasonality.

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## 4.10 Material Tracking

All excavated soil to be imported, re-positioned on-site or disposed of off-site should be tracked in order to provide detail and accurate information about the location and quantity of all materials both on- and off-site from the time of their excavation until their relocation or disposal or conversely, importation to site and emplacement. Off-site disposal facility locations will be determined by the Principal Contractor, should excess material requiring disposal be generated. Movement of material will be recorded by the Principal Contractor through a suitable tracking system.

For any vehicle moving contaminated material on- or off-site, the following information will be recorded:

- Origin of material.



- Material type.
- Approximate volume.
- Final destination.
- Vehicle registration number (for off-site disposal only).

This information, along with landfill docket numbers for any materials disposed of to an off-site facility, will be provided by the Principal Contractor for inclusion in the construction quality assurance documentation.

## 4.11 Waste Disposal

Anticipated excavation waste sources will include excavation for attainment of finished pre-construction levels, piling works and the installation of underground services.

All excavated materials which are unable to be retained beneath capping and are surplus to available on-site fill volume must be disposed off-site to an appropriately licensed facility. Prior to disposal, all materials are to be classified against the criteria presented in the table below and are to be accompanied by waste classification documentation which is compliant with the requirements of NSW EPA (2014), *Waste Classification Guidelines* and Table 2(d) of NSW EPA (2020), *Consultants Reporting on Contaminated Land*.

Table 4.1 Waste Classification Criteria – Off-site Disposal

Chemical	General Solid Waste			Restricted Solid Waste		
	CT1 (mg/kg)	SCC1 (mg/kg)	TCLP1 (mg/L)	CT2 (mg/kg)	SCC2 (mg/kg)	TCLP2 (mg/L)
Arsenic	100	500	5.0	400	2,000	20
Benzene	10	18	0.5	40	72	2
Benzo(a)pyrene	0.8	10	0.04	3.2	23	0.16
Cadmium	20	100	1.0	80	400	4
Chromium VI	100	1,900	5	400	7,600	20
Endosulfan	60	108	3	240	432	12
Ethylbenzene	600	1,080	30	2,400	4,320	120
Lead	100	1,500	5	400	6,000	20
Mercury	4	50	0.2	16	200	0.8
Moderately Harmful Pesticides	250	250	N/A	1,000	1,000	N/A
Nickel	40	1,050	2	160	4,200	8
C <sub>6</sub> -C <sub>9</sub> TPH	650	650	N/A	2,600	2,600	N/A
C <sub>10</sub> -C <sub>36</sub> TPH	10,000	10,000	N/A	40,000	40,000	N/A
Cyanide (amenable)	70	300	3.5	280	1,200	14
Cyanide (total)	320	5,900	16	1,280	23,600	64
Polychlorinated biphenyls	<50	<50	N/A	<50	<50	N/A
Polycyclic aromatic hydrocarbons	200	200	N/A	800	800	N/A

Chemical	General Solid Waste			Restricted Solid Waste		
	CT1 (mg/kg)	SCC1 (mg/kg)	TCLP1 (mg/L)	CT2 (mg/kg)	SCC2 (mg/kg)	TCLP2 (mg/L)
Scheduled chemicals	<50	<50	N/A	<50	<50	N/A
Toluene	288	518	14.4	1,152	2,073	57.6
Xylenes	1,000	1,800	50	4,000	7,200	200

**Note:** Where only total concentrations are available, the CT1 and CT2 criteria are to be applied. Where both total concentrations and TCLP results are available the SCC1/TCLP1 and SCC2/TCLP2 criteria can be applied.

As prescribed in the Waste Classification Guidelines and ASC NEPM (2013), statistical analysis of relevant datasets are able to be undertaken. Where required, the analysis will include the calculation of 95% upper confidence limits (UCLs) for all contaminants (when a sufficient number of samples are detected above the LOR). During statistical analysis, individual contaminant concentrations exceeding assessment criteria will be assessed against the spread and magnitude of the data. Specifically, any individual contaminant concentration must be less than 250% of the assessment criterion.

As per *Waste Classification Guidelines – Part 1: Classifying Waste*, any wastes identified as containing asbestos, clinical and related waste and/or waste tyres are to be classified as Special Waste on top of the chemical classification.

Wastes shall be categorised as Putrescible or Non-putrescible based upon comparison to the definition presented in Step 6 of *Waste Classification Guidelines – Part 1: Classifying Waste*.

Any material requiring off-site disposal will be appropriately chemically classified under NSW EPA (2014) *Waste Classification Guidelines* and transported to a facility licenced to receive the specific waste. The sampling density for material to be disposed off-site will comprise (as a minimum) one sample per 25 m<sup>3</sup> for less than or equal to 200 m<sup>3</sup> of material. If larger volumes are to be generated for a single batch then a minimum of ten samples are to be collected for up to 2,000 m<sup>3</sup> to facilitate statistical analysis along with relevant QA/QC samples as defined by the appointed Validation Consultant. As a minimum, samples are to be analysed for the following contaminants:

- Heavy metals (As, Cd, Cr Cu, Pb, Hg, Ni, Zn) – all samples.
- Total recoverable hydrocarbon (TRH) – all samples.
- Benzene, toluene, ethylbenzene and xylenes (BTEX) – all samples.
- Polycyclic aromatic hydrocarbons (PAH) – all samples.
- Cyanide (total and amenable) – all samples.
- Organochlorine pesticides (OCP) – all samples.
- Polychlorinated biphenyls (PCB) – all samples.
- Asbestos (presence/absence) – all samples.
- Leachability (TCLP) – selected samples as required.

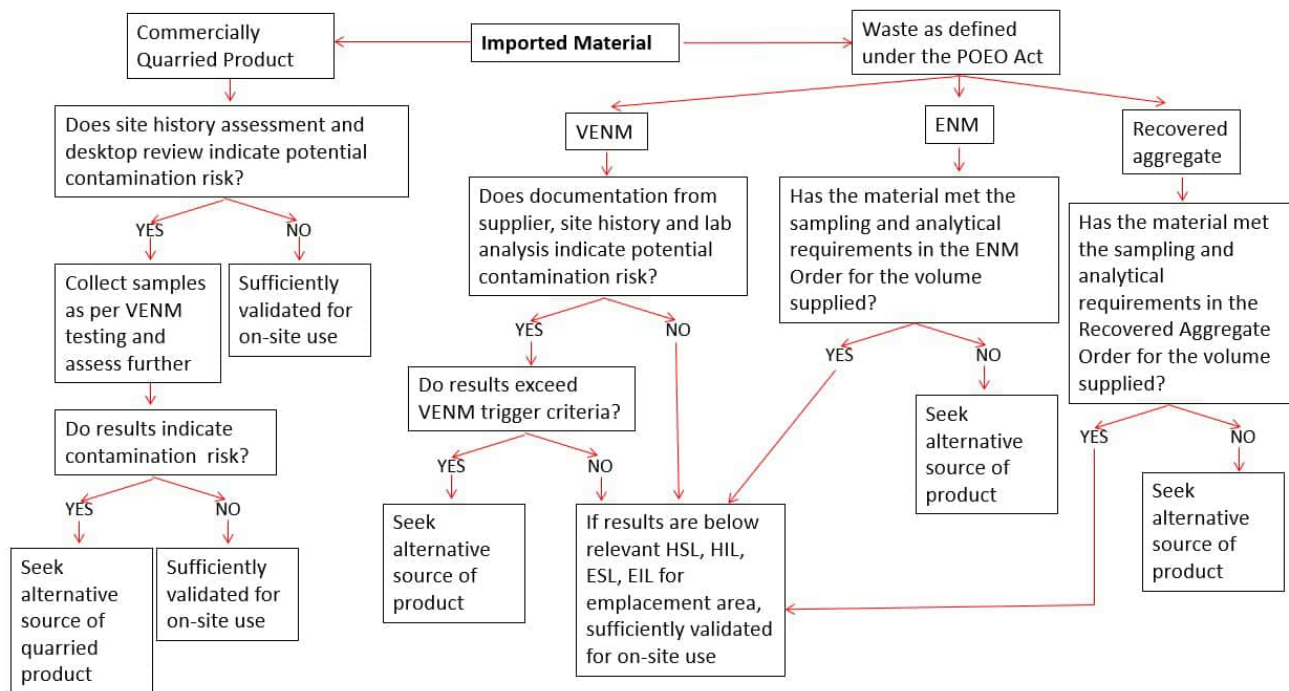
Waste classification information as well as disposal documentation with material tonnage and receipt dockets from the accepting waste facility will be provided to the environmental consultant.

## 4.12 Material Importation

The following materials may be imported to the site during the course of the remediation works:

- Commercially quarried product: Commercial product not defined as a waste under the *Protection of the Environment Operations Act 1997*.
- Excavated natural material (ENM): Classified under the NSW EPA (2014), *The Excavated Natural Material Order*.
- Virgin Excavated Natural Material (VENM): Defined in the *Protection of the Environment Operations Act 1997*.
- Recovered aggregate: Defined in NSW EPA (2014), *The Recovered Aggregate Order*.

The decision tree below presents how imported material is to be assessed for site suitability across the remediation site.



**Figure 4-1 Imported Material Validation Decision Tree**

The following sections discuss the detailed sampling and validation requirements which need to be implemented during the remedial works for imported materials.

### 4.12.1.1 On-site Inspection and Management of Imported Materials

All materials which are imported to site are to be inspected and managed as per the following process:

- 1 All loads of material being imported to site will be visually verified by trained on-site personnel to confirm:
  - The material imported to site is visually the same as the material presented in the relevant importation documentation.
  - The material imported to site is free of visual evidence of contamination.
- 2 Verification inspections will be documented on a register and include photographic records of the imported loads. These inspections will be carried out (as a minimum) for the initial load, monthly thereafter (for project duration or to volume limit of supplied material) and for the first load following a hiatus of import of greater than 6 weeks. The records of the verification inspections are to be retained and provided to the validation consultant for incorporation into the final validation report.

Note where material does not meet the requirements of point 1, this will trigger the need to either remove the material from site or further clarification from the supplier as to the source prior to making a decision on use versus removal. There may be need for further chemical characterisation if material which fails point 1 is deemed to be retained on-site. This process should be undertaken by or as agreed with the validation consultant.

#### 4.12.2 *Commercially Quarried Product*

Because commercially quarried product constitutes a commercial product and does not meet the definition of a “waste” in the *Protection of the Environment Operations Act 1997*, the standard waste characterisation process that is applied to wastes does not apply. The validation requirements for commercially quarried product are as follows:

- Assessment of details of the source site including material specifications, source-site history and any available chemical assessment.
- If the initial assessment indicates a potential for historic contamination, undertake sampling and analysis as per the requirements for Virgin Excavated Natural Material. Otherwise, no specific contamination testing would be required.

The validation consultant will require the details of the source-site assessment, any chemical analysis and results comparison and the verification inspection records to assess suitability of material.

#### 4.12.3 *Virgin Excavated Natural Material and Topsoil*

##### 4.12.3.1 *Virgin Excavated Natural Material*

NSW EPA (2014), *Waste Classification Guidelines – Part 1: Classifying Waste* defines VENM as natural material (such as clay, gravel, sand, soil or rock fines):

- That has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial, mining or agricultural activities.
- That does not include sulfidic ores or soils, or any other waste.

Virgin Excavated Natural Material sourced from off-site will be characterised for site suitability by applying the following validation procedure:

- Assessment of details of the source site including material specifications, source-site history and any available chemical assessment.
- Collection of confirmatory samples along with relevant QA/QC samples from each source site for analysis of the following parameters:
  - Heavy metals (As, Cd, Cr Cu, Pb, Hg, Ni, Zn).
  - TRH.
  - BTEX.
  - PAH.
  - OCP.
  - PCB.
  - Asbestos (presence/absence).
- The sampling density for imported VENM will comprise (as a minimum) one sample per 200 m<sup>3</sup> for stockpiles of less than or equal to 1,000 m<sup>3</sup> of material being beneficially reused and one sample per additional 1,000 m<sup>3</sup> thereafter along with relevant QA/QC samples.
- Preparation of a letter report detailing:

- Aspects of the source site including history and existing landuse.
- Product details and intended usage.
- Tabulated analytical results compared against relevant criteria.
- Conclusion of suitability of material imported from source-site.

All analytical results are to be compared to the criteria presented in Table 4.2. Any failures of the adopted criteria would result in the rejection of the material for use as VENM (however, depending on results and subsequent resampling, may potentially be considered suitable as ENM – refer to Section 4.12.4 of this Landfill Closure Plan).

The validation consultant will require the details of the source-site assessment, any chemical analysis and results comparison and the verification inspection records to assess suitability of material.

Table 4.2 Imported VENM Characterisation Criteria

Chemical	Trigger Value (mg/kg)	Source/Justification
Arsenic	20	Maximum Average Concentration – Table 4: NSW EPA (2014), <i>The Excavated Natural Material Order 2014</i>
Copper	60	NEPM Schedule B1 Minimum ACL for Urban Residential/Public Open Space Landuse
Chromium (Total)	75	Maximum Average Concentration – Table 4: NSW EPA (2014), <i>The Excavated Natural Material Order 2014</i>
Lead	50	Maximum Average Concentration – Table 4: NSW EPA (2014), <i>The Excavated Natural Material Order 2014</i>
Nickel	30	NEPM Schedule B1 Minimum ACL for Urban Residential/Public Open Space Landuse
Zinc	70	NEPM Schedule B1 Minimum ACL for Urban Residential/Public Open Space Landuse
Mercury	0.5	Maximum Average Concentration – Table 4: NSW EPA (2014), <i>The Excavated Natural Material Order 2014</i>
Total Recoverable Hydrocarbons	<LOR	VENM definition NSW EPA (2014) Waste Classification Guidelines
Polycyclic Aromatic Hydrocarbons	<LOR	VENM definition NSW EPA (2014) Waste Classification Guidelines
Organochlorine Pesticides	<LOR	VENM definition NSW EPA (2014) Waste Classification Guidelines
Polychlorinated Biphenyls	<LOR	VENM definition NSW EPA (2014) Waste Classification Guidelines
Asbestos	Non detect	Special Waste Criteria NSW EPA (2014) Waste Classification Guidelines

Note that where results are below the <LOR criteria, the LOR should be confirmed as being below the relevant HIL or HSL for that specific contaminant (where applicable).

#### 4.12.3.2 Topsoil

Topsoil will comprise a commercial product sourced from a reputable landscape materials supplier. Topsoil materials will be assessed for suitability using the following validation procedure:

- Assessment of details of the source site including material specifications, source-site history and any available chemical assessment.
- Collection of confirmatory samples along with relevant QA/QC samples from each source site for analysis of the following parameters:
  - Heavy metals (As, Cd, Cr Cu, Pb, Hg, Ni, Zn).
  - TRH.
  - BTEX.
  - PAH.
  - OCP.
  - PCB.
  - Asbestos (presence/absence).
- Because the topsoil will be a commercial product and the result of a continuous process, only a limited sampling density will be required. A total of primary three samples per source location are to be collected to validate the material along with relevant QA/QC samples as specified by the Validation Consultant. The results will be compared to the Imported VENM criteria presented in Table 4.2.
- Preparation of a letter report detailing:
  - Aspects of the source site including history and existing landuse.
  - Product details and intended usage.
  - Tabulated analytical results compared against relevant criteria.
  - Conclusion of suitability of material imported from source-site.

The validation consultant will require the details of the source-site assessment, any chemical analysis and results comparison and the verification inspection records to assess suitability of material.

#### 4.12.4 *Resource Recovery Order Exempted Soil and Recovered Aggregate Materials*

All material imported to the site under a resource recovery exemption and order must have undergone the required sampling and testing regime required to be able to be beneficially reused under that exemption and must be applied for the specific purpose outlined in the relevant order. All results must be demonstrated to meet the acceptance criteria for the specific order prior to the material being imported to site.

All materials imported under a general or specific exemption are required to be used for the purposes specifically prescribed in the exemption.

Any materials found to be non-compliant with the relevant exemption and order or with identified asbestos are to be rejected from importation.

The validation consultant will require the details of the source-site, chemical and material composition analysis and results comparison and the verification inspection records to assess suitability of material.

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## 4.13 Draft Construction Quality Assurance Plan

Table 4.3 below presents a draft list of items during the closure works which will require inspection and review prior to works proceeding. The intent of these hold points is to ensure that adequate information is collected in order to assess the compliance of the construction with this technical specification.

The Principal Contractor will be able to fully demobilise from site following the final inspection by the Validating Consultant. All information is to be supplied to the Validating Consultant who will collate the data and prepare the final validation/construction compliance report.

The Principal Contractor shall be responsible for all quality assurance and quality control of construction materials brought to site for the construction of the leachate collection system.

Table 4.3 Draft Construction Validation and Hold Points

Project Hold Point	Timing	Responsibility and Activities	Responsibility for Validation and Sign-off of Hold Point
<p>Review of all material specifications including manufacturer materials testing (where applicable) prior to importation to site. Specific items include:</p> <ul style="list-style-type: none"> <li>— Non-woven needle-punched geotextile</li> <li>— Subsurface drainage product</li> <li>— Cap regrading materials</li> <li>— Batter support materials and equipment</li> <li>— Haul road and surface finishing materials</li> </ul>	7 days prior to commencement of site works	To be received from manufacturers/suppliers by the Principal Contractor to provide Contract Administrator for review and comment. Note where materials vary from the parameters listed in this technical specification, sufficient technical justification must be provided by the Principal Contractor and agreed with the Contract Administrator	Contract Administrator (Wingecarribee Shire Council)
Environmental Management and Worker Health and Safety Documentation	7 days prior to commencement of site works	Principal Contractor to provide Contract Administrator for review and comment	Contract Administrator (Wingecarribee Shire Council)
Design of Stormwater Drains and Batter Support Infrastructure	7 days prior to commencement of site works	Material and equipment supplier to provide design drawings to the Principal Contractor for review and comment (note, must be compliant with this document or sufficient technical justification provided and agreed with Contract Administrator)	Contract Administrator (Wingecarribee Shire Council)
Preparation of Revegetation Plan	7 days prior to commencement of site works	Landscape architect or relevant experienced and qualified person to provide the Revegetation Plan to the Principal Contractor for review and comment (note, must be compliant with this document or sufficient technical justification provided and agreed with Contract Administrator)	Contract Administrator (Wingecarribee Shire Council)



<b>Project Hold Point</b>	<b>Timing</b>	<b>Responsibility and Activities</b>	<b>Responsibility for Validation and Sign-off of Hold Point</b>
Construction Materials Compliance	7 days prior to commencement of site works	Principal Contractor to ensure compliance with WHSE regulations and incorporate into their QHSE Plan	Principal Contractor has responsibility but will supply relevant documentation to the Contract Administrator
Compaction of Regraded Capping Area	Data to be supplied 14 days after completion of cap regrading works	Principal Contractor – Engage an engineer to undertake geotechnical testing of final cap regrading demonstrating compaction and hydraulic conductivity requirements have been achieved  Validating Consultant – Inspection of installation as required	Validating Consultant – Review of information provided by Principal Contractor and inspection of final surface
Required Slope of the Regraded Capping Area Achieved	Survey data to be supplied 14 days after completion of cap regrading works	Principal Contractor – Engage a registered surveyor to undertake a survey of the finished surface and demonstrate slope requirements have been achieved  Validating Consultant – Inspection of installation as required	Validating Consultant – Review of information provided by Principal Contractor and inspection of final surface
Installation of Site Won Capping Material	Hold point during Validating Consultant review of validation documentation following construction	Principal Contractor – Information of material to be used from stockpiles and borrow excavations including material physical composition, photographs and chemical data from previous contamination testing. Supply of photographic evidence of spreading.	Validating Consultant – sign-off following review of product information, photographic evidence and site inspection if deemed necessary

<b>Project Hold Point</b>	<b>Timing</b>	<b>Responsibility and Activities</b>	<b>Responsibility for Validation and Sign-off of Hold Point</b>
Installation of Off-site Sourced Capping Material	Hold point during Validating Consultant review of validation documentation following construction	Principal Contractor – Material geotechnical properties, VENM, ENM or commercially quarried product classification, importation dockets and then photographic evidence of installation, evidence of achieving required compaction and survey of final construction surface and slope from crown	Validating Consultant – sign-off following review of supplied information
Construction of Surface Finishing / Revegetation Layer	Importation documentation to be supplied prior to import of materials. Installation information supplied following completion of installation works. Hold point during Validating Consultant review of validation documentation following construction	Principal Contractor – Material geotechnical properties, VENM, ENM or commercially quarried product classification, importation dockets and then photographic evidence of installation, evidence of achieving required compaction and survey of final construction surface and slope from crown	Validating Consultant – sign-off following review of supplied information
Final Inspection	Upon final surfacing of the regrading area, stormwater infrastructure and batter protection infrastructure	Principal Contractor – Survey of finished levels  Validating Consultant – Inspection of finished regrading area, stormwater infrastructure and batter protection infrastructure	Validating Consultant – Inspection of final regrading area, stormwater infrastructure and batter protection infrastructure.
Works as Executed Drawings (Batter Protection, Stormwater Infrastructure and Finished Cap Grade)	Hold point during Validating Consultant review of validation documentation following construction	Work as executed drawings to be certified by a Registered Surveyor engaged by the Principal Contractor	Validating Consultant – sign-off following review of product information, photographic evidence and site inspection if deemed necessary

<b>Project Hold Point</b>	<b>Timing</b>	<b>Responsibility and Activities</b>	<b>Responsibility for Validation and Sign-off of Hold Point</b>
Management of Excavated Spoil, Imported Material and Existing Stockpiles / Material Tracking	Information to be collected throughout the project with hold point during Validating Consultant review of validation documentation	Principal Contractor to provide waste classification certificates, disposal docketts and other waste tracking data (as specified in Section 4.10) to the Validation Consultant for review at project completion	Validating Consultant - sign-off following review of information by Validating Consultant

# 5 Post Closure Monitoring and Maintenance

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## 5.1 Closure Infrastructure Monitoring and Maintenance

This section specifically relates to the monitoring and maintenance requirements for the former Welby Landfill and the remedial structures being constructed as part of this closure plan.

The following ongoing closure infrastructure monitoring and maintenance works will be required:

- Visual survey and inspection to assess ongoing effectiveness of the cap and batters and identify any environmental hazards associated with the former landfill (e.g. leachate seeps if present). Inspection program to be undertaken on a quarterly basis for a minimum of 12 months after installation. These works will be undertaken by Wingecarribee Shire Council.
- Inspection and monitoring of runoff controls (e.g. stormwater drains, sumps, dams, etc.), and based on the inspection, undertake maintenance activities including repair of stormwater structures, removal of accumulated rubbish and sediment from drains. Inspection program to be undertaken on a quarterly basis for a minimum of 12 months after installation. These works will be undertaken by Wingecarribee Shire Council.

As a minimum, three monitoring and maintenance events are to be undertaken within the 12 month period (including at least one event to be completed within 72 hours following a significant rainfall event. A significant rainfall event is classed as exceeding 25mm in 48 hours).

### 5.1.1 Inspection Checklist

Prior to commencement of the performance monitoring and maintenance program an inspection checklist is to be prepared which will capture the standard information required to be recorded during each event. As a minimum the inspection checklist should include the following information:

- Date and time of inspection.
- Name of inspector and relevant qualifications/job title.
- Company of the inspector.
- Weather conditions during inspection.
- Surface observations of the capping (evidence of erosion, ponding of water, vegetation growth, etc. including photographic evidence).
- Surface observations of the batters (evidence of erosion, slumping or failure, vegetation growth, etc. including photographic evidence).
- General surface runoff structure observations for the system alignment (evidence of damage to stormwater structures, sediment or general rubbish build-up, erosion, vegetation growth, etc. including photographic evidence).
- Any evidence of surface seepage of leachate across the landfill extent, description of seepage, GPS location and photographic evidence).
- Record of any damage and/or repair works undertaken on the system.
- A section noting general comments other than those listed above.

### 5.1.2 *Repair and Maintenance Register*

An ongoing register of maintenance and repairs is to be maintained by Wingecarribee Shire Council which details the date, nature and outcome of maintenance or repairs undertaken on the landfill extent. Maintenance could involve (but not be limited to) removal of rubbish or sediment from the stormwater controls. Repairs may involve (but not be limited to) rehabilitation of eroded surfaces on the batter or surficial repairs from falling trees, bushfires, etc.

The items documented in this register are to be incorporated into the ongoing program monitoring review.

### 5.1.3 *Monitoring Review and Training Handover*

An output of this monitoring program will be the review of the monitoring and inspection results to assess effectiveness and suitability of the controls and based upon those findings, amend the program as required once the 12 month maintenance and monitoring period is completed. This may mean inclusion of different monitoring activities or amendment to the monitoring/inspection frequency (e.g. moving from quarterly to biannual or annual monitoring).

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## 5.2 Environmental Monitoring Program

A post-closure environmental monitoring program includes ground gas, groundwater, surface water and leachate monitoring to be implemented. The following sections outline the required monitoring program.

### 5.2.1 *Monitoring Frequency*

The environmental monitoring program will commence within three months of completion of the closure works presented in Section 4. The environmental monitoring program will be undertaken on an annual basis with the intent of demonstrating the eventual compliance of the site with the adopted environmental criteria. The monitoring works are to be undertaken on an annual basis until a Statement of Completion has been prepared and approved by NSW EPA (refer to Section 6).

WSP notes that there is potential for some gas, leachate and groundwater monitoring wells to be damaged during the closure works. These locations are to be reinstated prior to commencement of the post-closure monitoring program.

### 5.2.2 *Ground Gas Monitoring*

A program of annual gas monitoring of sub-surface monitoring wells and surface locations will be undertaken in accordance with this Closure Plan. The timing of each event will be roughly around the same period every year with two weeks variation on either side of the day so that preferred atmospheric conditions can be targeted for the sub-surface gas and surface monitoring. The protocol for undertaking these works is presented in the following sections.

#### 5.2.2.1 Sub-surface Landfill Gas Monitoring

The sub-surface gas monitoring will be undertaken to compare targeted monitoring wells within the landfill extent (and known to contain elevated gas concentrations), against the boundary monitoring well network (which have historically held lower gas concentrations). The procedure for works is as follows:

- During each annual monitoring event a targeted sub-surface landfill gas monitoring round will be undertaken. Where possible within the required timeframe for each event, the fieldwork will be undertaken during a period of low or falling barometric pressure.
- Prior to commencing the monitoring, each of the selected locations within the network are to be inspected to ensure that they have been fitted with appropriate gas monitoring caps.
- The wells to be included in the monitoring network include:
  - WELMLEACH-01, GAS 1, GAS 2 and GAS 3 on the landfill cap.

- WELM-01, WELM-02, WELM-04, WELM-06S, WELM-06D, WELM-07S and WELM-07D bounding the former landfill.
- The monitoring equipment will include a landfill gas meter which can monitor methane (%v/v), carbon dioxide (%v/v), oxygen (%v/v), carbon monoxide (ppm), hydrogen sulfide (ppm) and flow rate (L/hr) and an oil/water interface probe. The equipment will be kept in full working order for the duration of the project and also be appropriately calibrated as per the specification of the specific model. Calibration and service documentation will be retained for the meters for inclusion in annual reports and reference by relevant parties.
- A field monitoring sheet for sub-surface gas monitoring should be filled out with all relevant information during each event. A plan of the location of the existing monitoring well network is presented in Figure 2 of Appendix A1. It should be noted that the gas concentrations within the landfill extent are anticipated to exceed the criteria and because they are within the landfill boundary will unlikely require further management. Exceedances of the criteria in the boundary wells would be indicative of potential lateral migration from the waste mass and therefore require further investigation and characterisation as well as potential notification to NSW EPA.

Methane results will be compared to the notification trigger criteria presented in NSW EPA (2016), *Environmental Guidelines: Solid Waste Landfills (second edition)*. If methane concentrations of 1 %v/v or greater are encountered in boundary wells, this triggers the need for notification to NSW EPA. Note that elevated methane concentrations in monitoring wells situated on the former landfill extent do not trigger the need for notification.

In addition to the above methane criteria, for the purpose of this Closure Plan WSP has adopted the following criteria which will act as trigger values for enacting contingency measures (see Section 5.3):

- Carbon dioxide: 5 %v/v (derived from Modified Wilson and Card Classification).
- Hydrogen sulfide: 10 ppm (derived from Safe Work Australia 2019 time weighted average for workplace exposure).
- Carbon monoxide: 30 ppm (derived from Safe Work Australia 2019 time weighted average for workplace exposure).

Note that the above are triggers for further action only and are not necessarily considered triggers for notification of NSW EPA. Additionally, any exceedances of these criteria from monitoring wells situated on the former landfill extent do not necessarily require enactment of the contingency measures presented in Section 5.2.2.3.

#### 5.2.2.2 Surface Gas Monitoring

The monitoring protocol for surface gas monitoring is to be undertaken annually. The procedure for the works is as follows:

- Surface gas monitoring should be undertaken during a period of low rainfall and atmospherically stable conditions. A general rule of thumb for surface gas monitoring is undertaking the works during a period where wind is less than 10 kilometres an hour. Therefore, weather reports should be consulted prior to selecting the monitoring day to minimise the risk of it being too windy to undertake the works.
- Prior to commencing field assessment of surface gas concentrations a grid system should be developed for the cap and accessible sections of the batters. Once the grid is established, the field consultant will record the maximum surface gas concentration for each grid-space. Grid spacing should be at a maximum of 25 metres as specified in NSW EPA (2016), *Environmental Guidelines: Solid Waste Landfills*.
- Monitoring should be undertaken using a calibrated flame ionisation detector or similar which measures flammable gases in parts per million. A photoionisation detector (PID) should also be used to assess potential volatile vapours. Note that the main items to be assessed during this monitoring event are flammable gases (such as methane) and volatile compounds.
- When undertaking surface gas monitoring the inlet to the gas meter should be held approximately 5 cm above the ground surface as the consultant walks along the monitoring grid. The consultant should record the concentrations identified while progressing along the monitoring grid. For each grid cell the consultant should record the maximum

concentration within the grid. If a sharp spike in concentrations is identified the field scientist/engineer should inspect the ground surface looking for cracks, leachate/water seepage or dead vegetation or using the monitoring equipment to identify localised spikes. If a definitive emission source is identified the location of this point should be located with a GPS and noted down in the scientist/engineer’s field notes. This information may be crucial in identifying and repairing cap breaches of design and construction of controls.

- The results of each round of surface gas monitoring are to be compared to the threshold criteria presented in NSW EPA (2016), Environmental Guidelines: Solid Waste Landfills (i.e. equal to or greater than 500 parts per million for methane).
- Atmospheric data collected from the nearest Bureau of Meteorology weather station for the monitoring period and the week prior should be collected for comparison against monitoring results. Relevant atmospheric parameters include temperature, rainfall, barometric pressure and wind speed/direction.
- The time of monitoring (start and finish time) should be recorded for comparison against atmospheric data (where required).
- If any readings for gases exceed the trigger criteria, the contingency measures presented in Section 5.2.2.3 of this report should be consulted.

### 5.2.2.3 Landfill Gas Contingency and Corrective Action

Wingecarribee Shire Council is responsible for ensuring the ongoing safe condition of the site and surrounds with regards to potential landfill gas hazards on the site and their interaction with surrounding properties and landuses.

Non-conformance will be detected through the ongoing monitoring program.

Contingency and corrective actions for landfill gas hazards detailed in Table 5.1 are to be implemented where exceedances are identified during routine monitoring.

Table 5.1 Contingency Measures for Landfill Gas Exceedances

Event/Trigger	Corrective Action / Contingency Plan
Methane detected above 500ppm in ambient conditions during surface gas monitoring	<p>As noted in NSW EPA 2016, If methane is detected at levels above 500 parts per million, investigation and corrective actions can include:</p> <ul style="list-style-type: none"> <li>– Repair or replacement of the cover material.</li> <li>– More detailed and quantitative risk assessment comprising flux (emissions) monitoring to quantify emission rates and help identify the extent of gas loss (surface scans give a concentration, not a flow rate) and assessment of source-pathway-receptor linkages.</li> <li>– Installation of sub-surface monitoring wells (if not already installed) to gauge the extent of any lateral migration of gas.</li> <li>– Adjustment or installation of landfill gas controls to extract and treat gas.</li> </ul>
Methane detected above 1 %v/v in boundary gas monitoring wells	<p>Wingecarribee Shire Council is required to notify NSW EPA of the exceedance promptly and within 14 days of the notification, submit a plan to NSW EPA detailing anticipated further investigation, risk characterisation and/or remediation. The plan should be prepared and implemented with reference to the following guidance:</p> <ul style="list-style-type: none"> <li>– NSW EPA (2016), <i>Environmental Guidelines: Solid Waste Landfills (second edition)</i>.</li> <li>– NSW EPA (2020), <i>Contaminated Land Guidelines: Assessment and Management of Hazardous Ground Gases</i></li> </ul> <p>Management/remedial measures recommended by the findings of the additional works outlined in the plan (if any) are to be implemented by Wingecarribee Shire Council.</p>

Event/Trigger	Corrective Action / Contingency Plan
Carbon dioxide, carbon monoxide and/or hydrogen sulfide exceeding the adopted site criteria are identified in boundary wells during sub-surface gas monitoring	<p>Undertake a semi quantitative or quantitative risk assessment which will be prepared with reference to the following guidance:</p> <ul style="list-style-type: none"> <li>— NSW EPA (2016), <i>Environmental Guidelines: Solid Waste Landfills (second edition)</i>.</li> <li>— NSW EPA (2020), <i>Contaminated Land Guidelines: Assessment and Management of Hazardous Ground Gases</i></li> </ul> <p>Management/remedial measures recommended by the findings of the additional works outlined in the risk assessment (if any) are to be implemented by Wingecarribee Shire Council.</p> <p>WSP notes that the carbon monoxide and hydrogen sulfide trigger criteria are derived from occupational exposure thresholds and are not directly applicable to sub-surface conditions. As such, they act as triggers for further assessment rather than immediate remedial action.</p>
Surface and sub-surface landfill gas concentrations continue to exceed the adopted site criteria past the intended completion period	<p>Wingecarribee Shire Council to either continue annual monitoring until the results meet the stabilisation criteria presented in Section 6 or undertake a quantitative risk assessment which adequately characterises the residual risk associated with the ongoing exceedances. The risk assessment is to be submitted to NSW EPA for review in the context of meeting the Statement of Completion requirements.</p>

### 5.2.3 Leachate and Groundwater Monitoring

The leachate and groundwater monitoring will be undertaken to compare levels and contaminant concentrations of targeted monitoring wells within the landfill extent, against boundary monitoring wells. The procedure for works is as follows:

- Groundwater/leachate monitoring events will be undertaken annually post closure. Wells to be included in the monitoring program include the following (refer to Figure 2 of Appendix A1 for monitoring point locations):
  - Leachate monitoring location: WELMLEACH-01.
  - Boundary monitoring locations: WELM-01, WELM-02, WELM-04, WELM-06S, WELM-06D, WELM-07S and WELM-07D.
- During each monitoring event the following field parameters will be collected from each monitoring well by calibrated equipment:
  - Groundwater level and free-phase product (with an interface probe).
  - pH.
  - Electrical conductivity (EC).
  - Turbidity.
  - Dissolve oxygen (DO).
  - Redox potential.
  - Temperature.
- Samples will be collected using a low disturbance sampling technique approved prior to commencement by the NSW EPA. Primary and quality control samples (comprising one inter laboratory duplicate and one intra laboratory duplicate per sampling event) will be analysed at a NATA accredited laboratory for the following analytes (full suite):



- Major anions and cations.
- Nutrients (ammonia, phosphorus as P, nitrate, nitrite).
- Heavy metals (Al, As, Ba, Cd, Co, Cr, Cu, Hg, Mn, Ni, Pb, Zn).
- Total recoverable hydrocarbons (TRH).
- Benzene, toluene, ethylbenzene and xylenes (BTEX).
- Polycyclic aromatic hydrocarbons (PAH).
- Per and poly-fluoroalkyl substances (PFAS) – as agreed with NSW EPA in email dated 10 January 2023.
- The Action Levels to be applied to the monitoring wells outside of the former landfill footprint are as follows:
  - ANZG (2018), *Australian and New Zealand Guidelines for Fresh and Marine Water Quality (fresh water criteria)*.
  - NHMRC (2011), *Australian Drinking Water Guidelines*.
  - HEPA (2020), *PFAS National Environmental Management Plan (Version 2.0 – January 2020)*.
- Elevated contaminant concentrations are anticipated for the leachate sampling location (WELMLEACH-01). However, any exceedances of the adopted criteria within the boundary wells would require triggering of the specific contingency measures presented in Section 5.2.3.1.

### 5.2.3.1 Landfill Leachate and Groundwater Contingency and Corrective Action

In the event of exceedances of the adopted criteria or identification of surface leachate seeps the contingency measures presented in Table 5.2 below should be applied.

Table 5.2 Leachate and Groundwater Contingency Measures

Event / Trigger	Corrective Action / Contingency Plan
Groundwater and leachate monitoring results identify a potential link between leachate in the former landfill and the surrounding groundwater system did not exist prior to completion of closure works	<p>Follow obligations under the Environmental Protection Licence and <i>Protection of the Environment Operations Act 1997</i> with regards to reporting of findings to NSW EPA.</p> <p>Undertake two additional monthly rounds of monitoring at the affected location(s). The results along with any additional lines of evidence should be incorporated by a specialist in contamination and/or pollution assessment into an assessment which characterises the exceedance and the potential risk to on-site and off-site receptors. Based on the assessment, the contamination and/or pollution specialist will provide recommendations for future management of the exceedance.</p> <p>Wingecarribee Shire Council will implement the recommendations of the contamination and/or pollution specialist and liaise with NSW EPA as relevant.</p> <p>Unless otherwise recommended by the contamination and/or pollution specialist or NSW EPA, continue monitoring of groundwater under the existing annual monitoring regime to track the effectiveness of the implemented controls and based upon the results of the monitoring, undertake further actions (if required).</p>

Event / Trigger	Corrective Action / Contingency Plan
Groundwater and leachate monitoring results identify a potential link between leachate in the former landfill and the surrounding groundwater system did exist prior to completion of closure works and continues post-closure	<p>Follow obligations under the Environmental Protection Licence and <i>Protection of the Environment Operations Act 1997</i> with regards to reporting of findings to NSW EPA.</p> <p>Following two additional annual rounds of monitoring at the affected location(s), track the trend in concentrations over time. The results along with any additional lines of evidence should be incorporated by a specialist in contamination and/or pollution assessment into an assessment which characterises the exceedance and the potential risk to on-site and off-site receptors. Based on the assessment, the contamination and/or pollution specialist will provide recommendations for future management of the exceedance.</p> <p>Wingecarribee Shire Council will implement the recommendations of the contamination and/or pollution specialist and liaise with NSW EPA as relevant.</p> <p>Unless otherwise recommended by the contamination and/or pollution specialist or NSW EPA, continue monitoring of groundwater under the existing annual monitoring regime to track the effectiveness of the implemented controls and based upon the results of the monitoring, undertake further actions (if required).</p>

#### 5.2.4 Surface Water Monitoring

The surface water monitoring will be undertaken to compare contaminant concentrations of targeted monitoring points within the landfill extent, against creek monitoring points. The procedure for works is as follows:

- Surface water monitoring events will be undertaken annually post closure. Locations to be included in the monitoring program include the following (refer to Figure 2 of Appendix A1 for monitoring point locations):
  - On-site stormwater dam locations: DAM 1, DAM 2, DAM 3, DAM 5 and DAM6.
  - Off-site creek monitoring locations: WELMSW-01 and WELMSW-02.
- During each monitoring event the following field parameters will be collected from each monitoring point by calibrated equipment:
  - pH.
  - Electrical conductivity (EC).
  - Turbidity.
  - Dissolve oxygen (DO).
  - Redox potential.
  - Temperature.
- Primary and quality control samples (comprising one inter laboratory duplicate and one intra laboratory duplicate per sampling event) will be analysed at a NATA accredited laboratory for the following analytes (full suite):
  - Major anions and cations.
  - Nutrients (ammonia, phosphorus as P, nitrate, nitrite).
  - Heavy metals (Al, As, Ba, Cd, Co, Cr, Cu, Hg, Mn, Ni, Pb, Zn).
  - Total recoverable hydrocarbons (TRH).
  - Benzene, toluene, ethylbenzene and xylenes (BTEX).
  - Polycyclic aromatic hydrocarbons (PAH).

- Per and poly-fluoroalkyl substances (PFAS) – as agreed with NSW EPA in email dated 10 January 2023.
- The Action Levels to be applied to the surface water dataset are as follows:
  - ANZG (2018), *Australian and New Zealand Guidelines for Fresh and Marine Water Quality (fresh water criteria)*.
  - NHMRC (2011), *Australian Drinking Water Guidelines*.
  - HEPA (2020), *PFAS National Environmental Management Plan (Version 2.0 – January 2020)*.
  - Background concentration ranges identified in the upstream creek sample (WELMSW-01). These ranges can be derived from results collected during the annual monitoring as well as the historical dataset (refer to Appendix D).0
- Any exceedances of the adopted criteria and the background concentration dataset derived from WELMSW-01 would require triggering of the specific contingency measures presented in Section 5.2.4.1.

#### 5.2.4.1 Surface Water Contingency and Corrective Action

In the event of exceedances of the adopted criteria in surface water or the identification of surface leachate seeps the contingency measures presented in Table 5.3 below should be applied.

Table 5.3 Surface Water Contingency Measures

Event / Trigger	Corrective Action / Contingency Plan
<p>Surface water monitoring results identify a potential link between leachate in the former landfill and the surrounding surface water bodies</p>	<p>Follow obligations under the Environmental Protection Licence and <i>Protection of the Environment Operations Act 1997</i> with regards to reporting of findings to NSW EPA.</p> <p>Undertake three additional weekly rounds of monitoring at the affected location(s). The results along with any additional lines of evidence should be incorporated by a specialist in contamination and/or pollution assessment into an assessment which characterises the exceedance and the potential risk to on-site and off-site receptors. Based on the assessment, the contamination and/or pollution specialist will provide recommendations for future management of the exceedance.</p> <p>Wingecarribee Shire Council will implement the recommendations of the contamination and/or pollution specialist and liaise with NSW EPA as relevant.</p> <p>Unless otherwise recommended by the contamination and/or pollution specialist or NSW EPA, continue monitoring of surface water under the existing annual monitoring regime to track the effectiveness of the implemented controls and based upon the results of the monitoring, undertake further actions (if required).</p>
<p>During site inspections a surface leachate seep is identified on the batter or cap of the landfill surface.</p>	<p>Upon identification, isolate the location to prevent seepage from leaving the area, undertake targeted repairs of capping, batters and other surface areas to block off leachate seepage. Repairs will vary based upon the surface being repaired (e.g. compacted clay on unsealed surfaces or retaining structures on high slope sections of the batter).</p> <p>Undertake inspections in the days and weeks following the repair works to ensure that the repairs have been successful. If controls require amendment, undertake the works.</p>

#### 5.2.5 Reporting

The results of the monitoring program will be incorporated into an annual report will combine both the surface structure and sub-surface monitoring results. The document will be made available to the Environment Manager and relevant Construction Manager(s). Each letter report will provide the following:

- Summary of relevant regulations and guidance relating to landfill gas, surface water, groundwater and leachate monitoring and management.
- Discussion of site conditions at the time of monitoring along with activities taking place on-site.
- Discussion of atmospheric conditions (barometric pressure, temperature, rainfall derived from BoM weather station) on the day of and week preceding the monitoring event and a discussion of how the conditions may have affected data collection.
- Presentation of monitoring data in a tabular format as well as a discussion in the body of the text and a comparison of the results to relevant criteria.
- A brief comparison to results from previous monitoring rounds.
- Conclusions and recommendations (if required) based on the results of the monitoring works.

The annual water quality assessment report shall be submitted to NSW EPA by Wingecarribee Shire Council for review and comment.

## 5.3 Review and Revision of the Post-Closure Monitoring and Maintenance Program

### 5.3.1 *Review of the Plan*

The Plan is to be reviewed on an annual basis to ensure that:

- Information and environmental management procedures remain current.
- The Plan is updated if an incident occurs that indicates the provisions of the Plan are inadequate.
- The Plan is updated to reflect changes to the site conditions and / or land use.
- Any opportunities for improvements are incorporated in the Plan.
- Changes to legislation, approval conditions and other regulatory updates are complied with.

### 5.3.2 *Revision of the Plan*

If the reviews discussed above identify that amendments are required to be made to the Plan, it is to be revised by a suitably qualified environmental consultant and approved by the owner / occupier or their delegate. Any changes to this Plan which lessens the management requirements must be approved by the NSW EPA.

It is the responsibility of the owner/occupier of the site to ensure that all relevant parties are provided with the most current version of the Plan. The Plan must remain in place and implemented until such time as NSW EPA determines that the Plan is no longer required (refer to Section 6 for more information).

## 6 Statement of Completion

As stated in Section 3.1, landfilling ceased by 2002. As per NSW EPA (2016), *Environmental Guidelines: Solid Waste Landfills*, Wingecarribee Shire Council can attain a certified Statement of Completion from 30 years after the site has stopped receiving waste (i.e. from 2032 onwards).

The Statement of Completion must demonstrate that the landfill is stable and non-polluting. If sufficient evidence is provided, Wingecarribee Shire Council may complete all obligations in relation to the environmental risks of the former landfill.

This statement must certify that the closure plan has been implemented, remediation work has been completed, and further environmental management of the premises is not required. Specifically, the certified Statement of Completion should sufficiently demonstrate that the following stabilisation criteria be met:

- Gas concentration levels in all perimeter gas wells have fallen to less than 1% methane (volume/volume) and less than 1.5% carbon dioxide (volume/volume) above the established natural background for a period of 24 months.
- Analysis of the leachate composition indicates low levels of contamination posing no hazard to the environment, and surface water and groundwater monitoring indicates no water pollution. These matters should be addressed in accordance with the relevant published water quality guidelines.
- The landfill final capping has been assessed over some years and found to be in good condition and stable, with acceptable stormwater drainage and with no evidence of erosion, cracking, dead vegetation, ponding, differential settlement or slope instability.
- The level of suspended solids in rainwater running off the final capping should be less than 50 milligrams/litre.
- The methane concentration at the surface of the final capping should not exceed 500 parts per million at any point.
- The closed landfill no longer poses an adverse amenity risk. It does not generate offensive or excessive odour, dust, noise, litter and debris, present a fire risk, or attract scavengers and vermin.
- All other requirements of the Closure Plan and Surrender Notice have been completed and/or satisfied.

This certified Statement of Completion will compile the available dataset from the annual monitoring and inspections along with other data sources in order to assess the former Landfill against the above stabilisation criteria. The certified Statement of Completion is to be submitted to NSW EPA. Upon approval by NSW EPA, the ongoing obligations of Wingecarribee Shire Council will permanently lapse.

# 7 Preliminary Timeline and Costing

WSP undertook a pre-feasibility/conceptual cost estimate (+/-25% estimate accuracy), in support of this landfill closure plan. The cost estimate was generally carried out as follows:

1. Preparation of the cost breakdown structure (CBS) items based on the provided bill of quantities and details obtained from pre-feasibility / conceptual level design drawings and specifications.
2. The CBS elements have been developed as a bottom-up, crew-based, detailed cost model. The crews required to perform the majority of the various work items have been built-up using first principles, to develop hourly rates or unit rates. Inclusion of support equipment within a crew has been determined on a per activity basis.

The cost estimate accounts for preliminaries, planning and preparation, owner's costs (including engineering design and project management), contractor direct construction costs, project contingency (20%) and three years of post-construction monitoring. In total the cost including growth has been estimated at \$17,312,700.

Based on WSPs knowledge of the works to be undertaken and liaison with Wingecarribee Shire Council, an indicative planning, design and approvals timeframe of 11 months and construction timeframe of 10 months has been adopted to complete the construction works program.

The full breakdown of individual cost items and bill of quantities as well as the preliminary construction schedule is presented in *Landfill Closure Plan, Former Welby Landfill – Basis of Estimate* presented in Appendix I of this Closure Plan.

# 8 Limitations

This Report is provided by WSP Australia Pty Limited (*WSP*) for Wingecarribee Shire Council (*Client*) in response to specific instructions from the Client and in accordance with WSP's proposal dated 13 December 2021 and agreement with the Client dated 23 March 2022 (Purchase Order 00242161) (*Agreement*).

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- Woodward-Clyde (1996), *Environmental Audit of Welby Landfill, Mittagong, NSW*
- WSP (July 2019), *Waste and Reuse Assessment – Stockpiled Materials, Former Welby Landfill*
- WSP (April 2022), *Organic Waste Stockpiles Remedial Options Appraisal – Former Welby Landfill, Welby NSW*

- WSP (September 2022), *Per-and Poly-fluoroalkyl Substances (PFAS) Assessment – Former Welby Landfill, Colo Street, Welby NSW*

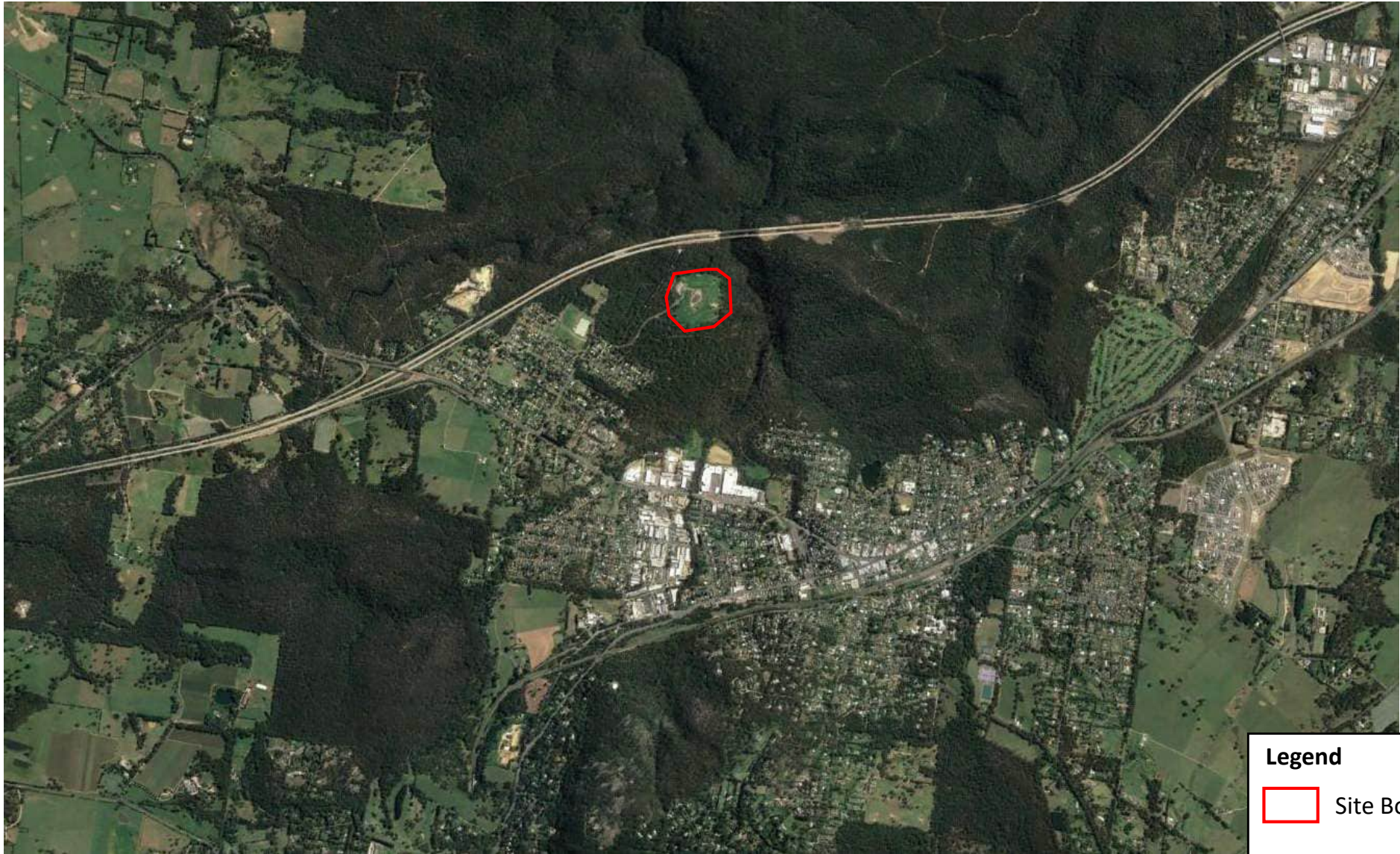
# Appendix A

Site Figures and Drawings





*Appendix A1 – Site Figures*






**Legend**

Site Boundary

Map: PS129987_FIG01	Author: J. Hilliard		<b>SCALE</b> 
Date: 02.05.2022	Approved: H. Jones		
Data Source: GoogleEarth (accessed May 2022)			

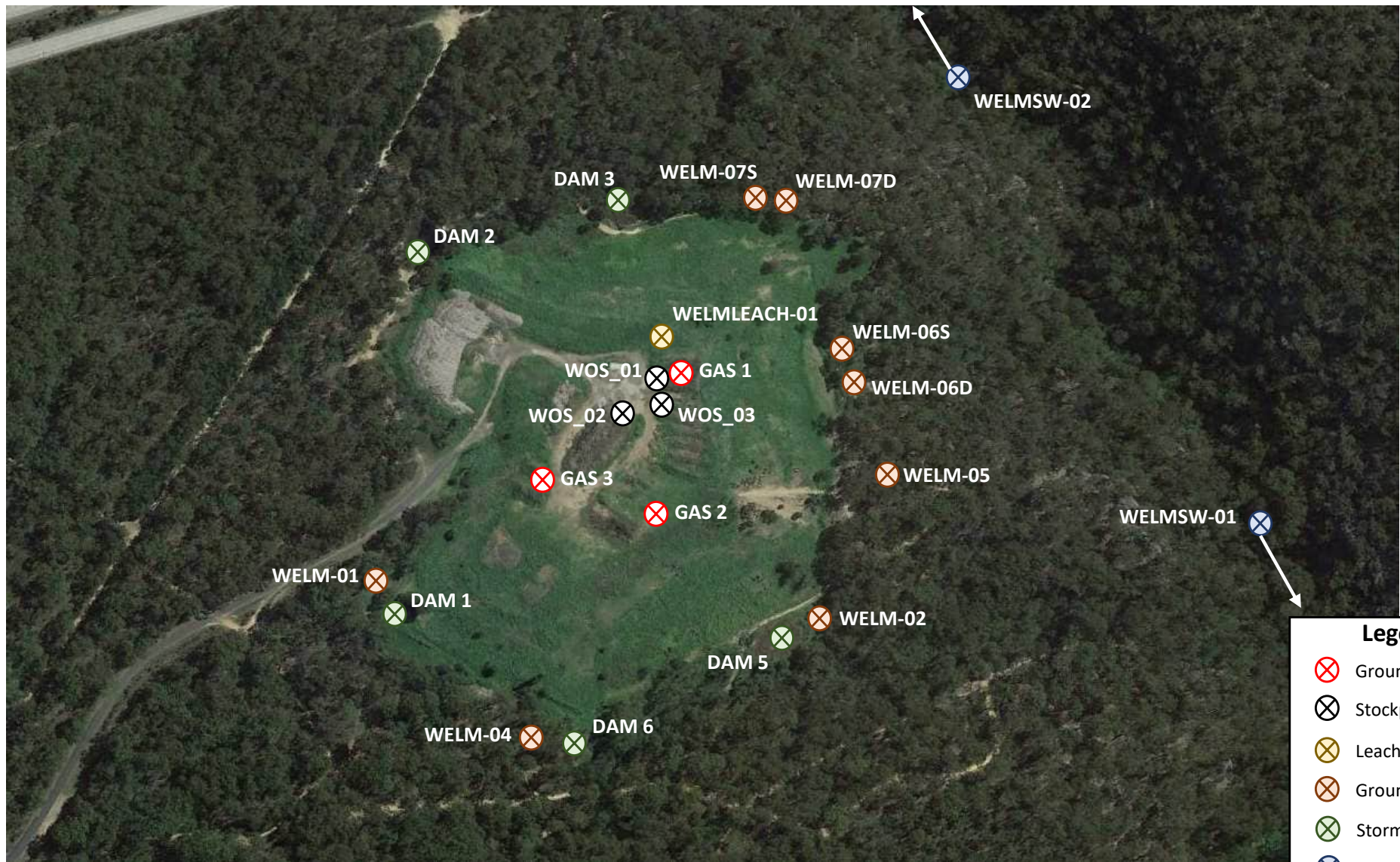
**Wingecarribee Shire Council – Closure Plan  
Former Welby Landfill, Colo Street, Welby NSW**

Figure 1: Site Locality Plan



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Legend	
	Ground Gas Well
	Stockpile Sample
	Leachate Well
	Groundwater Well
	Stormwater Dam
	Creek Sample

Map: PS129987_FIG02	Author: J. Hilliard		SCALE 0 50 100 m 
Date: 02.05.2022	Approved: H. Jones		
Data Source: GoogleEarth (accessed May 2022)			

**Wingecarribee Shire Council – Closure  
Former Welby Landfill, Colo Street, Welby NSW**

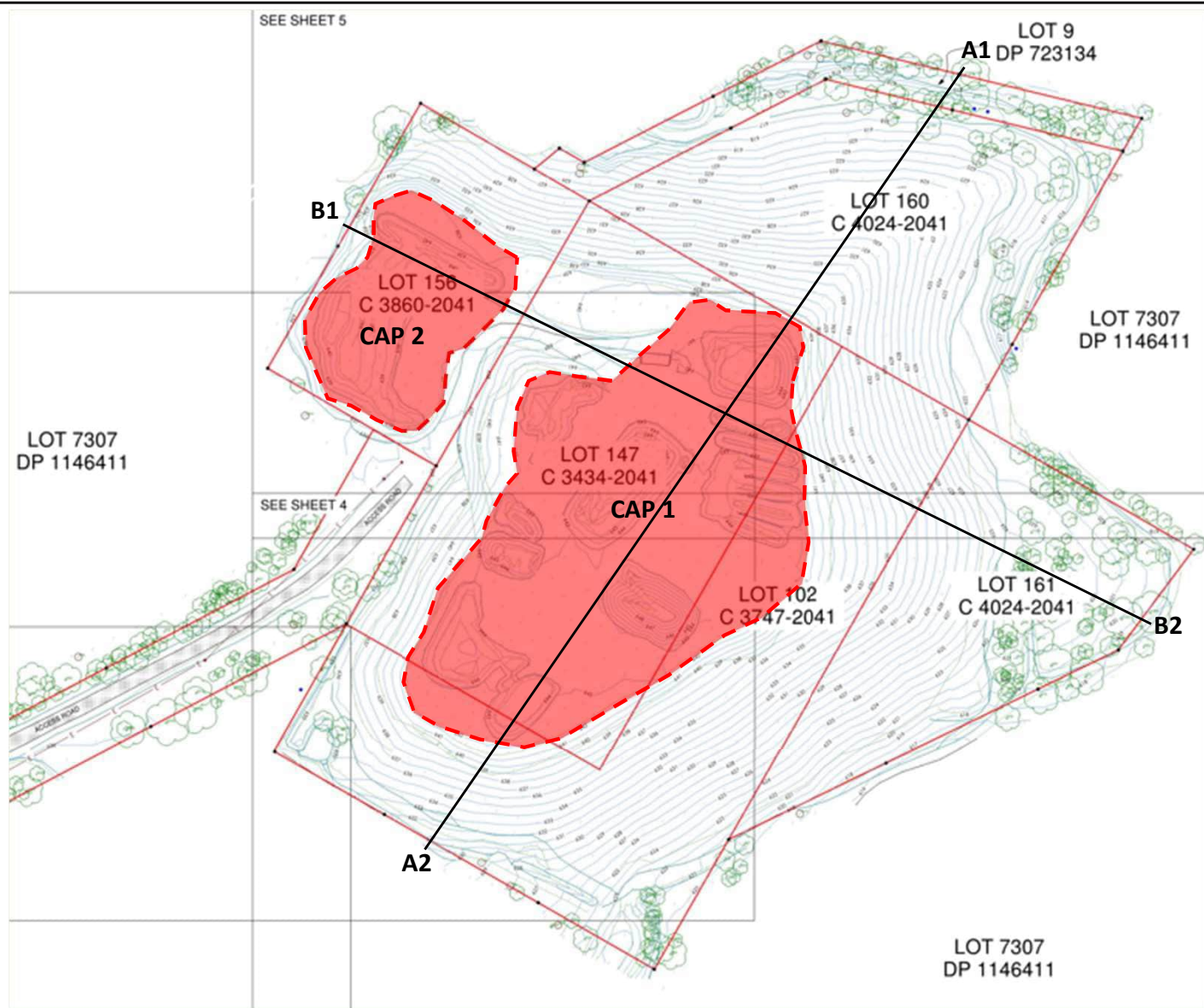
Figure 2: Sample Location Plan




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Map: PS129987_FIG04	Author: J. Hilliard	
Date: 27.06.2022	Approved: H. Jones	
Data Source: Matthew Freeburn Survey (Ref. 35373 – Sheet 1)		

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**Wingecarribee Shire Council – Closure  
Former Welby Landfill, Colo Street, Welby NSW**

Figure 4: Conceptual Cap Regrading Works Extent

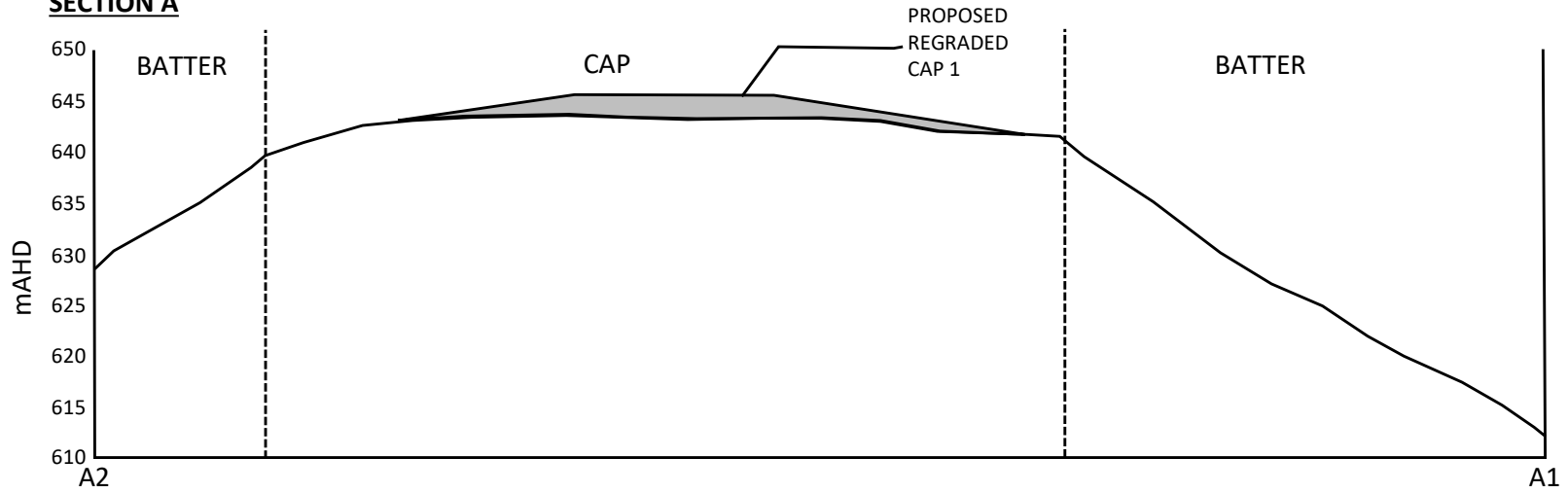


Wingecarribee Shire Council

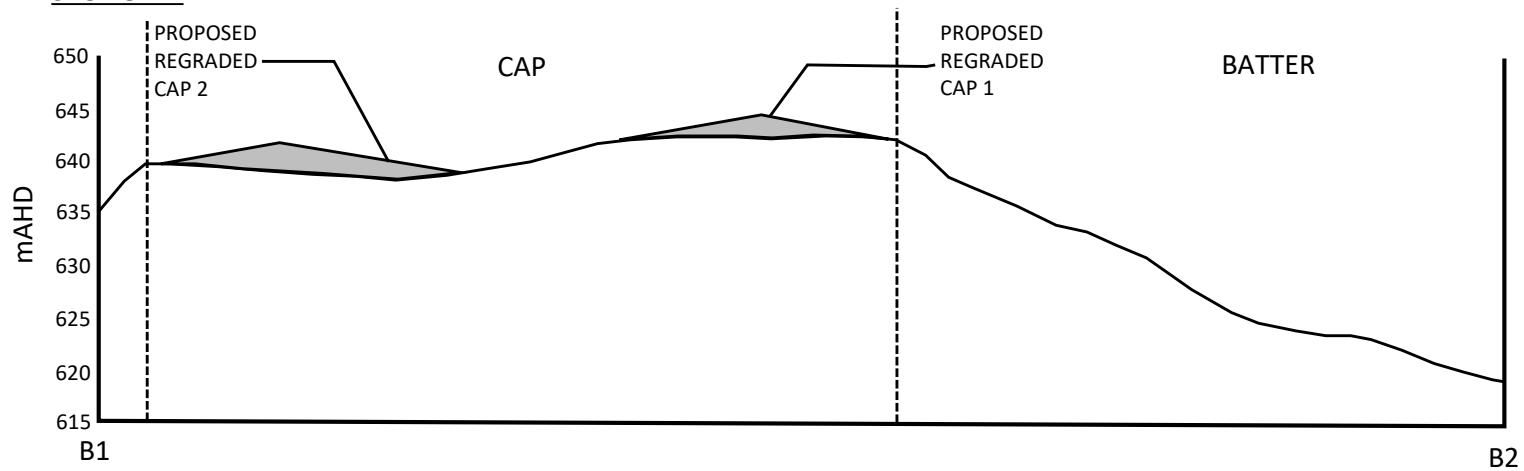
[www.wsp.com](http://www.wsp.com)



**SECTION A**



**SECTION B**



Map: PS129987\_FIG05

Author: J. Hilliard

**Note:** Stockpile footprints excluded from the surveyed levels when preparing these sections

Date: 27.06.2022

Approved: H. Jones

Contour Source: Freeburn Surveying dated 13/05/2016 (Ref. 35373 – Sheet 1)

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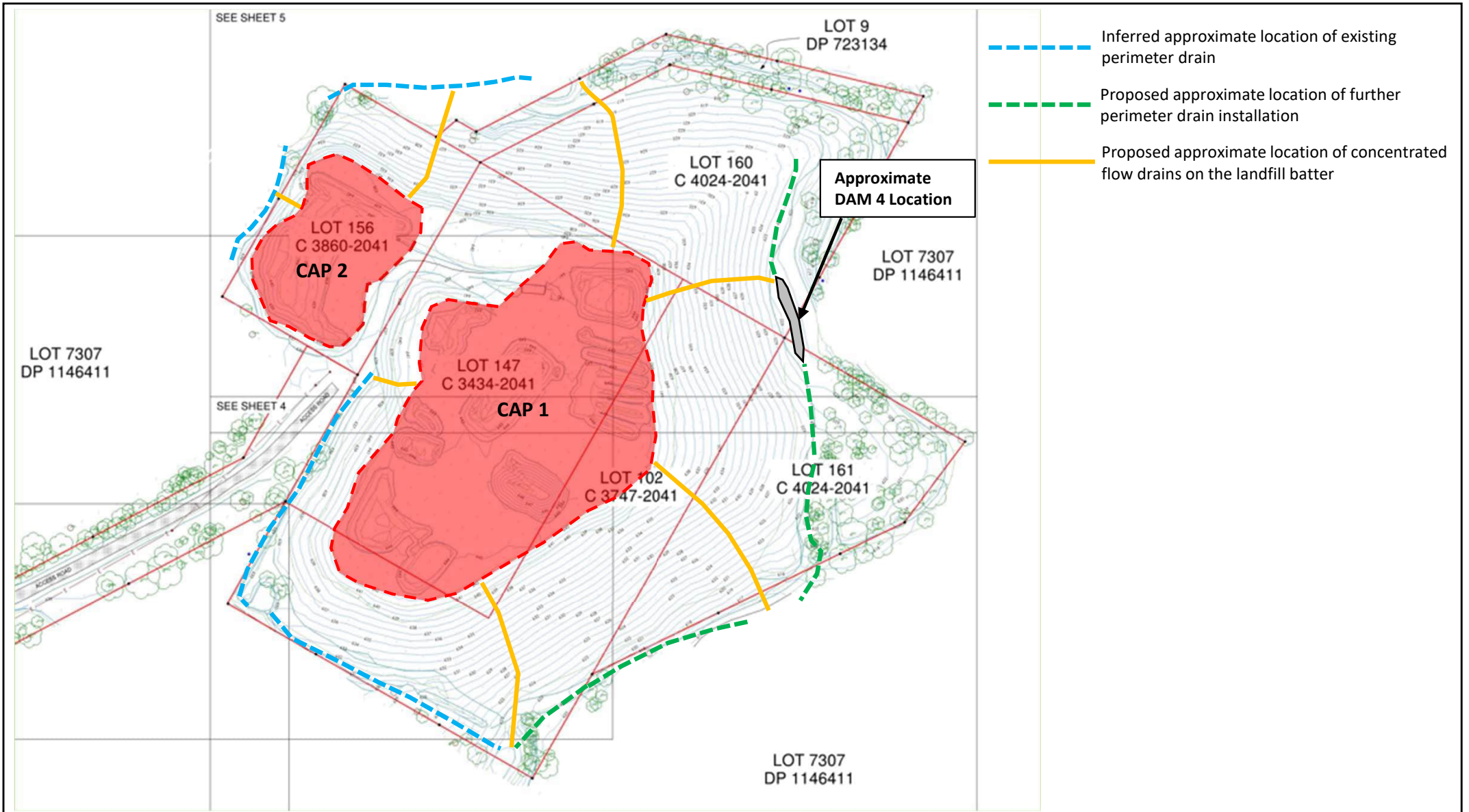


Wingecarribee Shire Council


**Wingecarribee Shire Council – Closure  
Former Welby Landfill, Colo Street, Welby NSW**

Figure 5: Conceptual Cap Regrading Landform

[www.wsp.com](http://www.wsp.com)



- - - Inferred approximate location of existing perimeter drain
- - - Proposed approximate location of further perimeter drain installation
- Proposed approximate location of concentrated flow drains on the landfill batter

Map: PS129987_FIG06	Author: J. Hilliard	
Date: 27.06.2022	Approved: H. Jones	
Data Source: Matthew Freeburn Survey (Ref. 35373 – Sheet 1)		

**Wingecarribee Shire Council – Closure  
Former Welby Landfill, Colo Street, Welby NSW**

Figure 6: Proposed stormwater infrastructure layout

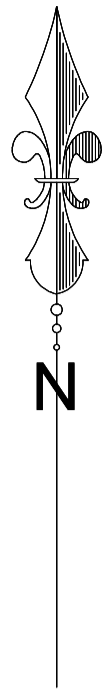


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*Appendix A2 – Site Drawings*







NOTES:

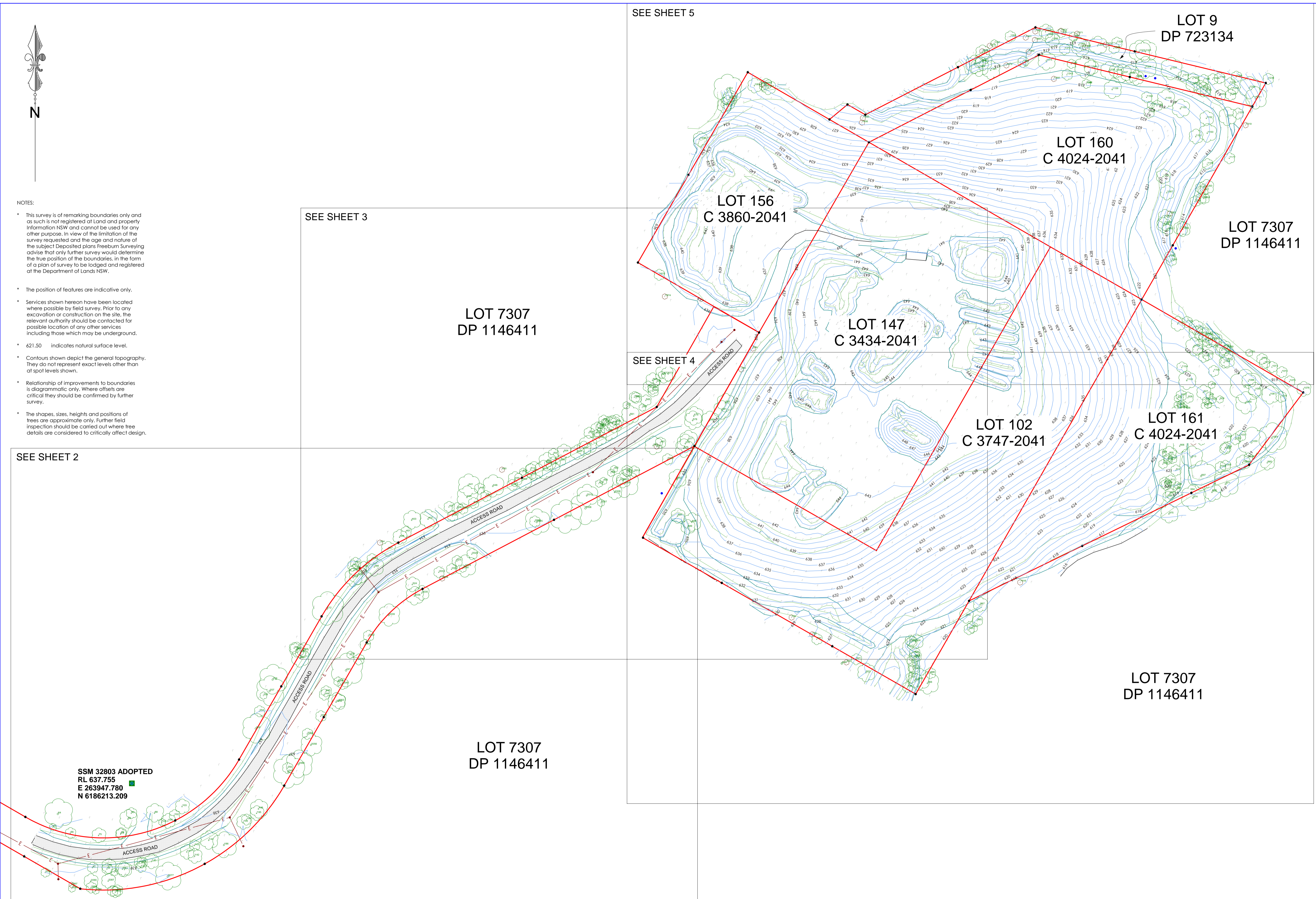
- \* This survey is of remarking boundaries only and as such is not registered at Land and Property Information NSW and cannot be used for any other purpose. In view of the limitation of the survey requested and the age and nature of the subject Deposited plans Freeburn Surveying advise that only further survey would determine the true position of the boundaries, in the form of a plan of survey to be lodged and registered at the Department of Lands NSW.
- \* The position of features are indicative only.
- \* Services shown hereon have been located where possible by field survey. Prior to any excavation or construction on the site, the relevant authority should be contacted for possible location of any other services including those which may be underground.
- \* 621.50 indicates natural surface level.
- \* Contours shown depict the general topography. They do not represent exact levels other than at spot levels shown.
- \* Relationship of improvements to boundaries is diagrammatic only. Where offsets are critical they should be confirmed by further survey.
- \* The shapes, sizes, heights and positions of trees are approximate only. Further field inspection should be carried out where tree details are considered to critically affect design.

SEE SHEET 2

SEE SHEET 3

SEE SHEET 5

SEE SHEET 4



Client: WINGECARRIBEE SHIRE COUNCIL	Project: <b>PLAN SHOWING DETAIL, LEVELS &amp; CONTOURS OVER WELBY LANDFILL SITE LOCATED AT COLO STREET, WELBY.</b>
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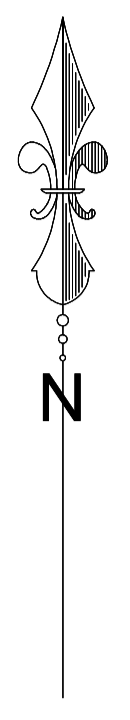
FREEBURN  
  
 SURVEYING

**MATTHEW FREEBURN**  
 LAND, ENGINEERING & MINING SURVEYOR  
 SUITE 2, FIRST FLOOR, "SURVEYOR HOUSE"  
 2 CASTLEREAGH STREET  
 PENRITH 2750

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 Fax 02 4721 5646  
 email matthew@freeburnsurveyors.com

Date: 13/5/2016	Ref: 35373	Sheet 1 of 5
Scale 1: 1000	Datum: AHD	Contour: 1.0m
Surveyor: CD/DC	Drawn By: CD	Checked: MF
Stored: 35373		A1 SHEET





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  - \* The shapes, sizes, heights and positions of trees are approximate only. Further field inspection should be carried out where tree details are considered to critically affect design.

LOT 7307  
DP 1146411

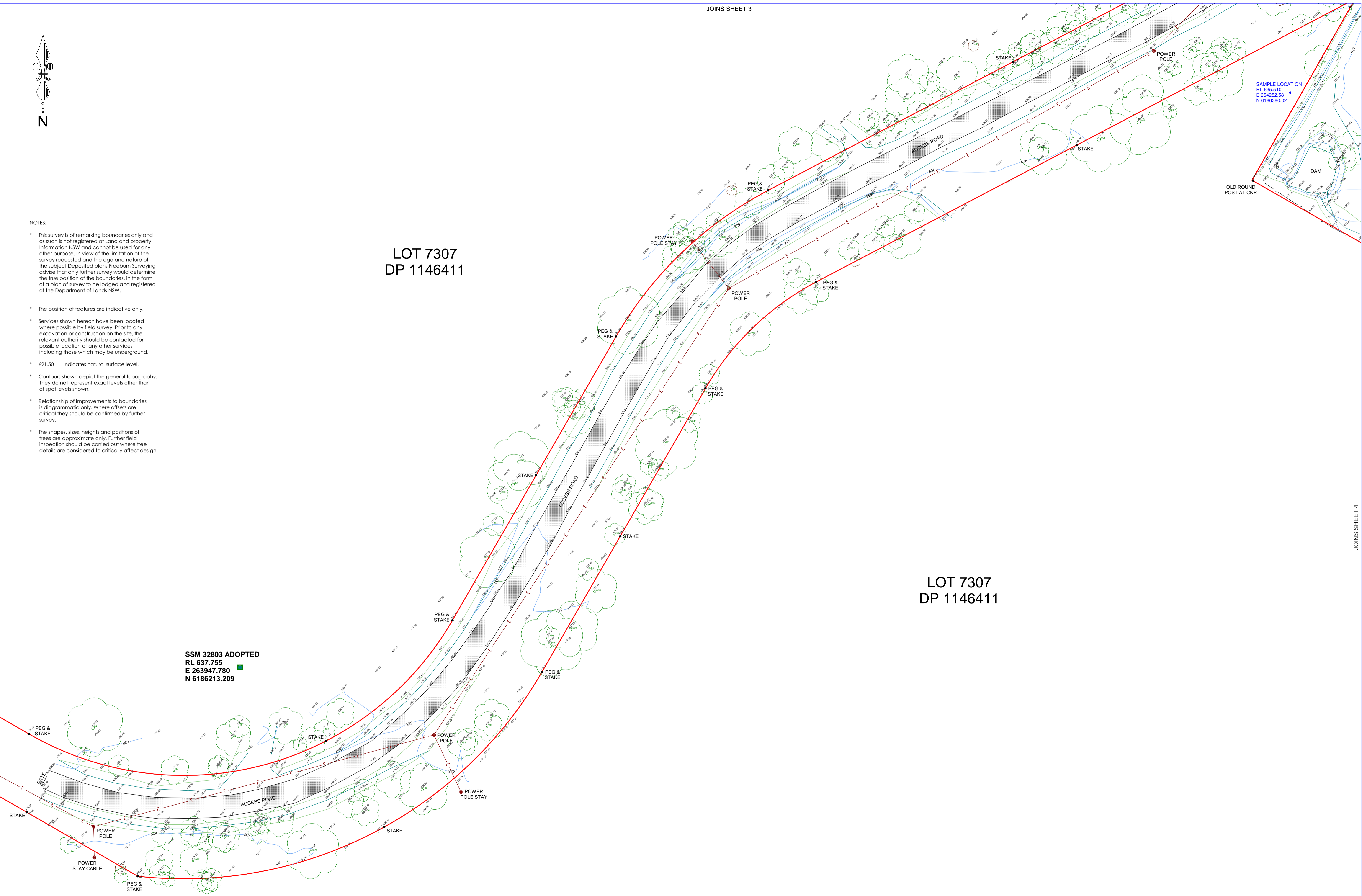
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DP 1146411

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N 6186380.02

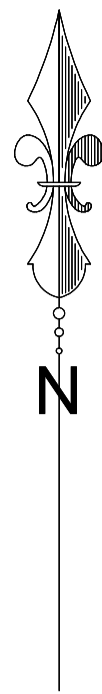
OLD ROUND  
POST AT CNR

DAM



Client: WINGECARRIBEE SHIRE COUNCIL	Project: PLAN SHOWING DETAIL, LEVELS & CONTOURS OVER WELBY LANDFILL SITE LOCATED AT COLO STREET, WELBY.	FREEBURN  SURVEYING	<b>MATTHEW FREEBURN</b> LAND, ENGINEERING & MINING SURVEYOR SUITE 2, FIRST FLOOR, "SURVEYOR HOUSE" 2 CASTLEREAGH STREET PENRITH 2750	Telephone 02 4721 2289 Fax 02 4721 5646 email matthew@freeburnsurveyors.com	Date: 13/5/2016 Scale 1: 500 Surveyor: CD/DC Stored: 35373	Ref: 35373 Datum: AHD Drawn By: CD	Sheet 2 of 5 Contour: 1.0m Checked: MF A1 SHEET
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NOTES:

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LOT 7307  
DP 1146411

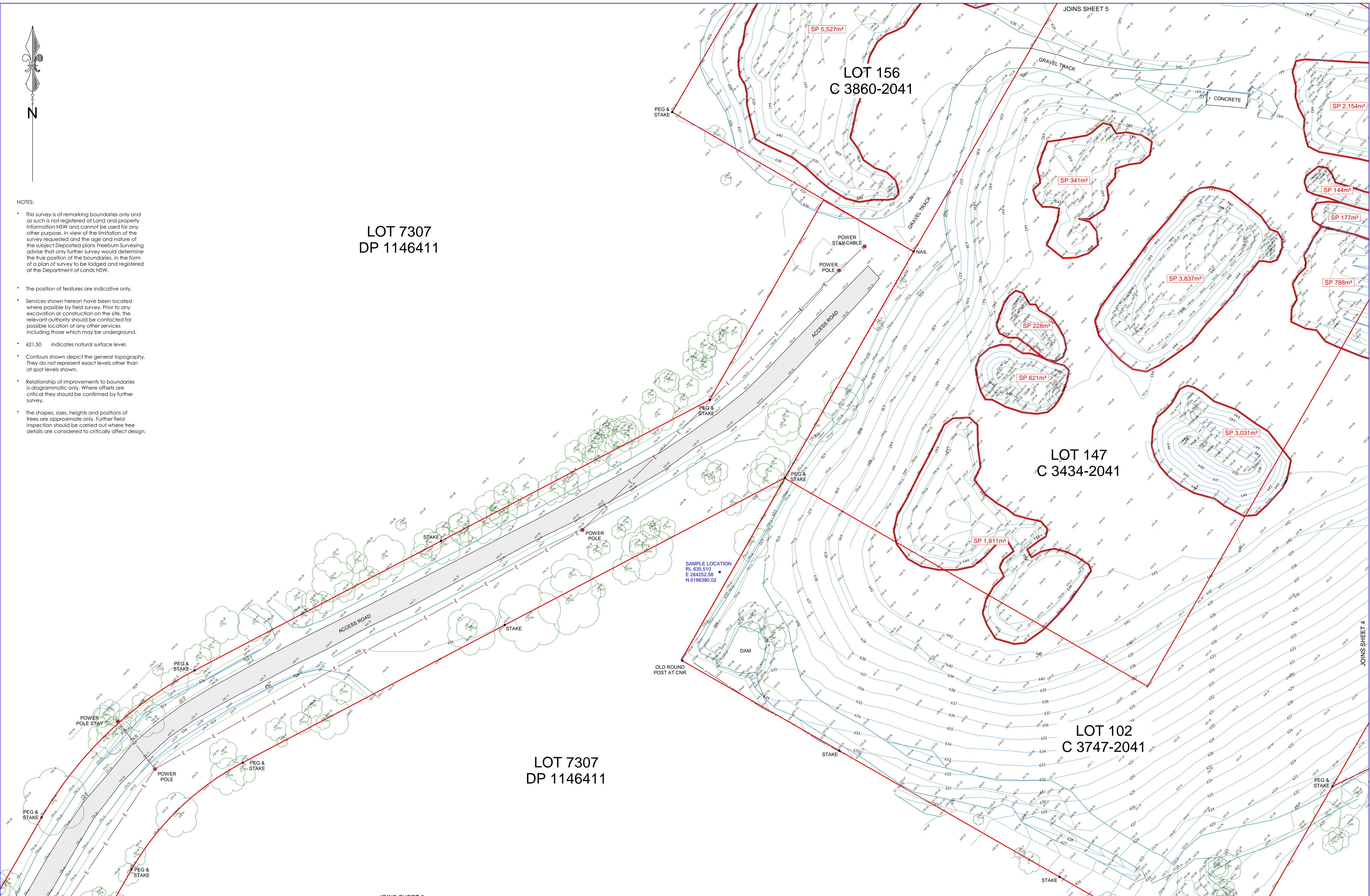
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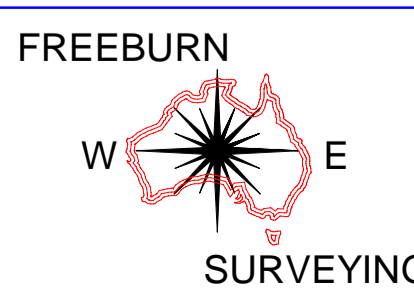
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LOT 102  
C 3747-2041

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N 6186380.02



Client: WINGECARRIBEE SHIRE COUNCIL	Project: PLAN SHOWING DETAIL, LEVELS & CONTOURS OVER WELBY LANDFILL SITE LOCATED AT COLO STREET, WELBY.
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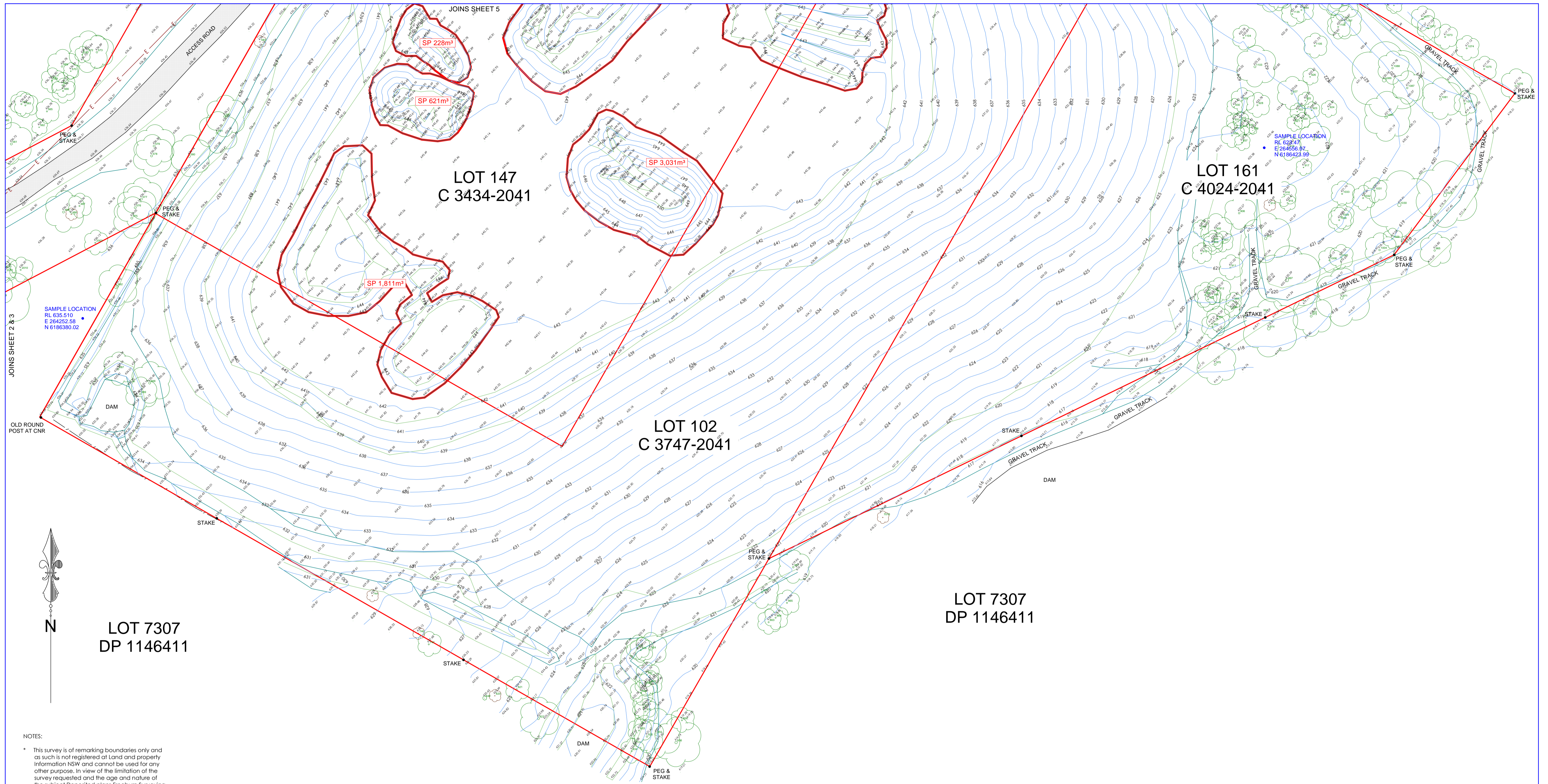


**MATTHEW FREEBURN**  
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SUITE 2, FIRST FLOOR, "SURVEYOR HOUSE"  
2 CASTLEREAGH STREET  
PENRITH 2750

Telephone 02 4721 2289  
Fax 02 4721 5646  
email matthew@freeburnsurveyors.com

Date: 13/5/2016	Ref: 35373	Sheet 3 of 5
Scale 1: 500	Datum: AHD	Contour: 1.0m
Surveyor: CD/DC	Drawn By: CD	Checked: MF
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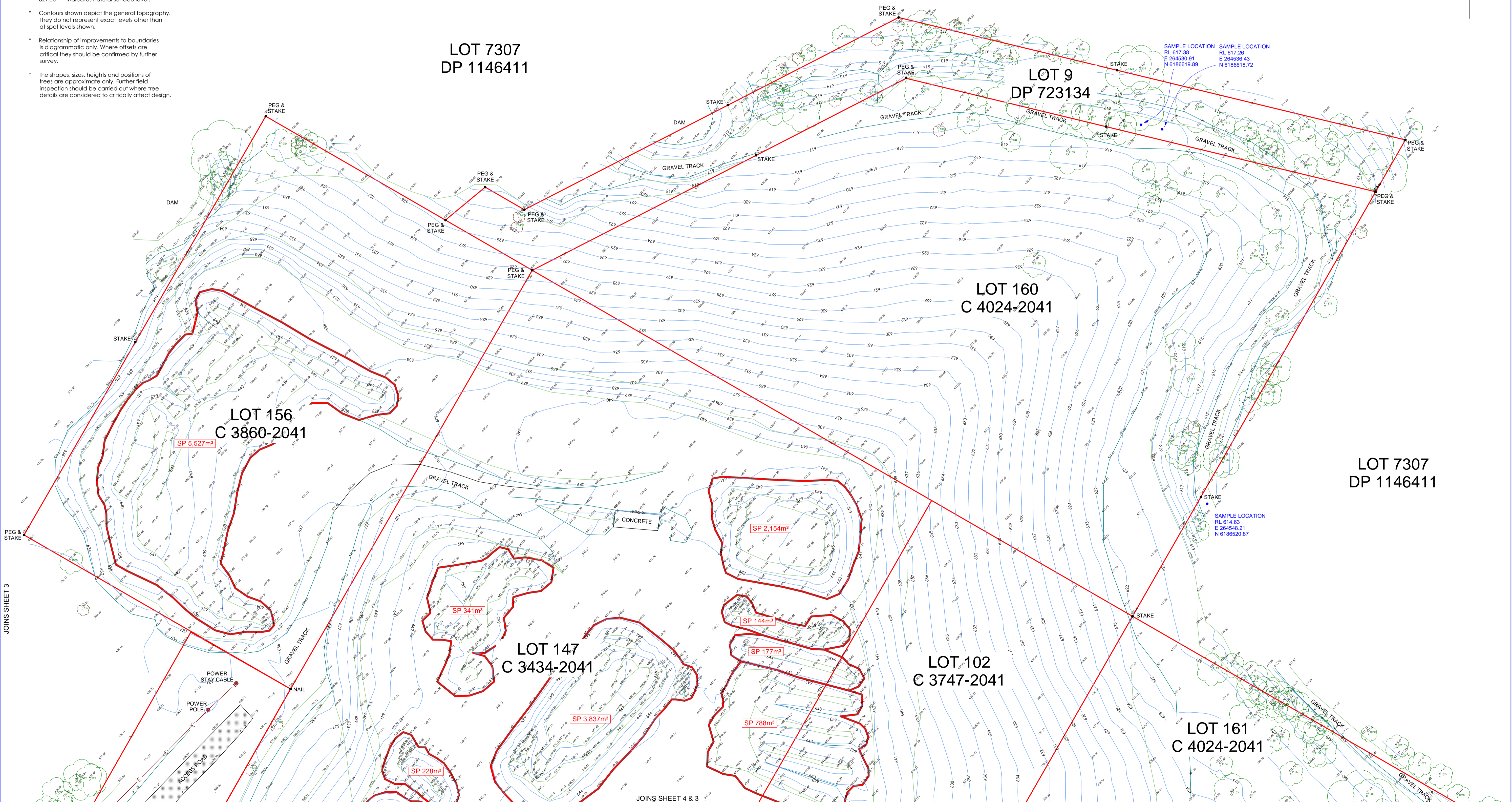
- NOTES:
- This survey is of remarking boundaries only and as such is not registered at Land and property information NSW and cannot be used for any other purpose. In view of the limitation of the survey requested and the age and nature of the subject Deposited plans Freeburn Surveying advise that only further survey would determine the true position of the boundaries, in the form of a plan of survey to be lodged and registered at the Department of Lands NSW.
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Client: <b>WINGECARRIBEE SHIRE COUNCIL</b>	Project: <b>PLAN SHOWING DETAIL, LEVELS &amp; CONTOURS OVER WELBY LANDFILL SITE LOCATED AT COLO STREET, WELBY.</b>	FREEBURN  SURVEYING	<b>MATTHEW FREEBURN</b> LAND, ENGINEERING & MINING SURVEYOR SUITE 2, FIRST FLOOR, "SURVEYOR HOUSE" 2 CASTLEREAGH STREET PENRITH 2750	Telephone 02 4721 2289 Fax 02 4721 5646 email matthew@freeburnsurveyors.com	Date: 13/5/2016 Scale 1: 500 Surveyor: CD/DC Stored: 35373	Ref: 35373 Datum: AHD Drawn By: CD	Sheet 4 of 5 Contour: 1.0m Checked: MF A1 SHEET
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NOTES:

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Client: WINGECARRIBEE SHIRE COUNCIL	Project: PLAN SHOWING DETAIL, LEVELS & CONTOURS OVER WELBY LANDFILL SITE LOCATED AT COLO STREET, WELBY.	FREEBURN  SURVEYING	MATTHEW FREEBURN LAND, ENGINEERING & MINING SURVEYOR SUITE 2, FIRST FLOOR, "SURVEYOR HOUSE" 2 CASTLEREAGH STREET PENRITH 2750	Telephone 02 4721 2289 Fax 02 4721 5646 email matthew@freeburnsurveyors.com	Date: 13/5/2016 Scale 1: 500 Surveyor: CD/DC Stored: 35373	Ref: 35373 Datum: AHD Drawn By: CD	Sheet 5 of 5 Contour: 1.0m Checked: MF A1 SHEET
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# Appendix B

Leachate Production Calculations – US EPA  
1975



**Table B1: Leachate Generation - Current Capping**

Parameter	January	February	March	April	May	June	July	August	September	October	November	December	Annual	Information Source
PET	116.7	98.3	91	61	49.2	36.4	51.6	68.7	99.3	116	90.10	124.1	1002.40	Derived from monthly total 2021 Bureau of Meteorology Moss Vale Evapotranspiration calculation (Penman-Monteith Equations from UN FAO56)
P	62.8	104.6	96.6	55.9	47.3	79.8	47.3	55.1	36.4	48.1	71.4	59.4	764.70	Mean rainfall derived from Moss Vale AWS (068239) Climate Statistics
C <sub>R/O</sub>	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		Derived from Table 3 of US EPA (1975), <i>Use of the Water Balance Method for Predicting Leachate Generation from Solid Waste Disposal Sites</i>
R/O	3.1	5.2	4.8	2.8	2.4	4.0	2.4	2.8	1.8	2.4	3.6	3.0	38.24	
I	59.7	99.4	91.8	53.1	44.9	75.8	44.9	52.3	34.6	45.7	67.8	56.4	726.5	
I-PET	-57.0	1.1	0.8	-7.9	-4.3	39.4	-6.7	-16.4	-64.7	-70.3	-22.3	-67.7	-275.9	
NEG (I-PET)	-581.0			-7.9	-12.2		-6.7	-23.0	-87.7	-158.0	-180.3	-248.0	-523.9	
ST	143.0	200.0	200.0	192.1	195.7	200.0	193.3	183.6	135.3	129.7	177.7	132.3		Base ST (200mm water per m of soil) derived from Silty Loam Available Water in Table 2 of US EPA (1975), <i>Use of the Water Balance Method for Predicting Leachate Generation from Solid Waste Disposal Sites</i>
Change in ST	10.6	0.0	0.0	-7.9	3.6	4.3	-6.7	-9.7	-48.4	-5.6	48.0	-45.4		
AET	49.0	98.3	91.0	61.0	41.3	36.4	51.6	62.0	82.9	51.3	19.8	101.8		
PERCOLATION	0.0	1.1	0.8	0.0	0.0	35.1	0.0	0.0	0.0	0.0	0.0	0.0	36.99	mm per square meter

PET Potential Evapotranspiration  
P Precipitation  
C<sub>R/O</sub> Surface Runoff Coefficient  
R/O Surface Runoff Coefficient  
I Infiltration  
ST Soil Moisture Storage  
Change in ST Change in Storage  
AET Actual Evapotranspiration  
PERC Percolation

**Table B2: Leachate Generation - Proposed Capping**

Parameter	January	February	March	April	May	June	July	August	September	October	November	December	Annual	Information Source
PET	116.7	98.3	91	61	49.2	36.4	51.6	68.7	99.3	116	90.10	124.1	1002.40	Derived from monthly total 2021 Bureau of Meteorology Moss Vale Evapotranspiration calculation (Penman-Monteith Equations from UN FAO56)
P	62.8	104.6	96.6	55.9	47.3	79.8	47.3	55.1	36.4	48.1	71.4	59.4	764.70	Mean rainfall derived from Moss Vale AWS (068239) Climate Statistics
C <sub>R/O</sub>	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2		Derived from Table 3 of US EPA (1975), <i>Use of the Water Balance Method for Predicting Leachate Generation from Solid Waste Disposal Sites</i>
R/O	12.6	20.9	19.3	11.2	9.5	16.0	9.5	11.0	7.3	9.6	14.3	11.9	152.94	
I	50.2	83.7	77.3	44.7	37.8	63.8	37.8	44.1	29.1	38.5	57.1	47.5	611.8	
I-PET	-66.5	-14.6	-13.7	-16.3	-11.4	27.4	-13.8	-24.6	-70.2	-77.5	-33.0	-76.6	-390.6	
NEG (I-PET)	-752.7			-16.3	-27.6		-13.8	-38.4	-108.6	-186.1	-219.1	-295.6	-686.3	
ST	133.5	200.0	200.0	183.7	188.6	200.0	186.2	175.4	129.8	122.5	167.0	123.4		Base ST (200mm water per m of soil) derived from Silty Loam Available Water in Table 2 of US EPA (1975), <i>Use of the Water Balance Method for Predicting Leachate Generation from Solid Waste Disposal Sites</i>
Change in ST	10.1	0.0	0.0	-16.3	4.9	11.4	-13.8	-10.9	-45.6	-7.3	44.5	-43.6		
AET	40.1	98.3	91.0	61.0	32.9	36.4	51.6	54.9	74.7	45.8	12.6	91.1		
PERCOLATION	0.0	0.0	0.0	0.0	0.0	16.1	0.0	0.0	0.0	0.0	0.0	0.0	16.08	mm per square meter

PET Potential Evapotranspiration  
P Precipitation  
C<sub>R/O</sub> Surface Runoff Coefficient  
R/O Surface Runoff Coefficient  
I Infiltration  
ST Soil Moisture Storage  
Change in ST Change in Storage  
AET Actual Evapotranspiration  
PERC Percolation

# Appendix C

Leachate Production Calculations – US EPA  
2020 (Visual HELP)



-----  
**HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE**  
**HELP MODEL VERSION 4.0 BETA (2018)**  
**DEVELOPED BY USEPA NATIONAL RISK MANAGEMENT RESEARCH LABORATORY**  
 -----

**Title:** Welby Landfill - Current Cap                      **Simulated On:** 16/05/2022 10:56  
 -----

**Layer 1**

Type 1 - Vertical Percolation Layer (Cover Soil)

SiL - Silty Loam

Material Texture Number 9

Thickness	=	99 centimeters
Porosity	=	0.501 vol/vol
Field Capacity	=	0.284 vol/vol
Wilting Point	=	0.135 vol/vol
Initial Soil Water Content	=	0.1584 vol/vol
Effective Sat. Hyd. Conductivity	=	1.90E-04 cm/sec

**Layer 2**

Type 1 - Vertical Percolation Layer (Waste)

Municipal Solid Waste (MSW) (900 pcy)

Material Texture Number 18

Thickness	=	1200 centimeters
Porosity	=	0.671 vol/vol
Field Capacity	=	0.292 vol/vol
Wilting Point	=	0.077 vol/vol
Initial Soil Water Content	=	0.292 vol/vol
Effective Sat. Hyd. Conductivity	=	1.00E-03 cm/sec

Note: Initial moisture content of the layers and snow water were computed as nearly steady-state values by HELP.

**General Design and Evaporative Zone Data**

SCS Runoff Curve Number	=	75.9
Fraction of Area Allowing Runoff	=	72 %
Area projected on a horizontal plane	=	7.9 Hectares
Evaporative Zone Depth	=	99 cm
Initial Water in Evaporative Zone	=	15.68 cm
Upper Limit of Evaporative Storage	=	49.6 cm
Lower Limit of Evaporative Storage	=	13.36 cm
Initial Snow Water	=	0 cm
Initial Water in Layer Materials	=	366.08 cm
Total Initial Water	=	366.08 cm
Total Subsurface Inflow	=	0 mm/year

Note: SCS Runoff Curve Number was calculated by HELP.

### Evapotranspiration and Weather Data

Station Latitude	=	31.33 Degrees
Maximum Leaf Area Index	=	2.45
Start of Growing Season (Julian Date)	=	244 days
End of Growing Season (Julian Date)	=	151 days
Average Wind Speed	=	12.4 kph
Average 1st Quarter Relative Humidity	=	67 %
Average 2nd Quarter Relative Humidity	=	71 %
Average 3rd Quarter Relative Humidity	=	64 %
Average 4th Quarter Relative Humidity	=	60 %

-----  
Note: Evapotranspiration data was obtained for ,

### Normal Mean Monthly Precipitation (mm)

<u>Jan/Jul</u>	<u>Feb/Aug</u>	<u>Mar/Sep</u>	<u>Apr/Oct</u>	<u>May/Nov</u>	<u>Jun/Dec</u>
64.99091	107.05	102.2455	55.83182	49.175	80.95
46.81227	56.01	37.22955	47.85091	72.07182	63.51455

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Note: Precipitation was simulated using NOAA data for the following weather station  
MOSS VALE AWS, AS, 0, 0

### Normal Mean Monthly Temperature (Degrees Celsius)

<u>Jan/Jul</u>	<u>Feb/Aug</u>	<u>Mar/Sep</u>	<u>Apr/Oct</u>	<u>May/Nov</u>	<u>Jun/Dec</u>
20.3	19.1	17	13.9	10.1	7.9
7.2	8.1	11.1	13.7	16.3	18.2

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Note: Temperature was simulated using NOAA data for the following weather station  
MOSS VALE AWS, AS, 0, 0  
Solar radiation was simulated using NSRDB data for the following location:  
2051109\_-34.43\_150.42



15:

15:



**Daily Output for Year 1**

**Column key:**

**Title:** Welby Landfill - Current Cap

**Simulated On:** 16/05/2022 10:56

Leak #1: leakage thru Layer 2

Day	Freezing Status*		Rain (mm)	Runoff (mm)	ET (mm)	Evap. Zone		Head #1 (cm)	Drain #1 (mm)	Leak #1 (mm)
	Air	Soil				Water (cm/cm)				
1			2.10	0.000	3.717	0.1568	0.0000	0.0000	0.00E+00	
2			2.10	0.000	3.379	0.1555	0.0000	0.0000	0.00E+00	
3			2.10	0.000	2.870	0.1547	0.0000	0.0000	0.00E+00	
4	*Note: head		2.10	0.000	2.664	0.1541	0.0000	0.0000	0.00E+00	
5			2.10	0.000	3.112	0.1531	0.0000	0.0000	0.00E+00	
6			2.10	0.000	4.105	0.1511	0.0000	0.0000	0.00E+00	
7			2.10	0.000	3.484	0.1497	0.0000	0.0000	0.00E+00	
8			2.10	0.000	3.861	0.1479	0.0000	0.0000	0.00E+00	
9			2.10	0.000	2.779	0.1472	0.0000	0.0000	0.00E+00	
10			2.10	0.000	3.145	0.1458	0.0000	0.0000	3.67E-01	
11			2.10	0.000	2.476	0.1455	0.0000	0.0000	4.60E-01	
12			2.10	0.000	2.645	0.1449	0.0000	0.0000	0.00E+00	
13			2.10	0.000	2.916	0.1441	0.0000	0.0000	0.00E+00	
14			2.10	0.000	3.070	0.1431	0.0000	0.0000	0.00E+00	
15			2.10	0.000	3.038	0.1422	0.0000	0.0000	0.00E+00	
16			2.10	0.000	3.489	0.1408	0.0000	0.0000	0.00E+00	
17			2.10	0.000	2.510	0.1402	0.0000	0.0000	0.00E+00	
18			2.10	0.000	2.141	0.1402	0.0000	0.0000	0.00E+00	
19			2.10	0.000	2.063	0.1402	0.0000	0.0000	0.00E+00	
20			2.10	0.000	2.103	0.1402	0.0000	0.0000	0.00E+00	
21			2.10	0.000	2.115	0.1402	0.0000	0.0000	0.00E+00	
22			2.10	0.000	2.037	0.1403	0.0000	0.0000	0.00E+00	
23			2.10	0.000	2.105	0.1403	0.0000	0.0000	0.00E+00	

24	2.10	0.000	1.980	0.1404	0.0000	0.0000	0.00E+00
25	2.10	0.000	2.240	0.1402	0.0000	0.0000	0.00E+00
26	2.10	0.000	2.070	0.1403	0.0000	0.0000	0.00E+00
27	2.10	0.000	2.166	0.1402	0.0000	0.0000	0.00E+00
28	2.10	0.000	2.129	0.1402	0.0000	0.0000	0.00E+00
29	2.10	0.000	2.061	0.1402	0.0000	0.0000	0.00E+00
30	2.10	0.000	2.217	0.1401	0.0000	0.0000	0.00E+00
31	2.10	0.000	2.148	0.1400	0.0000	0.0000	0.00E+00
32	3.90	0.000	2.153	0.1418	0.0000	0.0000	0.00E+00
33	3.90	0.000	2.838	0.1429	0.0000	0.0000	0.00E+00
34	3.90	0.000	3.002	0.1438	0.0000	0.0000	0.00E+00
35	3.90	0.000	2.416	0.1453	0.0000	0.0000	0.00E+00
36	3.90	0.000	2.827	0.1464	0.0000	0.0000	0.00E+00
37	3.90	0.000	2.301	0.1480	0.0000	0.0000	0.00E+00
38	3.90	0.000	2.264	0.1496	0.0000	0.0000	0.00E+00
39	3.90	0.000	2.813	0.1507	0.0000	0.0000	0.00E+00
40	3.90	0.000	2.473	0.1522	0.0000	0.0000	0.00E+00
41	3.90	0.000	2.672	0.1534	0.0000	0.0000	0.00E+00
42	3.90	0.000	2.415	0.1549	0.0000	0.0000	0.00E+00
43	3.90	0.000	2.053	0.1568	0.0000	0.0000	0.00E+00
44	3.90	0.000	1.871	0.1588	0.0000	0.0000	0.00E+00
45	3.90	0.000	2.296	0.1605	0.0000	0.0000	0.00E+00
46	3.90	0.000	2.167	0.1622	0.0000	0.0000	0.00E+00
47	3.90	0.000	2.219	0.1639	0.0000	0.0000	0.00E+00
48	3.90	0.000	2.826	0.1650	0.0000	0.0000	0.00E+00
49	3.90	0.000	3.781	0.1651	0.0000	0.0000	0.00E+00
50	3.90	0.000	3.436	0.1656	0.0000	0.0000	0.00E+00
51	3.90	0.000	3.502	0.1660	0.0000	0.0000	0.00E+00
52	3.90	0.000	4.315	0.1656	0.0000	0.0000	0.00E+00
53	3.90	0.000	4.112	0.1653	0.0000	0.0000	0.00E+00
54	3.90	0.000	4.350	0.1649	0.0000	0.0000	0.00E+00

55	3.90	0.000	4.416	0.1644	0.0000	0.0000	0.00E+00
56	3.90	0.000	3.651	0.1646	0.0000	0.0000	0.00E+00
57	3.90	0.000	4.413	0.1641	0.0000	0.0000	0.00E+00
58	0.00	0.000	2.770	0.1613	0.0000	0.0000	0.00E+00
59	4.00	0.000	2.836	0.1625	0.0000	0.0000	0.00E+00
60	5.00	0.000	3.546	0.1640	0.0000	0.0000	0.00E+00
61	4.00	0.000	3.954	0.1640	0.0000	0.0000	0.00E+00
62	16.00	0.000	4.750	0.1754	0.0000	0.0000	0.00E+00
63	0.20	0.000	4.002	0.1715	0.0000	0.0000	0.00E+00
64	0.00	0.000	2.375	0.1691	0.0000	0.0000	0.00E+00
65	3.00	0.000	3.027	0.1691	0.0000	0.0000	0.00E+00
66	3.00	0.000	3.354	0.1687	0.0000	0.0000	0.00E+00
67	1.00	0.000	4.016	0.1657	0.0000	0.0000	0.00E+00
68	1.00	0.000	2.904	0.1638	0.0000	0.0000	0.00E+00
69	6.00	0.000	2.964	0.1668	0.0000	0.0000	0.00E+00
70	0.80	0.000	2.900	0.1647	0.0000	0.0000	0.00E+00
71	3.00	0.000	3.873	0.1638	0.0000	0.0000	0.00E+00
72	0.40	0.000	3.396	0.1608	0.0000	0.0000	0.00E+00
73	0.00	0.000	2.001	0.1588	0.0000	0.0000	0.00E+00
74	0.00	0.000	2.117	0.1566	0.0000	0.0000	0.00E+00
75	0.00	0.000	3.329	0.1533	0.0000	0.0000	0.00E+00
76	8.00	0.000	3.115	0.1582	0.0000	0.0000	0.00E+00
77	0.80	0.000	3.515	0.1555	0.0000	0.0000	0.00E+00
78	0.00	0.000	2.251	0.1532	0.0000	0.0000	0.00E+00
79	0.00	0.000	2.407	0.1508	0.0000	0.0000	0.00E+00
80	0.20	0.000	1.793	0.1492	0.0000	0.0000	0.00E+00
81	0.40	0.000	2.612	0.1469	0.0000	0.0000	0.00E+00
82	0.00	0.000	3.113	0.1438	0.0000	0.0000	0.00E+00
83	0.00	0.000	3.341	0.1404	0.0000	0.0000	0.00E+00
84	0.00	0.000	3.789	0.1366	0.0000	0.0000	0.00E+00
85	0.00	0.000	1.310	0.1353	0.0000	0.0000	0.00E+00

86	0.20	0.000	0.402	0.1351	0.0000	0.0000	0.00E+00
87	0.00	0.000	0.053	0.1350	0.0000	0.0000	0.00E+00
88	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
89	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
90	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
91	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
92	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
93	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
94	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
95	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
96	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
97	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
98	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
99	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
100	37.00	0.000	1.855	0.1705	0.0000	0.0000	0.00E+00
101	0.20	0.000	1.750	0.1689	0.0000	0.0000	0.00E+00
102	0.00	0.000	1.401	0.1675	0.0000	0.0000	0.00E+00
103	0.00	0.000	1.050	0.1665	0.0000	0.0000	0.00E+00
104	0.00	0.000	1.961	0.1645	0.0000	0.0000	0.00E+00
105	0.00	0.000	1.612	0.1628	0.0000	0.0000	0.00E+00
106	0.00	0.000	0.885	0.1620	0.0000	0.0000	0.00E+00
107	0.00	0.000	1.423	0.1605	0.0000	0.0000	0.00E+00
108	0.20	0.000	2.298	0.1584	0.0000	0.0000	0.00E+00
109	0.00	0.000	1.532	0.1569	0.0000	0.0000	0.00E+00
110	0.80	0.000	1.831	0.1558	0.0000	0.0000	0.00E+00
111	17.00	0.000	3.234	0.1697	0.0000	0.0000	0.00E+00
112	20.00	0.000	2.744	0.1871	0.0000	0.0000	0.00E+00
113	1.90	0.000	1.771	0.1873	0.0000	0.0000	0.00E+00
114	1.90	0.000	2.451	0.1867	0.0000	0.0000	0.00E+00
115	0.00	0.000	0.615	0.1861	0.0000	0.0000	0.00E+00
116	0.00	0.000	1.760	0.1843	0.0000	0.0000	0.00E+00

117	0.00	0.000	1.094	0.1832	0.0000	0.0000	0.00E+00
118	0.00	0.000	1.178	0.1820	0.0000	0.0000	0.00E+00
119	0.00	0.000	1.241	0.1808	0.0000	0.0000	0.00E+00
120	0.80	0.000	2.241	0.1793	0.0000	0.0000	0.00E+00
121	1.00	0.000	2.149	0.1782	0.0000	0.0000	0.00E+00
122	2.00	0.000	1.867	0.1783	0.0000	0.0000	0.00E+00
123	0.20	0.000	0.954	0.1775	0.0000	0.0000	0.00E+00
124	0.00	0.000	1.503	0.1760	0.0000	0.0000	0.00E+00
125	0.20	0.000	1.679	0.1745	0.0000	0.0000	0.00E+00
126	8.00	0.000	2.555	0.1800	0.0000	0.0000	0.00E+00
127	10.00	0.000	2.557	0.1875	0.0000	0.0000	0.00E+00
128	4.00	0.000	2.616	0.1889	0.0000	0.0000	0.00E+00
129	6.00	0.000	2.411	0.1926	0.0000	0.0000	0.00E+00
130	0.20	0.000	1.566	0.1912	0.0000	0.0000	0.00E+00
131	0.20	0.000	1.317	0.1900	0.0000	0.0000	0.00E+00
132	0.20	0.000	1.461	0.1888	0.0000	0.0000	0.00E+00
133	0.00	0.000	1.296	0.1875	0.0000	0.0000	0.00E+00
134	0.00	0.000	1.307	0.1861	0.0000	0.0000	0.00E+00
135	0.00	0.000	1.405	0.1847	0.0000	0.0000	0.00E+00
136	0.00	0.000	1.444	0.1833	0.0000	0.0000	0.00E+00
137	0.00	0.000	1.246	0.1820	0.0000	0.0000	0.00E+00
138	0.20	0.000	1.244	0.1810	0.0000	0.0000	0.00E+00
139	0.20	0.000	1.063	0.1801	0.0000	0.0000	0.00E+00
140	0.00	0.000	0.927	0.1791	0.0000	0.0000	0.00E+00
141	0.40	0.000	1.415	0.1781	0.0000	0.0000	0.00E+00
142	0.00	0.000	0.744	0.1774	0.0000	0.0000	0.00E+00
143	1.00	0.000	1.635	0.1767	0.0000	0.0000	0.00E+00
144	0.40	0.000	0.872	0.1763	0.0000	0.0000	0.00E+00
145	0.00	0.000	0.849	0.1754	0.0000	0.0000	0.00E+00
146	0.00	0.000	1.088	0.1743	0.0000	0.0000	0.00E+00
147	0.00	0.000	0.923	0.1734	0.0000	0.0000	0.00E+00

148	0.00	0.000	0.884	0.1725	0.0000	0.0000	0.00E+00
149	8.00	0.000	2.010	0.1785	0.0000	0.0000	0.00E+00
150	1.00	0.000	0.966	0.1786	0.0000	0.0000	0.00E+00
151	0.00	0.000	0.481	0.1781	0.0000	0.0000	0.00E+00
152	0.20	0.000	0.589	0.1777	0.0000	0.0000	0.00E+00
153	0.00	0.000	1.004	0.1767	0.0000	0.0000	0.00E+00
154	0.00	0.000	1.254	0.1754	0.0000	0.0000	0.00E+00
155	0.20	0.000	0.860	0.1747	0.0000	0.0000	0.00E+00
156	0.00	0.000	1.290	0.1734	0.0000	0.0000	0.00E+00
157	0.20	0.000	1.577	0.1720	0.0000	0.0000	0.00E+00
158	0.00	0.000	1.178	0.1708	0.0000	0.0000	0.00E+00
159	0.40	0.000	1.877	0.1694	0.0000	0.0000	0.00E+00
160	2.00	0.000	2.141	0.1692	0.0000	0.0000	0.00E+00
161	0.00	0.000	0.905	0.1683	0.0000	0.0000	0.00E+00
162	5.00	0.000	2.199	0.1711	0.0000	0.0000	0.00E+00
163	0.00	0.000	0.949	0.1702	0.0000	0.0000	0.00E+00
164	1.00	0.000	1.360	0.1698	0.0000	0.0000	0.00E+00
165	0.00	0.000	0.696	0.1691	0.0000	0.0000	0.00E+00
166	0.00	0.000	0.748	0.1683	0.0000	0.0000	0.00E+00
167	0.00	0.000	0.744	0.1676	0.0000	0.0000	0.00E+00
168	0.00	0.000	1.182	0.1664	0.0000	0.0000	0.00E+00
169	0.20	0.000	1.390	0.1652	0.0000	0.0000	0.00E+00
170	0.20	0.000	1.457	0.1639	0.0000	0.0000	0.00E+00
171	0.00	0.000	1.221	0.1627	0.0000	0.0000	0.00E+00
172	0.00	0.000	0.878	0.1618	0.0000	0.0000	0.00E+00
173	0.00	0.000	1.307	0.1605	0.0000	0.0000	0.00E+00
174	0.00	0.000	1.257	0.1592	0.0000	0.0000	0.00E+00
175	0.20	0.000	1.390	0.1580	0.0000	0.0000	0.00E+00
176	0.00	0.000	1.259	0.1567	0.0000	0.0000	0.00E+00
177	0.00	0.000	1.340	0.1554	0.0000	0.0000	0.00E+00
178	0.60	0.000	1.626	0.1544	0.0000	0.0000	0.00E+00

179	0.00	0.000	1.181	0.1532	0.0000	0.0000	0.00E+00
180	0.20	0.000	0.942	0.1524	0.0000	0.0000	0.00E+00
181	0.00	0.000	0.519	0.1519	0.0000	0.0000	0.00E+00
182	0.20	0.000	1.181	0.1509	0.0000	0.0000	0.00E+00
183	0.20	0.000	1.111	0.1500	0.0000	0.0000	0.00E+00
184	0.00	0.000	0.874	0.1491	0.0000	0.0000	0.00E+00
185	0.20	0.000	1.007	0.1483	0.0000	0.0000	0.00E+00
186	0.20	0.000	0.967	0.1475	0.0000	0.0000	0.00E+00
187	6.00	0.000	1.702	0.1518	0.0000	0.0000	0.00E+00
188	0.00	0.000	0.721	0.1511	0.0000	0.0000	0.00E+00
189	0.00	0.000	0.694	0.1504	0.0000	0.0000	0.00E+00
190	0.40	0.000	0.996	0.1498	0.0000	0.0000	0.00E+00
191	16.00	0.000	1.599	0.1644	0.0000	0.0000	0.00E+00
192	38.00	0.000	2.373	0.2003	0.0000	0.0000	0.00E+00
193	0.20	0.000	1.690	0.1988	0.0000	0.0000	0.00E+00
194	1.00	0.000	1.167	0.1987	0.0000	0.0000	0.00E+00
195	3.00	0.000	2.240	0.1994	0.0000	0.0000	0.00E+00
196	0.20	0.000	1.284	0.1983	0.0000	0.0000	0.00E+00
197	0.00	0.000	0.839	0.1975	0.0000	0.0000	0.00E+00
198	0.00	0.000	0.562	0.1969	0.0000	0.0000	0.00E+00
199	0.00	0.000	1.061	0.1959	0.0000	0.0000	0.00E+00
200	0.00	0.000	0.563	0.1953	0.0000	0.0000	0.00E+00
201	0.20	0.000	0.885	0.1946	0.0000	0.0000	0.00E+00
202	0.20	0.000	0.863	0.1939	0.0000	0.0000	0.00E+00
203	0.00	0.000	0.559	0.1934	0.0000	0.0000	0.00E+00
204	0.40	0.000	1.621	0.1921	0.0000	0.0000	0.00E+00
205	2.00	0.000	1.751	0.1924	0.0000	0.0000	0.00E+00
206	2.00	0.000	1.892	0.1925	0.0000	0.0000	0.00E+00
207	9.00	0.000	2.436	0.1991	0.0000	0.0000	0.00E+00
208	19.00	0.000	2.310	0.2160	0.0000	0.0000	0.00E+00
209	3.00	0.000	2.365	0.2166	0.0000	0.0000	0.00E+00

210	0.80	0.000	2.033	0.2154	0.0000	0.0000	0.00E+00
211	2.00	0.000	2.331	0.2150	0.0000	0.0000	0.00E+00
212	0.40	0.000	1.300	0.2141	0.0000	0.0000	0.00E+00
213	0.00	0.000	1.509	0.2126	0.0000	0.0000	0.00E+00
214	2.00	0.000	2.114	0.2125	0.0000	0.0000	0.00E+00
215	0.20	0.000	1.537	0.2111	0.0000	0.0000	0.00E+00
216	0.00	0.000	1.589	0.2095	0.0000	0.0000	0.00E+00
217	0.00	0.000	1.571	0.2080	0.0000	0.0000	0.00E+00
218	0.00	0.000	0.976	0.2070	0.0000	0.0000	0.00E+00
219	0.00	0.000	0.935	0.2060	0.0000	0.0000	0.00E+00
220	0.00	0.000	0.442	0.2056	0.0000	0.0000	0.00E+00
221	0.00	0.000	0.550	0.2050	0.0000	0.0000	0.00E+00
222	0.00	0.000	0.694	0.2043	0.0000	0.0000	0.00E+00
223	0.00	0.000	0.480	0.2038	0.0000	0.0000	0.00E+00
224	1.81	0.000	1.425	0.2042	0.0000	0.0000	0.00E+00
225	1.81	0.000	2.274	0.2038	0.0000	0.0000	0.00E+00
226	1.81	0.000	1.352	0.2042	0.0000	0.0000	0.00E+00
227	1.81	0.000	1.439	0.2046	0.0000	0.0000	0.00E+00
228	1.81	0.000	1.782	0.2046	0.0000	0.0000	0.00E+00
229	1.81	0.000	1.336	0.2051	0.0000	0.0000	0.00E+00
230	0.00	0.000	1.489	0.2036	0.0000	0.0000	0.00E+00
231	0.00	0.000	0.867	0.2027	0.0000	0.0000	0.00E+00
232	0.00	0.000	1.247	0.2015	0.0000	0.0000	0.00E+00
233	0.00	0.000	1.168	0.2003	0.0000	0.0000	0.00E+00
234	1.00	0.000	1.686	0.1996	0.0000	0.0000	0.00E+00
235	0.00	0.000	1.162	0.1984	0.0000	0.0000	0.00E+00
236	0.00	0.000	1.474	0.1969	0.0000	0.0000	0.00E+00
237	0.00	0.000	1.762	0.1951	0.0000	0.0000	0.00E+00
238	0.00	0.000	1.755	0.1934	0.0000	0.0000	0.00E+00
239	19.00	0.000	2.006	0.2105	0.0000	0.0000	0.00E+00
240	46.00	0.364	2.426	0.2542	0.0000	0.0000	0.00E+00



241	17.00	0.000	2.304	0.2690	0.0000	0.0000	0.00E+00
242	17.00	0.000	2.387	0.2838	0.0000	0.0000	0.00E+00
243	0.40	0.000	2.017	0.2822	0.0000	0.0000	0.00E+00
244	0.20	0.000	1.834	0.2805	0.0000	0.0000	0.00E+00
245	0.80	0.000	1.614	0.2797	0.0000	0.0000	0.00E+00
246	0.40	0.000	2.270	0.2778	0.0000	0.0000	0.00E+00
247	0.00	0.000	1.688	0.2761	0.0000	0.0000	0.00E+00
248	0.40	0.000	1.020	0.2755	0.0000	0.0000	0.00E+00
249	0.20	0.000	1.745	0.2739	0.0000	0.0000	0.00E+00
250	0.00	0.000	2.027	0.2719	0.0000	0.0000	0.00E+00
251	1.00	0.000	2.310	0.2705	0.0000	0.0000	0.00E+00
252	0.00	0.000	0.802	0.2697	0.0000	0.0000	0.00E+00
253	0.20	0.000	1.878	0.2680	0.0000	0.0000	0.00E+00
254	0.00	0.000	1.538	0.2665	0.0000	0.0000	0.00E+00
255	17.00	0.000	2.980	0.2806	0.0000	0.0000	0.00E+00
256	7.00	0.000	3.100	0.2846	0.0000	0.0000	0.00E+00
257	0.00	0.000	2.102	0.2824	0.0000	0.0000	0.00E+00
258	0.20	0.000	2.294	0.2803	0.0000	0.0000	0.00E+00
259	0.00	0.000	2.247	0.2781	0.0000	0.0000	0.00E+00
260	0.00	0.000	2.141	0.2759	0.0000	0.0000	0.00E+00
261	0.80	0.000	2.970	0.2737	0.0000	0.0000	0.00E+00
262	0.00	0.000	2.640	0.2710	0.0000	0.0000	0.00E+00
263	0.00	0.000	2.138	0.2689	0.0000	0.0000	0.00E+00
264	14.00	0.000	3.504	0.2795	0.0000	0.0000	0.00E+00
265	0.00	0.000	2.743	0.2767	0.0000	0.0000	0.00E+00
266	0.00	0.000	2.658	0.2740	0.0000	0.0000	0.00E+00
267	0.00	0.000	0.983	0.2730	0.0000	0.0000	0.00E+00
268	0.00	0.000	1.392	0.2716	0.0000	0.0000	0.00E+00
269	3.00	0.000	2.557	0.2721	0.0000	0.0000	0.00E+00
270	0.00	0.000	2.047	0.2700	0.0000	0.0000	0.00E+00
271	0.20	0.000	1.139	0.2691	0.0000	0.0000	0.00E+00

272	0.00	0.000	2.078	0.2667	0.0000	0.0000	0.00E+00
273	0.00	0.000	2.643	0.2640	0.0000	0.0000	0.00E+00
274	0.20	0.000	2.060	0.2621	0.0000	0.0000	0.00E+00
275	2.00	0.000	2.563	0.2613	0.0000	0.0000	5.35E-01
276	56.00	1.087	2.843	0.3136	0.0000	0.0000	5.55E-01
277	0.00	0.000	1.790	0.3116	0.0000	0.0000	0.00E+00
278	0.00	0.000	2.076	0.3095	0.0000	0.0000	0.00E+00
279	1.00	0.000	2.081	0.3084	0.0000	0.0000	0.00E+00
280	0.00	0.000	1.403	0.3070	0.0000	0.0000	0.00E+00
281	0.00	0.000	1.607	0.3053	0.0000	0.0000	0.00E+00
282	7.00	0.000	2.449	0.3099	0.0000	0.0000	0.00E+00
283	0.00	0.000	2.574	0.3073	0.0000	0.0000	0.00E+00
284	5.00	0.000	3.059	0.3092	0.0000	0.0000	0.00E+00
285	4.00	0.000	3.027	0.3087	0.0000	0.0000	6.17E-01
286	0.00	0.000	2.730	0.3037	0.0000	0.0000	7.00E-01
287	4.00	0.000	2.508	0.3029	0.0000	0.0000	1.09E+00
288	9.00	0.000	2.914	0.3074	0.0000	0.0000	1.58E+00
289	0.00	0.000	3.087	0.3027	0.0000	0.0000	1.42E+00
290	0.00	0.000	3.196	0.2982	0.0000	0.0000	1.52E+00
291	0.60	0.000	3.583	0.2940	0.0000	0.0000	1.14E+00
292	0.00	0.000	3.026	0.2893	0.0000	0.0000	7.35E-01
293	1.00	0.000	3.199	0.2859	0.0000	0.0000	1.14E+00
294	0.00	0.000	2.940	0.2821	0.0000	0.0000	1.05E+00
295	0.00	0.000	2.746	0.2785	0.0000	0.0000	4.92E-01
296	0.00	0.000	3.235	0.2745	0.0000	0.0000	2.20E-01
297	0.80	0.000	4.126	0.2706	0.0000	0.0000	3.26E-01
298	2.00	0.000	2.594	0.2692	0.0000	0.0000	8.20E-01
299	0.00	0.000	1.846	0.2665	0.0000	0.0000	1.07E+00
300	0.00	0.000	2.069	0.2636	0.0000	0.0000	1.20E+00
301	0.00	0.000	3.170	0.2593	0.0000	0.0000	1.49E+00
302	0.00	0.000	2.169	0.2565	0.0000	0.0000	1.11E+00

303	0.00	0.000	3.550	0.2525	0.0000	0.0000	1.74E+00
304	0.00	0.000	2.874	0.2490	0.0000	0.0000	2.22E+00
305	0.00	0.000	2.055	0.2464	0.0000	0.0000	9.19E-01
306	0.00	0.000	2.296	0.2435	0.0000	0.0000	9.47E-01
307	0.00	0.000	1.188	0.2415	0.0000	0.0000	6.09E-01
308	0.00	0.000	2.122	0.2388	0.0000	0.0000	8.55E-01
309	0.00	0.000	2.431	0.2358	0.0000	0.0000	1.09E-01
310	8.00	0.000	2.535	0.2408	0.0000	0.0000	1.04E+00
311	24.00	0.000	2.202	0.2624	0.0000	0.0000	0.00E+00
312	3.00	0.000	2.202	0.2628	0.0000	0.0000	6.29E-01
313	0.00	0.000	2.318	0.2605	0.0000	0.0000	4.87E-01
314	2.00	0.000	3.486	0.2589	0.0000	0.0000	0.00E+00
315	0.00	0.000	2.614	0.2563	0.0000	0.0000	0.00E+00
316	1.00	0.000	2.564	0.2547	0.0000	0.0000	0.00E+00
317	0.80	0.000	2.305	0.2532	0.0000	0.0000	0.00E+00
318	0.80	0.000	2.989	0.2510	0.0000	0.0000	0.00E+00
319	0.20	0.000	4.372	0.2468	0.0000	0.0000	0.00E+00
320	0.40	0.000	2.699	0.2445	0.0000	0.0000	0.00E+00
321	0.00	0.000	2.659	0.2418	0.0000	0.0000	0.00E+00
322	3.00	0.000	3.883	0.2409	0.0000	0.0000	0.00E+00
323	11.00	0.000	2.501	0.2495	0.0000	0.0000	0.00E+00
324	10.00	0.000	2.244	0.2573	0.0000	0.0000	0.00E+00
325	5.00	0.000	3.015	0.2593	0.0000	0.0000	0.00E+00
326	0.00	0.000	2.230	0.2571	0.0000	0.0000	0.00E+00
327	0.00	0.000	2.228	0.2548	0.0000	0.0000	0.00E+00
328	2.00	0.000	2.658	0.2541	0.0000	0.0000	0.00E+00
329	0.00	0.000	2.621	0.2514	0.0000	0.0000	0.00E+00
330	0.00	0.000	2.681	0.2487	0.0000	0.0000	0.00E+00
331	0.00	0.000	3.581	0.2451	0.0000	0.0000	0.00E+00
332	0.60	0.000	3.774	0.2419	0.0000	0.0000	0.00E+00
333	0.00	0.000	3.249	0.2386	0.0000	0.0000	0.00E+00

334	0.00	0.000	2.921	0.2357	0.0000	0.0000	0.00E+00
335	0.00	0.000	3.898	0.2317	0.0000	0.0000	0.00E+00
336	0.00	0.000	2.837	0.2289	0.0000	0.0000	0.00E+00
337	0.00	0.000	5.153	0.2237	0.0000	0.0000	0.00E+00
338	0.00	0.000	2.529	0.2211	0.0000	0.0000	0.00E+00
339	1.00	0.000	2.357	0.2197	0.0000	0.0000	0.00E+00
340	0.20	0.000	2.501	0.2174	0.0000	0.0000	0.00E+00
341	0.00	0.000	2.763	0.2146	0.0000	0.0000	0.00E+00
342	5.00	0.000	1.631	0.2180	0.0000	0.0000	0.00E+00
343	0.80	0.000	2.382	0.2164	0.0000	0.0000	0.00E+00
344	0.00	0.000	2.440	0.2140	0.0000	0.0000	0.00E+00
345	0.00	0.000	2.408	0.2115	0.0000	0.0000	0.00E+00
346	0.00	0.000	1.161	0.2104	0.0000	0.0000	0.00E+00
347	0.00	0.000	1.448	0.2089	0.0000	0.0000	0.00E+00
348	0.00	0.000	3.117	0.2057	0.0000	0.0000	0.00E+00
349	0.20	0.000	2.691	0.2032	0.0000	0.0000	0.00E+00
350	0.40	0.000	2.573	0.2010	0.0000	0.0000	0.00E+00
351	0.40	0.000	2.898	0.1985	0.0000	0.0000	0.00E+00
352	0.00	0.000	3.455	0.1950	0.0000	0.0000	0.00E+00
353	0.00	0.000	2.728	0.1923	0.0000	0.0000	0.00E+00
354	0.20	0.000	3.112	0.1893	0.0000	0.0000	0.00E+00
355	0.00	0.000	2.788	0.1865	0.0000	0.0000	0.00E+00
356	0.20	0.000	2.631	0.1841	0.0000	0.0000	0.00E+00
357	0.20	0.000	2.699	0.1815	0.0000	0.0000	0.00E+00
358	3.00	0.000	3.901	0.1806	0.0000	0.0000	0.00E+00
359	0.00	0.000	2.635	0.1780	0.0000	0.0000	0.00E+00
360	0.00	0.000	2.487	0.1754	0.0000	0.0000	0.00E+00
361	0.00	0.000	2.531	0.1729	0.0000	0.0000	0.00E+00
362	0.00	0.000	3.198	0.1697	0.0000	0.0000	0.00E+00
363	0.00	0.000	3.160	0.1665	0.0000	0.0000	0.00E+00
364	2.04	0.000	2.931	0.1656	0.0000	0.0000	0.00E+00

365

0.00      0.000      3.905      0.1616      0.0000      0.0000      0.00E+00

\* = Frozen (air or soil)

Annual Totals for Year 1			
	mm*	cubic meters	percent
Precipitation	799.00	63,121.0	100.00
Runoff	1.450	114.6	0.18
Evapotranspiration	765.993	60,513.4	95.87
Percolation/Leakage through Layer 2	29.179707	2,305.2	3.65
Change in Water Storage	2.3772	187.8	0.30
Soil Water at Start of Year	3,660.7680	289,200.7	458.17
Soil Water at End of Year	3,663.1452	289,388.5	458.47
Snow Water at Start of Year	0.0000	0.0000	0.00
Snow Water at End of Year	0.0000	0.0000	0.00
Annual Water Budget Balance	0.0000	0.0000	0.00

\*Note: head on liners expressed in cm

**Daily Output for Year 2**

**Column key:**

**Title:** Welby Landfill - Current Cap

**Simulated On:** 16/05/2022 10:56

Leak #1: leakage thru Layer 2

Day	Freezing Status*		Rain (mm)	Runoff (mm)	ET (mm)	Evap. Zone			
	Air	Soil				Water (cm/cm)	Head #1 (cm)	Drain #1 (mm)	Leak #1 (mm)
1			0.00	0.000	3.968	0.1576	0.0000	0.0000	0.00E+00
2			0.00	0.000	3.392	0.1542	0.0000	0.0000	0.00E+00
3			0.00	0.000	3.160	0.1510	0.0000	0.0000	0.00E+00
4	*Note: head		0.00	0.000	2.703	0.1483	0.0000	0.0000	0.00E+00
5			0.00	0.000	3.435	0.1448	0.0000	0.0000	0.00E+00
6			0.00	0.000	3.690	0.1411	0.0000	0.0000	0.00E+00
7			12.00	0.000	4.646	0.1485	0.0000	0.0000	0.00E+00
8			0.00	0.000	2.581	0.1459	0.0000	0.0000	0.00E+00
9			0.00	0.000	3.062	0.1428	0.0000	0.0000	0.00E+00
10			0.00	0.000	2.395	0.1404	0.0000	0.0000	0.00E+00
11			0.00	0.000	2.583	0.1378	0.0000	0.0000	0.00E+00
12			0.00	0.000	1.918	0.1358	0.0000	0.0000	0.00E+00
13			0.20	0.000	0.740	0.1353	0.0000	0.0000	0.00E+00
14			0.00	0.000	0.205	0.1351	0.0000	0.0000	0.00E+00
15			0.00	0.000	0.056	0.1350	0.0000	0.0000	0.00E+00
16			27.00	0.000	1.722	0.1606	0.0000	0.0000	0.00E+00
17			0.20	0.000	2.145	0.1586	0.0000	0.0000	0.00E+00
18			0.00	0.000	3.138	0.1554	0.0000	0.0000	0.00E+00
19			0.00	0.000	3.698	0.1517	0.0000	0.0000	0.00E+00
20			0.00	0.000	3.508	0.1481	0.0000	0.0000	0.00E+00
21			0.00	0.000	3.364	0.1447	0.0000	0.0000	0.00E+00
22			27.00	0.000	4.089	0.1679	0.0000	0.0000	0.00E+00
23			0.00	0.000	3.474	0.1644	0.0000	0.0000	0.00E+00

24	0.00	0.000	2.915	0.1614	0.0000	0.0000	0.00E+00
25	5.00	0.000	2.388	0.1641	0.0000	0.0000	0.00E+00
26	0.20	0.000	2.890	0.1614	0.0000	0.0000	0.00E+00
27	0.00	0.000	3.521	0.1578	0.0000	0.0000	0.00E+00
28	0.00	0.000	2.852	0.1549	0.0000	0.0000	0.00E+00
29	0.00	0.000	3.073	0.1518	0.0000	0.0000	0.00E+00
30	1.00	0.000	3.487	0.1493	0.0000	0.0000	0.00E+00
31	1.00	0.000	3.134	0.1471	0.0000	0.0000	0.00E+00
32	4.00	0.000	2.736	0.1484	0.0000	0.0000	0.00E+00
33	5.00	0.000	2.439	0.1510	0.0000	0.0000	0.00E+00
34	0.80	0.000	2.399	0.1494	0.0000	0.0000	0.00E+00
35	25.00	0.000	4.099	0.1705	0.0000	0.0000	0.00E+00
36	51.00	0.677	3.883	0.2174	0.0000	0.0000	0.00E+00
37	15.00	0.000	4.011	0.2285	0.0000	0.0000	0.00E+00
38	10.00	0.000	2.595	0.2360	0.0000	0.0000	0.00E+00
39	0.00	0.000	2.598	0.2334	0.0000	0.0000	0.00E+00
40	0.00	0.000	2.687	0.2307	0.0000	0.0000	0.00E+00
41	0.60	0.000	2.910	0.2283	0.0000	0.0000	0.00E+00
42	10.00	0.000	3.079	0.2353	0.0000	0.0000	0.00E+00
43	1.00	0.000	3.638	0.2326	0.0000	0.0000	0.00E+00
44	0.20	0.000	3.518	0.2293	0.0000	0.0000	0.00E+00
45	0.00	0.000	4.151	0.2251	0.0000	0.0000	0.00E+00
46	0.00	0.000	4.860	0.2202	0.0000	0.0000	0.00E+00
47	9.00	0.000	5.352	0.2239	0.0000	0.0000	0.00E+00
48	0.00	0.000	3.318	0.2205	0.0000	0.0000	0.00E+00
49	7.00	0.000	4.011	0.2235	0.0000	0.0000	0.00E+00
50	1.00	0.000	4.370	0.2201	0.0000	0.0000	0.00E+00
51	0.00	0.000	3.968	0.2161	0.0000	0.0000	0.00E+00
52	0.20	0.000	4.635	0.2117	0.0000	0.0000	0.00E+00
53	0.00	0.000	4.096	0.2075	0.0000	0.0000	0.00E+00
54	0.00	0.000	4.740	0.2027	0.0000	0.0000	0.00E+00

55	0.00	0.000	4.925	0.1978	0.0000	0.0000	0.00E+00
56	0.00	0.000	4.816	0.1929	0.0000	0.0000	0.00E+00
57	8.00	0.000	3.159	0.1978	0.0000	0.0000	0.00E+00
58	0.20	0.000	3.533	0.1944	0.0000	0.0000	0.00E+00
59	20.00	0.000	2.788	0.2118	0.0000	0.0000	0.00E+00
60	0.00	0.000	2.705	0.2091	0.0000	0.0000	0.00E+00
61	0.00	0.000	3.017	0.2060	0.0000	0.0000	0.00E+00
62	0.00	0.000	2.461	0.2035	0.0000	0.0000	0.00E+00
63	0.00	0.000	2.378	0.2011	0.0000	0.0000	0.00E+00
64	1.00	0.000	2.350	0.1998	0.0000	0.0000	0.00E+00
65	1.00	0.000	4.636	0.1961	0.0000	0.0000	0.00E+00
66	0.00	0.000	3.888	0.1922	0.0000	0.0000	0.00E+00
67	0.20	0.000	2.542	0.1898	0.0000	0.0000	0.00E+00
68	2.00	0.000	2.474	0.1893	0.0000	0.0000	0.00E+00
69	0.20	0.000	4.172	0.1853	0.0000	0.0000	0.00E+00
70	0.00	0.000	4.282	0.1810	0.0000	0.0000	0.00E+00
71	0.20	0.000	4.251	0.1769	0.0000	0.0000	0.00E+00
72	0.00	0.000	3.220	0.1736	0.0000	0.0000	0.00E+00
73	0.20	0.000	4.308	0.1695	0.0000	0.0000	0.00E+00
74	0.00	0.000	4.134	0.1653	0.0000	0.0000	0.00E+00
75	0.20	0.000	3.942	0.1615	0.0000	0.0000	0.00E+00
76	0.00	0.000	4.774	0.1567	0.0000	0.0000	0.00E+00
77	0.00	0.000	4.295	0.1524	0.0000	0.0000	0.00E+00
78	0.00	0.000	5.185	0.1471	0.0000	0.0000	0.00E+00
79	0.00	0.000	4.028	0.1431	0.0000	0.0000	0.00E+00
80	0.00	0.000	3.292	0.1397	0.0000	0.0000	0.00E+00
81	0.40	0.000	2.534	0.1376	0.0000	0.0000	0.00E+00
82	0.00	0.000	2.391	0.1352	0.0000	0.0000	0.00E+00
83	0.20	0.000	0.369	0.1350	0.0000	0.0000	0.00E+00
84	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
85	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00



86	30.00	0.000	2.927	0.1623	0.0000	0.0000	0.00E+00
87	0.00	0.000	1.827	0.1605	0.0000	0.0000	0.00E+00
88	25.00	0.000	2.387	0.1833	0.0000	0.0000	0.00E+00
89	11.00	0.000	3.096	0.1913	0.0000	0.0000	0.00E+00
90	2.00	0.000	3.498	0.1898	0.0000	0.0000	0.00E+00
91	0.20	0.000	2.953	0.1870	0.0000	0.0000	0.00E+00
92	0.20	0.000	2.477	0.1847	0.0000	0.0000	0.00E+00
93	0.20	0.000	3.599	0.1813	0.0000	0.0000	0.00E+00
94	0.00	0.000	2.908	0.1784	0.0000	0.0000	0.00E+00
95	0.20	0.000	3.105	0.1754	0.0000	0.0000	0.00E+00
96	0.00	0.000	2.745	0.1727	0.0000	0.0000	0.00E+00
97	0.40	0.000	3.126	0.1699	0.0000	0.0000	0.00E+00
98	0.00	0.000	3.111	0.1668	0.0000	0.0000	0.00E+00
99	0.00	0.000	1.968	0.1648	0.0000	0.0000	0.00E+00
100	0.20	0.000	3.445	0.1615	0.0000	0.0000	0.00E+00
101	0.00	0.000	2.947	0.1585	0.0000	0.0000	0.00E+00
102	0.20	0.000	2.829	0.1559	0.0000	0.0000	0.00E+00
103	0.20	0.000	3.032	0.1530	0.0000	0.0000	0.00E+00
104	6.00	0.000	3.801	0.1552	0.0000	0.0000	0.00E+00
105	0.80	0.000	2.348	0.1537	0.0000	0.0000	0.00E+00
106	0.20	0.000	2.224	0.1516	0.0000	0.0000	0.00E+00
107	0.20	0.000	2.198	0.1496	0.0000	0.0000	0.00E+00
108	16.00	0.000	2.260	0.1635	0.0000	0.0000	0.00E+00
109	0.20	0.000	1.285	0.1624	0.0000	0.0000	0.00E+00
110	0.00	0.000	1.727	0.1606	0.0000	0.0000	0.00E+00
111	0.80	0.000	2.379	0.1590	0.0000	0.0000	0.00E+00
112	13.00	0.000	2.835	0.1693	0.0000	0.0000	0.00E+00
113	14.00	0.000	2.338	0.1811	0.0000	0.0000	0.00E+00
114	0.20	0.000	1.148	0.1801	0.0000	0.0000	0.00E+00
115	0.00	0.000	1.282	0.1788	0.0000	0.0000	0.00E+00
116	0.20	0.000	2.108	0.1769	0.0000	0.0000	0.00E+00

117	0.00	0.000	1.395	0.1755	0.0000	0.0000	0.00E+00
118	0.00	0.000	1.469	0.1740	0.0000	0.0000	0.00E+00
119	0.00	0.000	1.453	0.1725	0.0000	0.0000	0.00E+00
120	0.20	0.000	1.204	0.1715	0.0000	0.0000	0.00E+00
121	0.20	0.000	1.520	0.1702	0.0000	0.0000	0.00E+00
122	0.20	0.000	1.510	0.1689	0.0000	0.0000	0.00E+00
123	0.40	0.000	1.431	0.1678	0.0000	0.0000	0.00E+00
124	0.20	0.000	1.655	0.1664	0.0000	0.0000	0.00E+00
125	0.20	0.000	1.840	0.1647	0.0000	0.0000	0.00E+00
126	0.20	0.000	1.589	0.1633	0.0000	0.0000	0.00E+00
127	0.00	0.000	1.462	0.1618	0.0000	0.0000	0.00E+00
128	0.00	0.000	0.567	0.1613	0.0000	0.0000	0.00E+00
129	0.00	0.000	1.311	0.1599	0.0000	0.0000	0.00E+00
130	0.20	0.000	1.643	0.1585	0.0000	0.0000	0.00E+00
131	0.00	0.000	1.232	0.1572	0.0000	0.0000	0.00E+00
132	0.20	0.000	1.420	0.1560	0.0000	0.0000	0.00E+00
133	0.20	0.000	1.220	0.1550	0.0000	0.0000	0.00E+00
134	3.00	0.000	2.379	0.1556	0.0000	0.0000	0.00E+00
135	0.00	0.000	1.301	0.1543	0.0000	0.0000	0.00E+00
136	0.20	0.000	1.466	0.1530	0.0000	0.0000	0.00E+00
137	1.00	0.000	1.818	0.1522	0.0000	0.0000	0.00E+00
138	0.00	0.000	0.978	0.1512	0.0000	0.0000	0.00E+00
139	0.20	0.000	1.254	0.1501	0.0000	0.0000	0.00E+00
140	2.00	0.000	1.971	0.1501	0.0000	0.0000	0.00E+00
141	0.00	0.000	0.968	0.1492	0.0000	0.0000	0.00E+00
142	0.00	0.000	1.064	0.1481	0.0000	0.0000	0.00E+00
143	0.00	0.000	1.058	0.1470	0.0000	0.0000	0.00E+00
144	4.00	0.000	2.299	0.1487	0.0000	0.0000	0.00E+00
145	2.00	0.000	1.525	0.1492	0.0000	0.0000	0.00E+00
146	3.00	0.000	1.942	0.1503	0.0000	0.0000	0.00E+00
147	0.40	0.000	0.986	0.1497	0.0000	0.0000	0.00E+00

148	0.20	0.000	1.040	0.1489	0.0000	0.0000	0.00E+00
149	12.00	0.000	2.205	0.1587	0.0000	0.0000	0.00E+00
150	0.40	0.000	1.286	0.1579	0.0000	0.0000	0.00E+00
151	0.40	0.000	1.289	0.1570	0.0000	0.0000	0.00E+00
152	0.20	0.000	0.709	0.1564	0.0000	0.0000	0.00E+00
153	4.00	0.000	1.886	0.1586	0.0000	0.0000	0.00E+00
154	0.40	0.000	0.700	0.1583	0.0000	0.0000	0.00E+00
155	0.20	0.000	0.484	0.1580	0.0000	0.0000	0.00E+00
156	0.20	0.000	1.123	0.1571	0.0000	0.0000	0.00E+00
157	0.00	0.000	0.228	0.1568	0.0000	0.0000	0.00E+00
158	0.00	0.000	0.644	0.1562	0.0000	0.0000	0.00E+00
159	3.00	0.000	2.154	0.1570	0.0000	0.0000	0.00E+00
160	0.00	0.000	0.953	0.1561	0.0000	0.0000	0.00E+00
161	0.00	0.000	1.003	0.1550	0.0000	0.0000	0.00E+00
162	0.00	0.000	0.665	0.1544	0.0000	0.0000	0.00E+00
163	0.00	0.000	0.309	0.1541	0.0000	0.0000	0.00E+00
164	0.00	0.000	0.667	0.1534	0.0000	0.0000	0.00E+00
165	0.00	0.000	0.807	0.1526	0.0000	0.0000	0.00E+00
166	0.00	0.000	0.846	0.1517	0.0000	0.0000	0.00E+00
167	0.00	0.000	0.613	0.1511	0.0000	0.0000	0.00E+00
168	0.00	0.000	0.277	0.1508	0.0000	0.0000	0.00E+00
169	2.00	0.000	1.751	0.1511	0.0000	0.0000	0.00E+00
170	25.00	0.000	2.196	0.1741	0.0000	0.0000	0.00E+00
171	0.20	0.000	0.978	0.1733	0.0000	0.0000	0.00E+00
172	0.00	0.000	0.798	0.1725	0.0000	0.0000	0.00E+00
173	0.00	0.000	0.842	0.1717	0.0000	0.0000	0.00E+00
174	0.00	0.000	0.649	0.1710	0.0000	0.0000	0.00E+00
175	0.00	0.000	0.947	0.1701	0.0000	0.0000	0.00E+00
176	0.00	0.000	0.954	0.1691	0.0000	0.0000	0.00E+00
177	0.00	0.000	0.932	0.1682	0.0000	0.0000	0.00E+00
178	0.00	0.000	0.464	0.1677	0.0000	0.0000	0.00E+00

179	0.00	0.000	0.415	0.1673	0.0000	0.0000	0.00E+00
180	0.20	0.000	0.882	0.1666	0.0000	0.0000	0.00E+00
181	0.00	0.000	0.632	0.1659	0.0000	0.0000	0.00E+00
182	0.00	0.000	0.675	0.1653	0.0000	0.0000	0.00E+00
183	0.20	0.000	0.917	0.1645	0.0000	0.0000	0.00E+00
184	0.00	0.000	0.833	0.1637	0.0000	0.0000	0.00E+00
185	0.00	0.000	0.908	0.1628	0.0000	0.0000	0.00E+00
186	0.00	0.000	0.855	0.1619	0.0000	0.0000	0.00E+00
187	4.00	0.000	2.055	0.1639	0.0000	0.0000	0.00E+00
188	0.00	0.000	0.956	0.1629	0.0000	0.0000	0.00E+00
189	0.00	0.000	0.656	0.1622	0.0000	0.0000	0.00E+00
190	0.00	0.000	0.976	0.1613	0.0000	0.0000	0.00E+00
191	0.00	0.000	0.865	0.1604	0.0000	0.0000	0.00E+00
192	0.00	0.000	0.521	0.1599	0.0000	0.0000	0.00E+00
193	0.00	0.000	0.836	0.1590	0.0000	0.0000	0.00E+00
194	0.00	0.000	0.281	0.1587	0.0000	0.0000	0.00E+00
195	0.00	0.000	0.910	0.1578	0.0000	0.0000	0.00E+00
196	0.00	0.000	0.965	0.1568	0.0000	0.0000	0.00E+00
197	0.00	0.000	0.848	0.1560	0.0000	0.0000	0.00E+00
198	0.00	0.000	0.911	0.1551	0.0000	0.0000	0.00E+00
199	0.20	0.000	1.064	0.1542	0.0000	0.0000	0.00E+00
200	0.00	0.000	0.975	0.1532	0.0000	0.0000	0.00E+00
201	0.20	0.000	1.016	0.1524	0.0000	0.0000	0.00E+00
202	0.00	0.000	0.928	0.1514	0.0000	0.0000	0.00E+00
203	0.00	0.000	0.846	0.1506	0.0000	0.0000	0.00E+00
204	0.00	0.000	0.373	0.1502	0.0000	0.0000	0.00E+00
205	0.00	0.000	0.980	0.1492	0.0000	0.0000	0.00E+00
206	7.00	0.000	1.792	0.1545	0.0000	0.0000	0.00E+00
207	0.00	0.000	0.869	0.1536	0.0000	0.0000	0.00E+00
208	0.00	0.000	0.759	0.1528	0.0000	0.0000	0.00E+00
209	0.20	0.000	1.025	0.1520	0.0000	0.0000	0.00E+00

210	0.00	0.000	0.987	0.1510	0.0000	0.0000	0.00E+00
211	5.00	0.000	1.992	0.1540	0.0000	0.0000	0.00E+00
212	0.40	0.000	1.322	0.1531	0.0000	0.0000	0.00E+00
213	0.40	0.000	1.377	0.1521	0.0000	0.0000	0.00E+00
214	0.40	0.000	1.350	0.1512	0.0000	0.0000	0.00E+00
215	0.20	0.000	1.346	0.1500	0.0000	0.0000	0.00E+00
216	3.00	0.000	2.206	0.1508	0.0000	0.0000	0.00E+00
217	0.20	0.000	1.182	0.1498	0.0000	0.0000	0.00E+00
218	0.00	0.000	0.923	0.1489	0.0000	0.0000	0.00E+00
219	0.00	0.000	1.216	0.1477	0.0000	0.0000	0.00E+00
220	0.00	0.000	1.162	0.1465	0.0000	0.0000	0.00E+00
221	0.20	0.000	1.407	0.1453	0.0000	0.0000	0.00E+00
222	0.00	0.000	1.193	0.1441	0.0000	0.0000	0.00E+00
223	0.00	0.000	1.392	0.1427	0.0000	0.0000	0.00E+00
224	0.00	0.000	1.040	0.1416	0.0000	0.0000	0.00E+00
225	2.00	0.000	1.705	0.1419	0.0000	0.0000	0.00E+00
226	0.20	0.000	1.259	0.1408	0.0000	0.0000	0.00E+00
227	0.00	0.000	0.768	0.1401	0.0000	0.0000	0.00E+00
228	0.00	0.000	0.874	0.1392	0.0000	0.0000	0.00E+00
229	0.20	0.000	1.060	0.1383	0.0000	0.0000	0.00E+00
230	0.00	0.000	0.622	0.1377	0.0000	0.0000	0.00E+00
231	0.20	0.000	0.547	0.1373	0.0000	0.0000	0.00E+00
232	0.00	0.000	0.203	0.1371	0.0000	0.0000	0.00E+00
233	0.00	0.000	0.150	0.1370	0.0000	0.0000	0.00E+00
234	0.00	0.000	0.120	0.1368	0.0000	0.0000	0.00E+00
235	0.20	0.000	0.296	0.1368	0.0000	0.0000	0.00E+00
236	0.00	0.000	0.076	0.1367	0.0000	0.0000	0.00E+00
237	0.20	0.000	0.261	0.1366	0.0000	0.0000	0.00E+00
238	0.20	0.000	0.249	0.1366	0.0000	0.0000	0.00E+00
239	0.20	0.000	0.239	0.1365	0.0000	0.0000	0.00E+00
240	0.20	0.000	0.231	0.1365	0.0000	0.0000	0.00E+00

241	2.00	0.000	1.127	0.1374	0.0000	0.0000	0.00E+00
242	4.00	0.000	1.328	0.1401	0.0000	0.0000	0.00E+00
243	0.00	0.000	0.106	0.1400	0.0000	0.0000	0.00E+00
244	0.00	0.000	0.386	0.1396	0.0000	0.0000	0.00E+00
245	0.20	0.000	0.614	0.1392	0.0000	0.0000	0.00E+00
246	2.00	0.000	1.241	0.1399	0.0000	0.0000	0.00E+00
247	4.00	0.000	1.339	0.1426	0.0000	0.0000	0.00E+00
248	0.00	0.000	0.887	0.1417	0.0000	0.0000	0.00E+00
249	0.00	0.000	0.374	0.1413	0.0000	0.0000	0.00E+00
250	0.00	0.000	0.350	0.1410	0.0000	0.0000	0.00E+00
251	0.00	0.000	0.405	0.1406	0.0000	0.0000	0.00E+00
252	0.00	0.000	0.444	0.1401	0.0000	0.0000	0.00E+00
253	0.00	0.000	0.451	0.1397	0.0000	0.0000	0.00E+00
254	0.00	0.000	0.442	0.1392	0.0000	0.0000	0.00E+00
255	0.00	0.000	0.435	0.1388	0.0000	0.0000	0.00E+00
256	0.20	0.000	0.614	0.1384	0.0000	0.0000	0.00E+00
257	0.00	0.000	0.375	0.1380	0.0000	0.0000	0.00E+00
258	0.00	0.000	0.216	0.1378	0.0000	0.0000	0.00E+00
259	0.00	0.000	0.175	0.1376	0.0000	0.0000	0.00E+00
260	4.00	0.000	1.362	0.1403	0.0000	0.0000	0.00E+00
261	8.00	0.000	1.373	0.1470	0.0000	0.0000	0.00E+00
262	1.25	0.000	1.526	0.1467	0.0000	0.0000	0.00E+00
263	1.25	0.000	2.123	0.1458	0.0000	0.0000	0.00E+00
264	1.25	0.000	1.969	0.1451	0.0000	0.0000	0.00E+00
265	1.25	0.000	2.006	0.1443	0.0000	0.0000	0.00E+00
266	0.00	0.000	1.572	0.1427	0.0000	0.0000	0.00E+00
267	2.00	0.000	2.827	0.1419	0.0000	0.0000	0.00E+00
268	0.00	0.000	1.806	0.1401	0.0000	0.0000	0.00E+00
269	0.00	0.000	1.108	0.1389	0.0000	0.0000	0.00E+00
270	0.00	0.000	0.716	0.1382	0.0000	0.0000	0.00E+00
271	0.00	0.000	0.443	0.1378	0.0000	0.0000	0.00E+00

272	0.00	0.000	0.313	0.1374	0.0000	0.0000	0.00E+00
273	0.00	0.000	0.305	0.1371	0.0000	0.0000	0.00E+00
274	0.20	0.000	0.559	0.1368	0.0000	0.0000	0.00E+00
275	0.00	0.000	0.379	0.1364	0.0000	0.0000	0.00E+00
276	0.00	0.000	0.352	0.1360	0.0000	0.0000	0.00E+00
277	0.00	0.000	0.178	0.1359	0.0000	0.0000	0.00E+00
278	0.20	0.000	0.333	0.1357	0.0000	0.0000	0.00E+00
279	0.00	0.000	0.108	0.1356	0.0000	0.0000	0.00E+00
280	0.00	0.000	0.088	0.1355	0.0000	0.0000	0.00E+00
281	0.00	0.000	0.144	0.1354	0.0000	0.0000	0.00E+00
282	0.00	0.000	0.072	0.1353	0.0000	0.0000	0.00E+00
283	0.40	0.000	0.478	0.1352	0.0000	0.0000	0.00E+00
284	0.20	0.000	0.308	0.1351	0.0000	0.0000	0.00E+00
285	0.00	0.000	0.088	0.1350	0.0000	0.0000	0.00E+00
286	0.00	0.000	0.012	0.1350	0.0000	0.0000	0.00E+00
287	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
288	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
289	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
290	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
291	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
292	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
293	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
294	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
295	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
296	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
297	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
298	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
299	0.60	0.000	0.556	0.1350	0.0000	0.0000	0.00E+00
300	0.00	0.000	0.024	0.1350	0.0000	0.0000	0.00E+00
301	0.00	0.000	0.014	0.1350	0.0000	0.0000	0.00E+00
302	0.00	0.000	0.004	0.1350	0.0000	0.0000	0.00E+00

303	0.00	0.000	0.001	0.1350	0.0000	0.0000	0.00E+00
304	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
305	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
306	0.60	0.000	0.549	0.1351	0.0000	0.0000	0.00E+00
307	0.00	0.000	0.028	0.1350	0.0000	0.0000	0.00E+00
308	0.00	0.000	0.016	0.1350	0.0000	0.0000	0.00E+00
309	0.00	0.000	0.005	0.1350	0.0000	0.0000	0.00E+00
310	0.00	0.000	0.001	0.1350	0.0000	0.0000	0.00E+00
311	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
312	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
313	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
314	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
315	0.40	0.000	0.400	0.1350	0.0000	0.0000	0.00E+00
316	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
317	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
318	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
319	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
320	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
321	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
322	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
323	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
324	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
325	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
326	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
327	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
328	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
329	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
330	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
331	0.40	0.000	0.400	0.1350	0.0000	0.0000	0.00E+00
332	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
333	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00



334	9.00	0.000	1.324	0.1428	0.0000	0.0000	0.00E+00
335	13.00	0.000	1.798	0.1541	0.0000	0.0000	0.00E+00
336	0.20	0.000	0.640	0.1536	0.0000	0.0000	0.00E+00
337	0.00	0.000	0.361	0.1533	0.0000	0.0000	0.00E+00
338	0.20	0.000	1.231	0.1522	0.0000	0.0000	0.00E+00
339	0.00	0.000	1.383	0.1508	0.0000	0.0000	0.00E+00
340	5.00	0.000	1.763	0.1541	0.0000	0.0000	0.00E+00
341	0.00	0.000	1.025	0.1531	0.0000	0.0000	0.00E+00
342	0.00	0.000	0.899	0.1521	0.0000	0.0000	0.00E+00
343	0.00	0.000	1.392	0.1507	0.0000	0.0000	0.00E+00
344	16.00	0.000	1.739	0.1651	0.0000	0.0000	0.00E+00
345	6.00	0.000	1.760	0.1694	0.0000	0.0000	0.00E+00
346	0.00	0.000	0.437	0.1690	0.0000	0.0000	0.00E+00
347	0.00	0.000	0.397	0.1686	0.0000	0.0000	0.00E+00
348	0.00	0.000	1.413	0.1672	0.0000	0.0000	0.00E+00
349	0.00	0.000	0.650	0.1665	0.0000	0.0000	0.00E+00
350	0.00	0.000	0.486	0.1660	0.0000	0.0000	0.00E+00
351	0.00	0.000	0.765	0.1652	0.0000	0.0000	0.00E+00
352	0.20	0.000	0.683	0.1648	0.0000	0.0000	0.00E+00
353	0.20	0.000	1.610	0.1633	0.0000	0.0000	0.00E+00
354	0.00	0.000	1.692	0.1616	0.0000	0.0000	0.00E+00
355	0.00	0.000	1.118	0.1605	0.0000	0.0000	0.00E+00
356	0.00	0.000	1.112	0.1594	0.0000	0.0000	0.00E+00
357	0.00	0.000	0.478	0.1589	0.0000	0.0000	0.00E+00
358	0.60	0.000	0.906	0.1586	0.0000	0.0000	0.00E+00
359	2.00	0.000	2.032	0.1585	0.0000	0.0000	0.00E+00
360	0.00	0.000	0.423	0.1581	0.0000	0.0000	0.00E+00
361	1.00	0.000	1.551	0.1576	0.0000	0.0000	0.00E+00
362	7.00	0.000	3.141	0.1615	0.0000	0.0000	0.00E+00
363	0.00	0.000	2.090	0.1593	0.0000	0.0000	0.00E+00
364	0.00	0.000	2.464	0.1569	0.0000	0.0000	0.00E+00

365

0.00      0.000      1.907      0.1549      0.0000      0.0000      0.00E+00

\* = Frozen (air or soil)

Annual Totals for Year 2			
	mm*	cubic meters	percent
Precipitation	556.00	43,924.0	100.00
Runoff	0.677	53.5	0.12
Evapotranspiration	561.927	44,392.3	101.07
Percolation/Leakage through Layer 2	0.000000	0.0000	0.00
Change in Water Storage	-6.6044	-521.7	-1.19
Soil Water at Start of Year	3,663.1452	289,388.5	658.84
Soil Water at End of Year	3,656.5409	288,866.7	657.65
Snow Water at Start of Year	0.0000	0.0000	0.00
Snow Water at End of Year	0.0000	0.0000	0.00
Annual Water Budget Balance	0.0000	0.0000	0.00

\*Note: head on liners expressed in cm

**Daily Output for Year 3**

**Column key:**

**Title:** Welby Landfill - Current Cap

**Simulated On:** 16/05/2022 10:56

Leak #1: leakage thru Layer 2

Day	Freezing Status*		Rain (mm)	Runoff (mm)	ET (mm)	Evap. Zone		Head #1 (cm)	Drain #1 (mm)	Leak #1 (mm)
	Air	Soil				Water (cm/cm)				
1			13.00	0.000	3.148	0.1649	0.0000	0.0000	0.00E+00	
2			17.00	0.000	3.096	0.1789	0.0000	0.0000	0.00E+00	
3			0.20	0.000	2.729	0.1764	0.0000	0.0000	0.00E+00	
4	*Note: head		0.00	0.000	2.382	0.1740	0.0000	0.0000	0.00E+00	
5			0.60	0.000	2.978	0.1716	0.0000	0.0000	0.00E+00	
6			0.40	0.000	3.075	0.1689	0.0000	0.0000	0.00E+00	
7			1.00	0.000	3.755	0.1661	0.0000	0.0000	0.00E+00	
8			0.00	0.000	3.082	0.1630	0.0000	0.0000	0.00E+00	
9			0.00	0.000	2.608	0.1603	0.0000	0.0000	0.00E+00	
10			0.00	0.000	2.919	0.1574	0.0000	0.0000	0.00E+00	
11			2.00	0.000	3.666	0.1557	0.0000	0.0000	0.00E+00	
12			3.00	0.000	2.994	0.1557	0.0000	0.0000	0.00E+00	
13			0.00	0.000	1.994	0.1537	0.0000	0.0000	0.00E+00	
14			0.00	0.000	3.640	0.1500	0.0000	0.0000	0.00E+00	
15			0.00	0.000	3.667	0.1463	0.0000	0.0000	0.00E+00	
16			0.00	0.000	4.557	0.1417	0.0000	0.0000	0.00E+00	
17			0.00	0.000	4.929	0.1367	0.0000	0.0000	0.00E+00	
18			0.00	0.000	1.392	0.1353	0.0000	0.0000	0.00E+00	
19			0.00	0.000	0.234	0.1351	0.0000	0.0000	0.00E+00	
20			0.00	0.000	0.078	0.1350	0.0000	0.0000	0.00E+00	
21			0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00	
22			0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00	
23			0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00	

24	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
25	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
26	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
27	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
28	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
29	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
30	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
31	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
32	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
33	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
34	1.00	0.000	0.955	0.1350	0.0000	0.0000	0.00E+00
35	0.40	0.000	0.422	0.1350	0.0000	0.0000	0.00E+00
36	0.00	0.000	0.016	0.1350	0.0000	0.0000	0.00E+00
37	0.00	0.000	0.005	0.1350	0.0000	0.0000	0.00E+00
38	0.00	0.000	0.001	0.1350	0.0000	0.0000	0.00E+00
39	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
40	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
41	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
42	10.00	0.000	1.724	0.1434	0.0000	0.0000	0.00E+00
43	0.00	0.000	2.738	0.1406	0.0000	0.0000	0.00E+00
44	0.00	0.000	3.596	0.1370	0.0000	0.0000	0.00E+00
45	1.00	0.000	1.945	0.1360	0.0000	0.0000	0.00E+00
46	0.00	0.000	0.726	0.1353	0.0000	0.0000	0.00E+00
47	25.00	0.000	2.933	0.1576	0.0000	0.0000	0.00E+00
48	0.20	0.000	1.840	0.1559	0.0000	0.0000	0.00E+00
49	5.00	0.000	3.680	0.1572	0.0000	0.0000	0.00E+00
50	0.00	0.000	3.270	0.1539	0.0000	0.0000	0.00E+00
51	0.40	0.000	3.766	0.1505	0.0000	0.0000	0.00E+00
52	8.00	0.000	3.808	0.1548	0.0000	0.0000	0.00E+00
53	23.00	0.000	3.465	0.1745	0.0000	0.0000	0.00E+00
54	6.00	0.000	2.666	0.1779	0.0000	0.0000	0.00E+00

55	15.00	0.000	3.175	0.1898	0.0000	0.0000	0.00E+00
56	2.00	0.000	2.882	0.1889	0.0000	0.0000	0.00E+00
57	0.00	0.000	2.718	0.1862	0.0000	0.0000	0.00E+00
58	0.00	0.000	3.602	0.1825	0.0000	0.0000	0.00E+00
59	0.00	0.000	2.453	0.1801	0.0000	0.0000	0.00E+00
60	0.20	0.000	2.275	0.1780	0.0000	0.0000	0.00E+00
61	0.00	0.000	2.736	0.1752	0.0000	0.0000	0.00E+00
62	0.00	0.000	2.379	0.1728	0.0000	0.0000	0.00E+00
63	0.00	0.000	3.447	0.1693	0.0000	0.0000	0.00E+00
64	0.00	0.000	3.783	0.1655	0.0000	0.0000	0.00E+00
65	0.20	0.000	4.160	0.1615	0.0000	0.0000	0.00E+00
66	4.00	0.000	4.728	0.1608	0.0000	0.0000	0.00E+00
67	0.20	0.000	3.431	0.1575	0.0000	0.0000	0.00E+00
68	17.00	0.000	4.101	0.1705	0.0000	0.0000	0.00E+00
69	1.00	0.000	3.832	0.1677	0.0000	0.0000	0.00E+00
70	2.00	0.000	4.415	0.1652	0.0000	0.0000	0.00E+00
71	36.00	0.000	4.341	0.1972	0.0000	0.0000	0.00E+00
72	0.40	0.000	4.141	0.1934	0.0000	0.0000	0.00E+00
73	0.00	0.000	2.420	0.1910	0.0000	0.0000	0.00E+00
74	11.00	0.000	4.499	0.1975	0.0000	0.0000	0.00E+00
75	0.00	0.000	3.044	0.1945	0.0000	0.0000	0.00E+00
76	1.00	0.000	3.725	0.1917	0.0000	0.0000	0.00E+00
77	0.20	0.000	3.047	0.1888	0.0000	0.0000	0.00E+00
78	0.00	0.000	2.733	0.1861	0.0000	0.0000	0.00E+00
79	0.00	0.000	2.899	0.1832	0.0000	0.0000	0.00E+00
80	0.00	0.000	2.017	0.1811	0.0000	0.0000	0.00E+00
81	0.00	0.000	1.715	0.1794	0.0000	0.0000	0.00E+00
82	0.00	0.000	2.539	0.1768	0.0000	0.0000	0.00E+00
83	0.20	0.000	2.688	0.1743	0.0000	0.0000	0.00E+00
84	0.00	0.000	2.682	0.1716	0.0000	0.0000	0.00E+00
85	0.20	0.000	1.919	0.1699	0.0000	0.0000	0.00E+00

86	0.40	0.000	2.776	0.1675	0.0000	0.0000	0.00E+00
87	0.00	0.000	1.541	0.1659	0.0000	0.0000	0.00E+00
88	9.00	0.000	3.728	0.1712	0.0000	0.0000	0.00E+00
89	2.00	0.000	3.107	0.1701	0.0000	0.0000	0.00E+00
90	3.00	0.000	2.348	0.1708	0.0000	0.0000	0.00E+00
91	0.40	0.000	1.997	0.1692	0.0000	0.0000	0.00E+00
92	0.20	0.000	2.403	0.1669	0.0000	0.0000	0.00E+00
93	0.20	0.000	1.268	0.1659	0.0000	0.0000	0.00E+00
94	1.00	0.000	1.672	0.1652	0.0000	0.0000	0.00E+00
95	1.00	0.000	1.461	0.1647	0.0000	0.0000	0.00E+00
96	0.00	0.000	1.006	0.1637	0.0000	0.0000	0.00E+00
97	0.20	0.000	1.496	0.1624	0.0000	0.0000	0.00E+00
98	0.20	0.000	1.729	0.1608	0.0000	0.0000	0.00E+00
99	0.20	0.000	1.758	0.1593	0.0000	0.0000	0.00E+00
100	0.00	0.000	1.717	0.1575	0.0000	0.0000	0.00E+00
101	0.20	0.000	1.875	0.1558	0.0000	0.0000	0.00E+00
102	1.00	0.000	2.272	0.1546	0.0000	0.0000	0.00E+00
103	0.00	0.000	1.798	0.1527	0.0000	0.0000	0.00E+00
104	6.00	0.000	2.852	0.1559	0.0000	0.0000	0.00E+00
105	0.00	0.000	0.820	0.1551	0.0000	0.0000	0.00E+00
106	0.00	0.000	0.518	0.1546	0.0000	0.0000	0.00E+00
107	1.00	0.000	1.765	0.1538	0.0000	0.0000	0.00E+00
108	6.00	0.000	2.658	0.1572	0.0000	0.0000	0.00E+00
109	3.00	0.000	2.536	0.1576	0.0000	0.0000	0.00E+00
110	0.20	0.000	0.787	0.1570	0.0000	0.0000	0.00E+00
111	0.20	0.000	1.437	0.1558	0.0000	0.0000	0.00E+00
112	0.20	0.000	1.295	0.1547	0.0000	0.0000	0.00E+00
113	0.40	0.000	1.711	0.1534	0.0000	0.0000	0.00E+00
114	0.20	0.000	1.508	0.1520	0.0000	0.0000	0.00E+00
115	3.00	0.000	2.476	0.1526	0.0000	0.0000	0.00E+00
116	7.00	0.000	2.531	0.1571	0.0000	0.0000	0.00E+00

117	5.00	0.000	2.576	0.1595	0.0000	0.0000	0.00E+00
118	63.00	1.445	2.677	0.2190	0.0000	0.0000	0.00E+00
119	0.40	0.000	1.466	0.2179	0.0000	0.0000	0.00E+00
120	0.20	0.000	1.109	0.2170	0.0000	0.0000	0.00E+00
121	0.40	0.000	1.187	0.2162	0.0000	0.0000	0.00E+00
122	0.00	0.000	1.205	0.2150	0.0000	0.0000	0.00E+00
123	0.20	0.000	1.324	0.2139	0.0000	0.0000	0.00E+00
124	0.20	0.000	1.198	0.2129	0.0000	0.0000	0.00E+00
125	0.40	0.000	1.420	0.2118	0.0000	0.0000	0.00E+00
126	1.00	0.000	1.488	0.2113	0.0000	0.0000	0.00E+00
127	0.40	0.000	0.923	0.2108	0.0000	0.0000	0.00E+00
128	0.00	0.000	1.016	0.2098	0.0000	0.0000	0.00E+00
129	0.00	0.000	1.062	0.2087	0.0000	0.0000	0.00E+00
130	0.00	0.000	1.040	0.2077	0.0000	0.0000	0.00E+00
131	0.00	0.000	0.908	0.2067	0.0000	0.0000	0.00E+00
132	0.20	0.000	1.160	0.2058	0.0000	0.0000	0.00E+00
133	3.00	0.000	1.559	0.2072	0.0000	0.0000	0.00E+00
134	22.00	0.000	2.321	0.2271	0.0000	0.0000	0.00E+00
135	17.00	0.000	2.179	0.2421	0.0000	0.0000	0.00E+00
136	12.00	0.000	2.144	0.2520	0.0000	0.0000	0.00E+00
137	21.00	0.000	2.316	0.2709	0.0000	0.0000	0.00E+00
138	2.00	0.000	2.060	0.2708	0.0000	0.0000	0.00E+00
139	0.00	0.000	0.957	0.2699	0.0000	0.0000	0.00E+00
140	0.00	0.000	0.840	0.2690	0.0000	0.0000	0.00E+00
141	0.00	0.000	0.870	0.2681	0.0000	0.0000	0.00E+00
142	0.00	0.000	0.364	0.2678	0.0000	0.0000	0.00E+00
143	0.00	0.000	0.451	0.2673	0.0000	0.0000	0.00E+00
144	0.20	0.000	0.618	0.2669	0.0000	0.0000	0.00E+00
145	9.00	0.000	2.191	0.2738	0.0000	0.0000	0.00E+00
146	13.00	0.000	2.208	0.2847	0.0000	0.0000	0.00E+00
147	5.00	0.000	2.109	0.2876	0.0000	0.0000	0.00E+00

148	3.00	0.000	1.877	0.2887	0.0000	0.0000	0.00E+00
149	0.20	0.000	0.997	0.2879	0.0000	0.0000	0.00E+00
150	0.20	0.000	0.830	0.2873	0.0000	0.0000	0.00E+00
151	0.00	0.000	0.822	0.2865	0.0000	0.0000	0.00E+00
152	0.20	0.000	0.523	0.2861	0.0000	0.0000	0.00E+00
153	5.00	0.000	1.594	0.2896	0.0000	0.0000	0.00E+00
154	0.40	0.000	1.314	0.2887	0.0000	0.0000	0.00E+00
155	0.00	0.000	0.940	0.2877	0.0000	0.0000	0.00E+00
156	5.00	0.000	1.840	0.2909	0.0000	0.0000	0.00E+00
157	0.00	0.000	0.390	0.2905	0.0000	0.0000	0.00E+00
158	0.00	0.000	0.568	0.2899	0.0000	0.0000	0.00E+00
159	0.00	0.000	0.698	0.2892	0.0000	0.0000	0.00E+00
160	0.00	0.000	0.670	0.2885	0.0000	0.0000	0.00E+00
161	0.20	0.000	0.480	0.2883	0.0000	0.0000	0.00E+00
162	0.20	0.000	0.937	0.2875	0.0000	0.0000	0.00E+00
163	0.40	0.000	0.680	0.2872	0.0000	0.0000	0.00E+00
164	7.00	0.000	2.091	0.2922	0.0000	0.0000	0.00E+00
165	0.00	0.000	0.662	0.2915	0.0000	0.0000	0.00E+00
166	0.00	0.000	0.636	0.2908	0.0000	0.0000	0.00E+00
167	0.00	0.000	0.817	0.2900	0.0000	0.0000	0.00E+00
168	0.00	0.000	0.446	0.2896	0.0000	0.0000	0.00E+00
169	0.20	0.000	0.881	0.2889	0.0000	0.0000	0.00E+00
170	0.00	0.000	0.732	0.2879	0.0000	0.0000	0.00E+00
171	0.20	0.000	0.831	0.2873	0.0000	0.0000	0.00E+00
172	6.00	0.000	2.022	0.2908	0.0000	0.0000	0.00E+00
173	1.00	0.000	1.384	0.2902	0.0000	0.0000	6.60E-01
174	0.00	0.000	0.274	0.2894	0.0000	0.0000	0.00E+00
175	2.70	0.000	1.368	0.2903	0.0000	0.0000	6.46E-01
176	0.40	0.000	0.560	0.2899	0.0000	0.0000	6.25E-01
177	5.20	0.000	1.702	0.2929	0.0000	0.0000	3.61E-01
178	1.40	0.000	1.321	0.2923	0.0000	0.0000	7.15E-01



179	0.00	0.000	0.406	0.2915	0.0000	0.0000	2.19E-01
180	3.00	0.000	1.383	0.2926	0.0000	0.0000	6.07E-01
181	4.00	0.000	1.994	0.2944	0.0000	0.0000	1.64E-04
182	2.40	0.000	1.909	0.2943	0.0000	0.0000	8.53E-01
183	2.80	0.000	1.963	0.2949	0.0000	0.0000	1.14E-01
184	1.51	0.000	1.780	0.2943	0.0000	0.0000	5.49E-01
185	0.80	0.000	1.403	0.2930	0.0000	0.0000	3.84E-01
186	0.00	0.000	0.694	0.2917	0.0000	0.0000	7.23E-01
187	0.20	0.000	1.087	0.2906	0.0000	0.0000	3.94E-01
188	0.00	0.000	0.922	0.2893	0.0000	0.0000	0.00E+00
189	0.00	0.000	0.954	0.2876	0.0000	0.0000	1.12E+00
190	0.00	0.000	0.904	0.2861	0.0000	0.0000	1.91E-01
191	0.00	0.000	0.365	0.2853	0.0000	0.0000	7.51E-01
192	0.20	0.000	1.114	0.2844	0.0000	0.0000	3.25E-01
193	0.40	0.000	1.368	0.2833	0.0000	0.0000	0.00E+00
194	0.20	0.000	0.882	0.2822	0.0000	0.0000	0.00E+00
195	0.20	0.000	0.764	0.2813	0.0000	0.0000	5.70E-01
196	0.00	0.000	0.390	0.2803	0.0000	0.0000	3.55E-01
197	0.00	0.000	0.614	0.2792	0.0000	0.0000	6.19E-01
198	0.00	0.000	0.935	0.2780	0.0000	0.0000	4.89E-01
199	0.00	0.000	0.547	0.2773	0.0000	0.0000	0.00E+00
200	0.20	0.000	0.487	0.2770	0.0000	0.0000	0.00E+00
201	0.20	0.000	0.932	0.2762	0.0000	0.0000	0.00E+00
202	0.20	0.000	1.280	0.2748	0.0000	0.0000	0.00E+00
203	0.40	0.000	1.510	0.2732	0.0000	0.0000	8.06E-01
204	1.00	0.000	1.707	0.2717	0.0000	0.0000	8.04E-01
205	5.80	0.000	2.262	0.2748	0.0000	0.0000	3.22E-01
206	0.00	0.000	1.046	0.2733	0.0000	0.0000	5.85E-01
207	0.00	0.000	1.047	0.2722	0.0000	0.0000	1.88E-02
208	0.20	0.000	1.211	0.2711	0.0000	0.0000	0.00E+00
209	0.00	0.000	0.670	0.2701	0.0000	0.0000	5.30E-01

210	0.00	0.000	1.028	0.2687	0.0000	0.0000	7.31E-02
211	0.00	0.000	0.912	0.2673	0.0000	0.0000	5.25E-01
212	0.00	0.000	0.541	0.2663	0.0000	0.0000	5.26E-01
213	0.00	0.000	1.158	0.2646	0.0000	0.0000	5.29E-01
214	0.00	0.000	1.137	0.2630	0.0000	0.0000	5.26E-01
215	0.00	0.000	1.131	0.2616	0.0000	0.0000	0.00E+00
216	0.00	0.000	1.276	0.2601	0.0000	0.0000	0.00E+00
217	0.00	0.000	1.374	0.2585	0.0000	0.0000	7.00E-01
218	5.80	0.000	2.327	0.2620	0.0000	0.0000	4.30E-01
219	0.00	0.000	1.142	0.2607	0.0000	0.0000	0.00E+00
220	0.20	0.000	0.792	0.2598	0.0000	0.0000	0.00E+00
221	0.00	0.000	0.828	0.2586	0.0000	0.0000	0.00E+00
222	0.00	0.000	1.225	0.2570	0.0000	0.0000	6.62E-01
223	0.60	0.000	1.813	0.2552	0.0000	0.0000	2.92E-01
224	0.40	0.000	1.464	0.2538	0.0000	0.0000	7.23E-01
225	0.00	0.000	1.713	0.2517	0.0000	0.0000	3.82E-01
226	2.00	0.000	2.483	0.2509	0.0000	0.0000	0.00E+00
227	0.00	0.000	1.434	0.2490	0.0000	0.0000	4.82E-01
228	0.20	0.000	1.558	0.2470	0.0000	0.0000	5.45E-01
229	0.00	0.000	1.522	0.2449	0.0000	0.0000	6.39E-01
230	0.00	0.000	1.562	0.2429	0.0000	0.0000	4.09E-01
231	1.60	0.000	2.127	0.2420	0.0000	0.0000	5.93E-01
232	0.00	0.000	1.366	0.2402	0.0000	0.0000	4.37E-01
233	0.20	0.000	1.384	0.2387	0.0000	0.0000	0.00E+00
234	0.80	0.000	1.472	0.2380	0.0000	0.0000	0.00E+00
235	0.60	0.000	1.444	0.2372	0.0000	0.0000	0.00E+00
236	20.00	0.000	1.862	0.2555	0.0000	0.0000	0.00E+00
237	1.81	0.000	2.548	0.2546	0.0000	0.0000	0.00E+00
238	1.81	0.000	2.482	0.2538	0.0000	0.0000	0.00E+00
239	0.00	0.000	1.617	0.2520	0.0000	0.0000	6.49E-01
240	0.00	0.000	1.744	0.2503	0.0000	0.0000	0.00E+00

241	0.00	0.000	1.037	0.2492	0.0000	0.0000	0.00E+00
242	0.00	0.000	2.069	0.2471	0.0000	0.0000	0.00E+00
243	0.00	0.000	1.528	0.2456	0.0000	0.0000	0.00E+00
244	0.00	0.000	1.770	0.2438	0.0000	0.0000	0.00E+00
245	0.00	0.000	1.586	0.2422	0.0000	0.0000	0.00E+00
246	0.00	0.000	1.892	0.2403	0.0000	0.0000	0.00E+00
247	0.00	0.000	1.621	0.2387	0.0000	0.0000	0.00E+00
248	0.00	0.000	1.367	0.2373	0.0000	0.0000	0.00E+00
249	0.00	0.000	1.053	0.2362	0.0000	0.0000	0.00E+00
250	0.00	0.000	1.092	0.2351	0.0000	0.0000	0.00E+00
251	0.00	0.000	1.007	0.2341	0.0000	0.0000	0.00E+00
252	0.20	0.000	1.113	0.2332	0.0000	0.0000	0.00E+00
253	0.00	0.000	0.882	0.2323	0.0000	0.0000	0.00E+00
254	0.00	0.000	0.838	0.2314	0.0000	0.0000	0.00E+00
255	2.80	0.000	1.551	0.2327	0.0000	0.0000	0.00E+00
256	7.80	0.000	1.527	0.2390	0.0000	0.0000	0.00E+00
257	0.00	0.000	0.739	0.2383	0.0000	0.0000	0.00E+00
258	3.60	0.000	1.452	0.2404	0.0000	0.0000	0.00E+00
259	0.00	0.000	0.680	0.2398	0.0000	0.0000	0.00E+00
260	0.00	0.000	0.665	0.2390	0.0000	0.0000	0.00E+00
261	0.00	0.000	0.652	0.2381	0.0000	0.0000	0.00E+00
262	0.00	0.000	0.642	0.2374	0.0000	0.0000	0.00E+00
263	1.80	0.000	1.273	0.2379	0.0000	0.0000	0.00E+00
264	0.00	0.000	0.621	0.2372	0.0000	0.0000	0.00E+00
265	0.00	0.000	0.613	0.2364	0.0000	0.0000	5.70E-01
266	0.00	0.000	0.617	0.2357	0.0000	0.0000	3.66E-02
267	0.00	0.000	0.600	0.2350	0.0000	0.0000	0.00E+00
268	0.00	0.000	0.605	0.2343	0.0000	0.0000	0.00E+00
269	0.00	0.000	0.604	0.2337	0.0000	0.0000	0.00E+00
270	0.40	0.000	0.882	0.2333	0.0000	0.0000	0.00E+00
271	0.00	0.000	0.571	0.2327	0.0000	0.0000	0.00E+00

272	0.00	0.000	0.569	0.2321	0.0000	0.0000	0.00E+00
273	0.00	0.000	0.555	0.2315	0.0000	0.0000	0.00E+00
274	0.00	0.000	0.544	0.2310	0.0000	0.0000	0.00E+00
275	12.80	0.000	1.193	0.2427	0.0000	0.0000	0.00E+00
276	13.80	0.000	1.147	0.2555	0.0000	0.0000	0.00E+00
277	0.60	0.000	3.153	0.2529	0.0000	0.0000	0.00E+00
278	0.00	0.000	2.541	0.2503	0.0000	0.0000	0.00E+00
279	1.60	0.000	3.439	0.2485	0.0000	0.0000	0.00E+00
280	2.00	0.000	3.171	0.2473	0.0000	0.0000	0.00E+00
281	0.00	0.000	2.706	0.2445	0.0000	0.0000	0.00E+00
282	2.40	0.000	3.398	0.2435	0.0000	0.0000	0.00E+00
283	0.00	0.000	2.518	0.2410	0.0000	0.0000	0.00E+00
284	0.40	0.000	2.721	0.2386	0.0000	0.0000	0.00E+00
285	0.00	0.000	2.270	0.2363	0.0000	0.0000	0.00E+00
286	3.40	0.000	2.336	0.2374	0.0000	0.0000	0.00E+00
287	0.20	0.000	1.702	0.2358	0.0000	0.0000	0.00E+00
288	0.00	0.000	1.419	0.2343	0.0000	0.0000	0.00E+00
289	0.00	0.000	1.337	0.2329	0.0000	0.0000	0.00E+00
290	0.20	0.000	1.402	0.2317	0.0000	0.0000	0.00E+00
291	0.00	0.000	1.217	0.2305	0.0000	0.0000	0.00E+00
292	6.80	0.000	1.761	0.2356	0.0000	0.0000	0.00E+00
293	1.56	0.000	1.653	0.2355	0.0000	0.0000	0.00E+00
294	0.00	0.000	1.143	0.2343	0.0000	0.0000	0.00E+00
295	0.00	0.000	1.006	0.2332	0.0000	0.0000	6.14E-01
296	0.00	0.000	1.124	0.2319	0.0000	0.0000	4.73E-01
297	0.00	0.000	1.056	0.2309	0.0000	0.0000	0.00E+00
298	1.20	0.000	1.674	0.2304	0.0000	0.0000	0.00E+00
299	1.80	0.000	1.692	0.2305	0.0000	0.0000	0.00E+00
300	1.40	0.000	1.641	0.2302	0.0000	0.0000	0.00E+00
301	0.60	0.000	1.318	0.2295	0.0000	0.0000	0.00E+00
302	0.60	0.000	1.432	0.2285	0.0000	0.0000	0.00E+00

303	0.00	0.000	1.215	0.2272	0.0000	0.0000	0.00E+00
304	0.00	0.000	1.232	0.2258	0.0000	0.0000	0.00E+00
305	2.00	0.000	1.667	0.2262	0.0000	0.0000	0.00E+00
306	0.00	0.000	1.261	0.2249	0.0000	0.0000	0.00E+00
307	4.80	0.000	1.782	0.2279	0.0000	0.0000	0.00E+00
308	0.00	0.000	1.388	0.2265	0.0000	0.0000	0.00E+00
309	0.00	0.000	1.417	0.2250	0.0000	0.0000	0.00E+00
310	0.00	0.000	1.785	0.2231	0.0000	0.0000	0.00E+00
311	0.60	0.000	2.096	0.2216	0.0000	0.0000	0.00E+00
312	0.00	0.000	1.479	0.2201	0.0000	0.0000	0.00E+00
313	0.00	0.000	2.043	0.2180	0.0000	0.0000	0.00E+00
314	0.40	0.000	1.715	0.2167	0.0000	0.0000	0.00E+00
315	5.20	0.000	1.947	0.2200	0.0000	0.0000	0.00E+00
316	0.00	0.000	1.374	0.2186	0.0000	0.0000	0.00E+00
317	1.40	0.000	2.227	0.2178	0.0000	0.0000	0.00E+00
318	0.20	0.000	2.544	0.2153	0.0000	0.0000	0.00E+00
319	0.00	0.000	1.752	0.2135	0.0000	0.0000	0.00E+00
320	0.00	0.000	1.633	0.2119	0.0000	0.0000	0.00E+00
321	6.60	0.000	1.925	0.2166	0.0000	0.0000	0.00E+00
322	1.00	0.000	2.251	0.2153	0.0000	0.0000	0.00E+00
323	0.20	0.000	3.434	0.2121	0.0000	0.0000	0.00E+00
324	0.00	0.000	3.275	0.2088	0.0000	0.0000	0.00E+00
325	6.20	0.000	2.555	0.2124	0.0000	0.0000	0.00E+00
326	15.00	0.000	1.781	0.2258	0.0000	0.0000	0.00E+00
327	7.80	0.000	2.519	0.2311	0.0000	0.0000	0.00E+00
328	7.40	0.000	2.245	0.2363	0.0000	0.0000	0.00E+00
329	4.60	0.000	1.998	0.2390	0.0000	0.0000	0.00E+00
330	4.80	0.000	2.786	0.2410	0.0000	0.0000	0.00E+00
331	3.00	0.000	3.645	0.2403	0.0000	0.0000	0.00E+00
332	0.00	0.000	3.474	0.2368	0.0000	0.0000	0.00E+00
333	0.00	0.000	2.460	0.2344	0.0000	0.0000	0.00E+00

334	0.20	0.000	2.957	0.2316	0.0000	0.0000	0.00E+00
335	0.00	0.000	2.990	0.2285	0.0000	0.0000	0.00E+00
336	2.80	0.000	3.871	0.2275	0.0000	0.0000	0.00E+00
337	2.80	0.000	4.319	0.2259	0.0000	0.0000	0.00E+00
338	15.40	0.000	3.814	0.2376	0.0000	0.0000	0.00E+00
339	0.00	0.000	2.538	0.2351	0.0000	0.0000	0.00E+00
340	1.60	0.000	3.431	0.2332	0.0000	0.0000	0.00E+00
341	0.00	0.000	3.539	0.2296	0.0000	0.0000	0.00E+00
342	0.00	0.000	3.591	0.2260	0.0000	0.0000	0.00E+00
343	0.00	0.000	3.294	0.2226	0.0000	0.0000	0.00E+00
344	0.00	0.000	4.576	0.2180	0.0000	0.0000	0.00E+00
345	0.00	0.000	5.178	0.2128	0.0000	0.0000	0.00E+00
346	0.00	0.000	4.033	0.2087	0.0000	0.0000	0.00E+00
347	2.60	0.000	4.519	0.2068	0.0000	0.0000	0.00E+00
348	0.00	0.000	2.597	0.2042	0.0000	0.0000	0.00E+00
349	2.04	0.000	2.735	0.2035	0.0000	0.0000	0.00E+00
350	0.00	0.000	2.567	0.2009	0.0000	0.0000	0.00E+00
351	0.00	0.000	3.909	0.1969	0.0000	0.0000	0.00E+00
352	0.00	0.000	4.604	0.1923	0.0000	0.0000	0.00E+00
353	0.00	0.000	4.993	0.1872	0.0000	0.0000	0.00E+00
354	4.60	0.000	3.645	0.1882	0.0000	0.0000	0.00E+00
355	2.00	0.000	3.545	0.1866	0.0000	0.0000	0.00E+00
356	0.80	0.000	3.085	0.1843	0.0000	0.0000	0.00E+00
357	0.00	0.000	2.795	0.1815	0.0000	0.0000	0.00E+00
358	0.00	0.000	2.410	0.1791	0.0000	0.0000	0.00E+00
359	0.20	0.000	2.546	0.1767	0.0000	0.0000	0.00E+00
360	0.00	0.000	2.661	0.1740	0.0000	0.0000	0.00E+00
361	0.40	0.000	2.256	0.1721	0.0000	0.0000	0.00E+00
362	0.00	0.000	1.996	0.1701	0.0000	0.0000	0.00E+00
363	0.00	0.000	2.022	0.1680	0.0000	0.0000	0.00E+00
364	0.00	0.000	2.393	0.1656	0.0000	0.0000	0.00E+00

365

0.00      0.000      2.712      0.1629      0.0000      0.0000      0.00E+00

\* = Frozen (air or soil)

Annual Totals for Year 3			
	mm*	cubic meters	percent
Precipitation	703.03	55,539.4	100.00
Runoff	1.445	114.2	0.21
Evapotranspiration	667.909	52,764.8	95.00
Percolation/Leakage through Layer 2	25.146287	1,986.6	3.58
Change in Water Storage	8.5297	673.8	1.21
Soil Water at Start of Year	3,656.5409	288,866.7	520.11
Soil Water at End of Year	3,665.0706	289,540.6	521.32
Snow Water at Start of Year	0.0000	0.0000	0.00
Snow Water at End of Year	0.0000	0.0000	0.00
Annual Water Budget Balance	0.0000	0.0000	0.00

\*Note: head on liners expressed in cm

**Daily Output for Year 4**

**Column key:**

**Title:** Welby Landfill - Current Cap

**Simulated On:** 16/05/2022 10:56

Leak #1: leakage thru Layer 2

Day	Freezing Status*		Rain (mm)	Runoff (mm)	ET (mm)	Evap. Zone		Head #1 (cm)	Drain #1 (mm)	Leak #1 (mm)
	Air	Soil				Water (cm/cm)				
1			0.00	0.000	2.156	0.1607	0.0000	0.0000	0.00E+00	
2			0.00	0.000	1.940	0.1587	0.0000	0.0000	0.00E+00	
3			0.00	0.000	2.100	0.1566	0.0000	0.0000	0.00E+00	
4	*Note: head		0.00	0.000	2.554	0.1540	0.0000	0.0000	0.00E+00	
5			1.00	0.000	2.874	0.1522	0.0000	0.0000	0.00E+00	
6			2.10	0.000	3.016	0.1512	0.0000	0.0000	0.00E+00	
7			2.10	0.000	2.065	0.1513	0.0000	0.0000	0.00E+00	
8			2.10	0.000	2.052	0.1513	0.0000	0.0000	0.00E+00	
9			2.10	0.000	2.004	0.1514	0.0000	0.0000	0.00E+00	
10			2.10	0.000	2.552	0.1510	0.0000	0.0000	0.00E+00	
11			2.10	0.000	2.891	0.1502	0.0000	0.0000	0.00E+00	
12			0.00	0.000	3.094	0.1470	0.0000	0.0000	0.00E+00	
13			0.00	0.000	3.916	0.1431	0.0000	0.0000	0.00E+00	
14			13.00	0.000	3.229	0.1529	0.0000	0.0000	0.00E+00	
15			0.40	0.000	3.803	0.1495	0.0000	0.0000	0.00E+00	
16			0.00	0.000	4.227	0.1452	0.0000	0.0000	0.00E+00	
17			6.60	0.000	5.160	0.1467	0.0000	0.0000	0.00E+00	
18			0.40	0.000	3.909	0.1431	0.0000	0.0000	0.00E+00	
19			0.00	0.000	3.745	0.1394	0.0000	0.0000	0.00E+00	
20			0.00	0.000	2.905	0.1364	0.0000	0.0000	0.00E+00	
21			0.00	0.000	1.135	0.1353	0.0000	0.0000	0.00E+00	
22			17.00	0.000	2.946	0.1495	0.0000	0.0000	0.00E+00	
23			0.00	0.000	2.017	0.1474	0.0000	0.0000	0.00E+00	



24	11.80	0.000	2.851	0.1565	0.0000	0.0000	0.00E+00
25	7.40	0.000	3.481	0.1604	0.0000	0.0000	0.00E+00
26	2.10	0.000	3.160	0.1594	0.0000	0.0000	0.00E+00
27	2.10	0.000	4.262	0.1572	0.0000	0.0000	0.00E+00
28	2.10	0.000	4.288	0.1550	0.0000	0.0000	0.00E+00
29	2.10	0.000	4.235	0.1528	0.0000	0.0000	0.00E+00
30	2.10	0.000	4.288	0.1506	0.0000	0.0000	0.00E+00
31	0.40	0.000	3.307	0.1477	0.0000	0.0000	0.00E+00
32	0.00	0.000	3.685	0.1439	0.0000	0.0000	0.00E+00
33	0.00	0.000	3.471	0.1404	0.0000	0.0000	0.00E+00
34	7.00	0.000	3.829	0.1436	0.0000	0.0000	0.00E+00
35	0.40	0.000	2.432	0.1416	0.0000	0.0000	0.00E+00
36	0.00	0.000	2.252	0.1393	0.0000	0.0000	0.00E+00
37	0.00	0.000	2.268	0.1370	0.0000	0.0000	0.00E+00
38	0.00	0.000	1.282	0.1357	0.0000	0.0000	0.00E+00
39	0.00	0.000	0.494	0.1352	0.0000	0.0000	0.00E+00
40	2.40	0.000	1.842	0.1358	0.0000	0.0000	0.00E+00
41	0.00	0.000	0.448	0.1353	0.0000	0.0000	0.00E+00
42	0.00	0.000	0.239	0.1351	0.0000	0.0000	0.00E+00
43	11.60	0.000	1.697	0.1451	0.0000	0.0000	0.00E+00
44	0.60	0.000	2.481	0.1432	0.0000	0.0000	0.00E+00
45	0.40	0.000	2.724	0.1409	0.0000	0.0000	0.00E+00
46	0.00	0.000	2.463	0.1384	0.0000	0.0000	0.00E+00
47	0.00	0.000	1.829	0.1365	0.0000	0.0000	0.00E+00
48	0.00	0.000	0.816	0.1357	0.0000	0.0000	0.00E+00
49	0.00	0.000	0.516	0.1352	0.0000	0.0000	0.00E+00
50	0.00	0.000	0.129	0.1350	0.0000	0.0000	0.00E+00
51	0.00	0.000	0.034	0.1350	0.0000	0.0000	0.00E+00
52	0.00	0.000	0.007	0.1350	0.0000	0.0000	0.00E+00
53	0.00	0.000	0.002	0.1350	0.0000	0.0000	0.00E+00
54	6.20	0.000	1.551	0.1397	0.0000	0.0000	0.00E+00

55	0.00	0.000	0.497	0.1392	0.0000	0.0000	0.00E+00
56	19.20	0.000	3.006	0.1556	0.0000	0.0000	0.00E+00
57	24.60	0.000	2.038	0.1783	0.0000	0.0000	0.00E+00
58	1.00	0.000	3.075	0.1762	0.0000	0.0000	0.00E+00
59	0.00	0.000	1.725	0.1745	0.0000	0.0000	0.00E+00
60	0.00	0.000	1.941	0.1725	0.0000	0.0000	0.00E+00
61	0.00	0.000	2.062	0.1705	0.0000	0.0000	0.00E+00
62	0.00	0.000	2.285	0.1682	0.0000	0.0000	0.00E+00
63	0.00	0.000	3.718	0.1644	0.0000	0.0000	0.00E+00
64	0.00	0.000	3.832	0.1605	0.0000	0.0000	0.00E+00
65	0.00	0.000	3.391	0.1571	0.0000	0.0000	0.00E+00
66	0.00	0.000	3.156	0.1539	0.0000	0.0000	0.00E+00
67	28.20	0.000	4.529	0.1778	0.0000	0.0000	0.00E+00
68	0.00	0.000	4.340	0.1734	0.0000	0.0000	0.00E+00
69	0.00	0.000	5.302	0.1681	0.0000	0.0000	0.00E+00
70	0.00	0.000	4.151	0.1639	0.0000	0.0000	0.00E+00
71	0.00	0.000	2.832	0.1610	0.0000	0.0000	0.00E+00
72	0.00	0.000	3.737	0.1573	0.0000	0.0000	0.00E+00
73	8.00	0.000	3.136	0.1622	0.0000	0.0000	0.00E+00
74	0.00	0.000	3.225	0.1589	0.0000	0.0000	0.00E+00
75	0.00	0.000	3.918	0.1550	0.0000	0.0000	0.00E+00
76	10.60	0.000	4.799	0.1608	0.0000	0.0000	0.00E+00
77	0.00	0.000	4.250	0.1565	0.0000	0.0000	0.00E+00
78	0.00	0.000	3.680	0.1528	0.0000	0.0000	0.00E+00
79	0.00	0.000	3.340	0.1494	0.0000	0.0000	0.00E+00
80	0.00	0.000	2.399	0.1470	0.0000	0.0000	0.00E+00
81	0.00	0.000	2.562	0.1444	0.0000	0.0000	0.00E+00
82	3.00	0.000	3.276	0.1441	0.0000	0.0000	0.00E+00
83	0.00	0.000	1.052	0.1431	0.0000	0.0000	0.00E+00
84	0.20	0.000	2.998	0.1402	0.0000	0.0000	0.00E+00
85	0.20	0.000	1.841	0.1386	0.0000	0.0000	0.00E+00

86	0.20	0.000	1.698	0.1371	0.0000	0.0000	0.00E+00
87	0.00	0.000	1.621	0.1354	0.0000	0.0000	0.00E+00
88	1.40	0.000	1.505	0.1353	0.0000	0.0000	0.00E+00
89	0.00	0.000	0.222	0.1351	0.0000	0.0000	0.00E+00
90	0.00	0.000	0.072	0.1350	0.0000	0.0000	0.00E+00
91	0.00	0.000	0.022	0.1350	0.0000	0.0000	0.00E+00
92	0.00	0.000	0.006	0.1350	0.0000	0.0000	0.00E+00
93	0.00	0.000	0.001	0.1350	0.0000	0.0000	0.00E+00
94	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
95	5.80	0.000	1.503	0.1393	0.0000	0.0000	0.00E+00
96	5.60	0.000	1.482	0.1435	0.0000	0.0000	0.00E+00
97	9.80	0.000	2.243	0.1511	0.0000	0.0000	0.00E+00
98	0.20	0.000	1.283	0.1500	0.0000	0.0000	0.00E+00
99	1.40	0.000	2.038	0.1494	0.0000	0.0000	0.00E+00
100	0.00	0.000	0.636	0.1488	0.0000	0.0000	0.00E+00
101	0.20	0.000	1.295	0.1476	0.0000	0.0000	0.00E+00
102	0.00	0.000	1.734	0.1459	0.0000	0.0000	0.00E+00
103	0.00	0.000	1.350	0.1445	0.0000	0.0000	0.00E+00
104	0.20	0.000	1.461	0.1433	0.0000	0.0000	0.00E+00
105	0.00	0.000	1.769	0.1415	0.0000	0.0000	0.00E+00
106	0.00	0.000	1.715	0.1397	0.0000	0.0000	0.00E+00
107	0.20	0.000	2.031	0.1379	0.0000	0.0000	0.00E+00
108	0.00	0.000	1.648	0.1362	0.0000	0.0000	0.00E+00
109	0.00	0.000	1.046	0.1352	0.0000	0.0000	0.00E+00
110	0.00	0.000	0.124	0.1350	0.0000	0.0000	0.00E+00
111	0.20	0.000	0.231	0.1350	0.0000	0.0000	0.00E+00
112	0.00	0.000	0.010	0.1350	0.0000	0.0000	0.00E+00
113	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
114	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
115	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
116	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00

117	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
118	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
119	1.80	0.000	1.121	0.1357	0.0000	0.0000	0.00E+00
120	0.00	0.000	0.166	0.1355	0.0000	0.0000	0.00E+00
121	11.60	0.000	1.639	0.1456	0.0000	0.0000	0.00E+00
122	0.00	0.000	0.562	0.1450	0.0000	0.0000	0.00E+00
123	0.00	0.000	0.282	0.1447	0.0000	0.0000	0.00E+00
124	0.00	0.000	0.752	0.1440	0.0000	0.0000	0.00E+00
125	0.00	0.000	1.084	0.1429	0.0000	0.0000	0.00E+00
126	0.00	0.000	0.933	0.1419	0.0000	0.0000	0.00E+00
127	0.00	0.000	1.037	0.1409	0.0000	0.0000	0.00E+00
128	0.00	0.000	1.100	0.1398	0.0000	0.0000	0.00E+00
129	0.20	0.000	0.860	0.1391	0.0000	0.0000	0.00E+00
130	0.00	0.000	0.596	0.1385	0.0000	0.0000	0.00E+00
131	0.00	0.000	0.644	0.1379	0.0000	0.0000	0.00E+00
132	0.00	0.000	0.894	0.1369	0.0000	0.0000	0.00E+00
133	0.60	0.000	1.305	0.1362	0.0000	0.0000	0.00E+00
134	1.20	0.000	1.639	0.1358	0.0000	0.0000	0.00E+00
135	0.00	0.000	0.446	0.1353	0.0000	0.0000	0.00E+00
136	0.00	0.000	0.251	0.1351	0.0000	0.0000	0.00E+00
137	0.00	0.000	0.059	0.1350	0.0000	0.0000	0.00E+00
138	0.00	0.000	0.026	0.1350	0.0000	0.0000	0.00E+00
139	0.00	0.000	0.003	0.1350	0.0000	0.0000	0.00E+00
140	0.00	0.000	0.001	0.1350	0.0000	0.0000	0.00E+00
141	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
142	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
143	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
144	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
145	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
146	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
147	2.60	0.000	1.189	0.1364	0.0000	0.0000	0.00E+00

148	0.00	0.000	0.144	0.1363	0.0000	0.0000	0.00E+00
149	1.55	0.000	1.134	0.1367	0.0000	0.0000	0.00E+00
150	0.00	0.000	0.162	0.1365	0.0000	0.0000	0.00E+00
151	0.00	0.000	0.266	0.1363	0.0000	0.0000	0.00E+00
152	0.00	0.000	0.139	0.1361	0.0000	0.0000	0.00E+00
153	0.00	0.000	0.169	0.1360	0.0000	0.0000	0.00E+00
154	0.00	0.000	0.307	0.1356	0.0000	0.0000	0.00E+00
155	1.60	0.000	1.165	0.1361	0.0000	0.0000	0.00E+00
156	0.00	0.000	0.099	0.1360	0.0000	0.0000	0.00E+00
157	0.00	0.000	0.134	0.1358	0.0000	0.0000	0.00E+00
158	0.00	0.000	0.212	0.1356	0.0000	0.0000	0.00E+00
159	0.20	0.000	0.489	0.1353	0.0000	0.0000	0.00E+00
160	0.00	0.000	0.264	0.1351	0.0000	0.0000	0.00E+00
161	0.00	0.000	0.060	0.1350	0.0000	0.0000	0.00E+00
162	2.00	0.000	1.126	0.1359	0.0000	0.0000	0.00E+00
163	11.60	0.000	1.304	0.1463	0.0000	0.0000	0.00E+00
164	0.20	0.000	0.592	0.1459	0.0000	0.0000	0.00E+00
165	0.00	0.000	0.539	0.1454	0.0000	0.0000	0.00E+00
166	0.00	0.000	0.470	0.1449	0.0000	0.0000	0.00E+00
167	0.00	0.000	0.806	0.1441	0.0000	0.0000	0.00E+00
168	0.00	0.000	0.791	0.1433	0.0000	0.0000	0.00E+00
169	0.20	0.000	1.052	0.1424	0.0000	0.0000	0.00E+00
170	0.00	0.000	0.830	0.1416	0.0000	0.0000	0.00E+00
171	0.00	0.000	0.622	0.1409	0.0000	0.0000	0.00E+00
172	3.00	0.000	1.913	0.1420	0.0000	0.0000	0.00E+00
173	0.00	0.000	0.889	0.1411	0.0000	0.0000	0.00E+00
174	0.00	0.000	0.332	0.1408	0.0000	0.0000	0.00E+00
175	0.00	0.000	0.883	0.1399	0.0000	0.0000	0.00E+00
176	0.00	0.000	0.954	0.1390	0.0000	0.0000	0.00E+00
177	0.00	0.000	0.953	0.1380	0.0000	0.0000	0.00E+00
178	0.00	0.000	0.605	0.1374	0.0000	0.0000	0.00E+00

179	0.00	0.000	0.820	0.1365	0.0000	0.0000	0.00E+00
180	0.00	0.000	0.712	0.1358	0.0000	0.0000	0.00E+00
181	0.00	0.000	0.346	0.1355	0.0000	0.0000	0.00E+00
182	0.00	0.000	0.330	0.1351	0.0000	0.0000	0.00E+00
183	0.00	0.000	0.077	0.1351	0.0000	0.0000	0.00E+00
184	0.00	0.000	0.017	0.1351	0.0000	0.0000	0.00E+00
185	0.00	0.000	0.004	0.1350	0.0000	0.0000	0.00E+00
186	0.00	0.000	0.003	0.1350	0.0000	0.0000	0.00E+00
187	0.00	0.000	0.003	0.1350	0.0000	0.0000	0.00E+00
188	0.00	0.000	0.002	0.1350	0.0000	0.0000	0.00E+00
189	0.00	0.000	0.002	0.1350	0.0000	0.0000	0.00E+00
190	0.60	0.000	0.601	0.1350	0.0000	0.0000	0.00E+00
191	0.80	0.000	0.727	0.1351	0.0000	0.0000	0.00E+00
192	5.60	0.000	1.339	0.1394	0.0000	0.0000	0.00E+00
193	14.80	0.000	1.892	0.1525	0.0000	0.0000	0.00E+00
194	0.20	0.000	0.896	0.1518	0.0000	0.0000	0.00E+00
195	0.20	0.000	0.810	0.1511	0.0000	0.0000	0.00E+00
196	0.00	0.000	0.399	0.1507	0.0000	0.0000	0.00E+00
197	0.00	0.000	0.539	0.1502	0.0000	0.0000	0.00E+00
198	0.20	0.000	1.075	0.1493	0.0000	0.0000	0.00E+00
199	0.00	0.000	0.850	0.1484	0.0000	0.0000	0.00E+00
200	8.40	0.000	1.752	0.1552	0.0000	0.0000	0.00E+00
201	1.00	0.000	1.563	0.1546	0.0000	0.0000	0.00E+00
202	0.60	0.000	1.247	0.1539	0.0000	0.0000	0.00E+00
203	0.00	0.000	0.950	0.1530	0.0000	0.0000	0.00E+00
204	0.20	0.000	1.042	0.1521	0.0000	0.0000	0.00E+00
205	0.00	0.000	0.588	0.1515	0.0000	0.0000	0.00E+00
206	0.00	0.000	0.911	0.1506	0.0000	0.0000	0.00E+00
207	0.20	0.000	0.982	0.1498	0.0000	0.0000	0.00E+00
208	0.00	0.000	1.057	0.1488	0.0000	0.0000	0.00E+00
209	0.40	0.000	1.182	0.1480	0.0000	0.0000	0.00E+00

210	0.00	0.000	0.973	0.1470	0.0000	0.0000	0.00E+00
211	0.00	0.000	0.899	0.1461	0.0000	0.0000	0.00E+00
212	0.00	0.000	0.970	0.1451	0.0000	0.0000	0.00E+00
213	0.20	0.000	1.083	0.1442	0.0000	0.0000	0.00E+00
214	0.20	0.000	1.167	0.1432	0.0000	0.0000	0.00E+00
215	0.20	0.000	1.218	0.1422	0.0000	0.0000	0.00E+00
216	1.80	0.000	1.970	0.1420	0.0000	0.0000	0.00E+00
217	2.00	0.000	2.015	0.1420	0.0000	0.0000	0.00E+00
218	0.60	0.000	1.648	0.1410	0.0000	0.0000	0.00E+00
219	0.00	0.000	1.148	0.1398	0.0000	0.0000	0.00E+00
220	0.00	0.000	0.917	0.1389	0.0000	0.0000	0.00E+00
221	0.00	0.000	1.113	0.1377	0.0000	0.0000	0.00E+00
222	0.00	0.000	0.919	0.1368	0.0000	0.0000	0.00E+00
223	0.00	0.000	1.078	0.1357	0.0000	0.0000	0.00E+00
224	0.00	0.000	0.218	0.1355	0.0000	0.0000	0.00E+00
225	0.00	0.000	0.114	0.1354	0.0000	0.0000	0.00E+00
226	0.00	0.000	0.053	0.1353	0.0000	0.0000	0.00E+00
227	0.00	0.000	0.028	0.1353	0.0000	0.0000	0.00E+00
228	4.80	0.000	1.266	0.1389	0.0000	0.0000	0.00E+00
229	0.20	0.000	0.246	0.1388	0.0000	0.0000	0.00E+00
230	0.60	0.000	0.762	0.1387	0.0000	0.0000	0.00E+00
231	2.20	0.000	1.346	0.1395	0.0000	0.0000	0.00E+00
232	2.20	0.000	1.261	0.1405	0.0000	0.0000	0.00E+00
233	0.00	0.000	0.787	0.1397	0.0000	0.0000	0.00E+00
234	0.00	0.000	0.783	0.1389	0.0000	0.0000	0.00E+00
235	0.00	0.000	0.799	0.1381	0.0000	0.0000	0.00E+00
236	0.00	0.000	0.572	0.1375	0.0000	0.0000	0.00E+00
237	0.00	0.000	0.402	0.1371	0.0000	0.0000	0.00E+00
238	0.20	0.000	0.397	0.1369	0.0000	0.0000	0.00E+00
239	0.20	0.000	0.437	0.1367	0.0000	0.0000	0.00E+00
240	0.00	0.000	0.400	0.1363	0.0000	0.0000	0.00E+00

241	0.00	0.000	0.449	0.1358	0.0000	0.0000	0.00E+00
242	0.20	0.000	0.577	0.1354	0.0000	0.0000	0.00E+00
243	2.20	0.000	1.389	0.1362	0.0000	0.0000	0.00E+00
244	0.20	0.000	0.411	0.1360	0.0000	0.0000	0.00E+00
245	0.20	0.000	0.445	0.1358	0.0000	0.0000	0.00E+00
246	0.00	0.000	0.221	0.1356	0.0000	0.0000	0.00E+00
247	0.20	0.000	0.460	0.1353	0.0000	0.0000	0.00E+00
248	0.00	0.000	0.075	0.1352	0.0000	0.0000	0.00E+00
249	21.00	0.000	1.914	0.1545	0.0000	0.0000	0.00E+00
250	4.00	0.000	1.622	0.1569	0.0000	0.0000	0.00E+00
251	0.00	0.000	0.981	0.1559	0.0000	0.0000	0.00E+00
252	10.80	0.000	2.338	0.1645	0.0000	0.0000	0.00E+00
253	0.00	0.000	1.595	0.1629	0.0000	0.0000	0.00E+00
254	0.00	0.000	1.526	0.1613	0.0000	0.0000	0.00E+00
255	0.00	0.000	0.617	0.1607	0.0000	0.0000	0.00E+00
256	0.80	0.000	1.834	0.1596	0.0000	0.0000	0.00E+00
257	0.00	0.000	1.378	0.1583	0.0000	0.0000	0.00E+00
258	0.00	0.000	1.393	0.1568	0.0000	0.0000	0.00E+00
259	0.00	0.000	1.050	0.1558	0.0000	0.0000	0.00E+00
260	0.00	0.000	1.411	0.1544	0.0000	0.0000	0.00E+00
261	0.00	0.000	1.514	0.1528	0.0000	0.0000	0.00E+00
262	0.00	0.000	1.588	0.1512	0.0000	0.0000	0.00E+00
263	0.00	0.000	1.533	0.1497	0.0000	0.0000	0.00E+00
264	2.00	0.000	2.485	0.1492	0.0000	0.0000	0.00E+00
265	0.20	0.000	2.079	0.1473	0.0000	0.0000	0.00E+00
266	0.00	0.000	1.869	0.1454	0.0000	0.0000	0.00E+00
267	0.00	0.000	1.394	0.1440	0.0000	0.0000	0.00E+00
268	0.00	0.000	0.766	0.1432	0.0000	0.0000	0.00E+00
269	0.00	0.000	1.603	0.1416	0.0000	0.0000	0.00E+00
270	0.00	0.000	1.965	0.1396	0.0000	0.0000	0.00E+00
271	0.00	0.000	2.271	0.1373	0.0000	0.0000	0.00E+00



272	1.20	0.000	2.464	0.1360	0.0000	0.0000	0.00E+00
273	0.40	0.000	0.718	0.1357	0.0000	0.0000	0.00E+00
274	6.40	0.000	1.655	0.1405	0.0000	0.0000	0.00E+00
275	6.00	0.000	1.574	0.1450	0.0000	0.0000	0.00E+00
276	19.20	0.000	2.418	0.1619	0.0000	0.0000	0.00E+00
277	1.40	0.000	2.093	0.1612	0.0000	0.0000	0.00E+00
278	2.00	0.000	2.776	0.1605	0.0000	0.0000	0.00E+00
279	0.00	0.000	1.733	0.1587	0.0000	0.0000	0.00E+00
280	0.00	0.000	1.751	0.1569	0.0000	0.0000	0.00E+00
281	0.00	0.000	1.689	0.1552	0.0000	0.0000	0.00E+00
282	0.00	0.000	1.711	0.1535	0.0000	0.0000	0.00E+00
283	0.00	0.000	1.643	0.1518	0.0000	0.0000	0.00E+00
284	0.00	0.000	1.907	0.1499	0.0000	0.0000	0.00E+00
285	0.00	0.000	1.864	0.1480	0.0000	0.0000	0.00E+00
286	0.00	0.000	0.950	0.1471	0.0000	0.0000	0.00E+00
287	0.00	0.000	1.031	0.1460	0.0000	0.0000	0.00E+00
288	0.00	0.000	0.989	0.1450	0.0000	0.0000	0.00E+00
289	2.60	0.000	2.704	0.1449	0.0000	0.0000	0.00E+00
290	0.00	0.000	1.232	0.1437	0.0000	0.0000	0.00E+00
291	0.00	0.000	1.888	0.1418	0.0000	0.0000	0.00E+00
292	0.20	0.000	1.870	0.1401	0.0000	0.0000	0.00E+00
293	3.80	0.000	2.125	0.1418	0.0000	0.0000	0.00E+00
294	5.80	0.000	1.789	0.1458	0.0000	0.0000	0.00E+00
295	29.00	0.000	3.269	0.1718	0.0000	0.0000	0.00E+00
296	8.60	0.000	3.163	0.1773	0.0000	0.0000	0.00E+00
297	7.40	0.000	3.293	0.1815	0.0000	0.0000	0.00E+00
298	0.20	0.000	2.211	0.1794	0.0000	0.0000	0.00E+00
299	12.20	0.000	3.590	0.1881	0.0000	0.0000	0.00E+00
300	0.20	0.000	2.082	0.1862	0.0000	0.0000	0.00E+00
301	0.00	0.000	2.850	0.1833	0.0000	0.0000	0.00E+00
302	0.00	0.000	2.212	0.1811	0.0000	0.0000	0.00E+00

303	0.00	0.000	1.896	0.1792	0.0000	0.0000	0.00E+00
304	0.00	0.000	2.092	0.1771	0.0000	0.0000	0.00E+00
305	0.00	0.000	1.860	0.1752	0.0000	0.0000	0.00E+00
306	1.20	0.000	3.536	0.1728	0.0000	0.0000	0.00E+00
307	4.00	0.000	3.991	0.1729	0.0000	0.0000	0.00E+00
308	7.80	0.000	3.335	0.1774	0.0000	0.0000	0.00E+00
309	0.00	0.000	1.569	0.1758	0.0000	0.0000	0.00E+00
310	23.80	0.000	4.139	0.1956	0.0000	0.0000	0.00E+00
311	6.80	0.000	4.055	0.1984	0.0000	0.0000	0.00E+00
312	0.00	0.000	3.063	0.1953	0.0000	0.0000	0.00E+00
313	0.00	0.000	2.909	0.1924	0.0000	0.0000	0.00E+00
314	1.20	0.000	3.243	0.1903	0.0000	0.0000	0.00E+00
315	1.00	0.000	2.319	0.1890	0.0000	0.0000	0.00E+00
316	0.40	0.000	2.896	0.1865	0.0000	0.0000	0.00E+00
317	9.20	0.000	3.465	0.1923	0.0000	0.0000	0.00E+00
318	0.00	0.000	2.737	0.1895	0.0000	0.0000	0.00E+00
319	0.20	0.000	2.205	0.1875	0.0000	0.0000	0.00E+00
320	0.00	0.000	1.534	0.1859	0.0000	0.0000	0.00E+00
321	0.00	0.000	3.398	0.1825	0.0000	0.0000	0.00E+00
322	0.00	0.000	3.850	0.1786	0.0000	0.0000	0.00E+00
323	0.20	0.000	3.450	0.1753	0.0000	0.0000	0.00E+00
324	0.00	0.000	4.648	0.1706	0.0000	0.0000	0.00E+00
325	1.20	0.000	3.371	0.1684	0.0000	0.0000	0.00E+00
326	0.20	0.000	3.578	0.1650	0.0000	0.0000	0.00E+00
327	0.20	0.000	2.717	0.1625	0.0000	0.0000	0.00E+00
328	0.00	0.000	2.128	0.1603	0.0000	0.0000	0.00E+00
329	0.00	0.000	3.532	0.1567	0.0000	0.0000	0.00E+00
330	0.80	0.000	3.050	0.1545	0.0000	0.0000	0.00E+00
331	0.00	0.000	1.963	0.1525	0.0000	0.0000	0.00E+00
332	0.00	0.000	4.311	0.1481	0.0000	0.0000	0.00E+00
333	0.00	0.000	4.823	0.1433	0.0000	0.0000	0.00E+00

334	0.00	0.000	3.026	0.1402	0.0000	0.0000	0.00E+00
335	0.00	0.000	4.176	0.1360	0.0000	0.0000	0.00E+00
336	0.00	0.000	0.744	0.1352	0.0000	0.0000	0.00E+00
337	0.00	0.000	0.238	0.1350	0.0000	0.0000	0.00E+00
338	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
339	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
340	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
341	2.04	0.000	1.311	0.1357	0.0000	0.0000	0.00E+00
342	0.20	0.000	0.523	0.1354	0.0000	0.0000	0.00E+00
343	0.20	0.000	0.486	0.1351	0.0000	0.0000	0.00E+00
344	8.20	0.000	1.654	0.1417	0.0000	0.0000	0.00E+00
345	0.00	0.000	1.409	0.1403	0.0000	0.0000	0.00E+00
346	23.00	0.000	3.092	0.1604	0.0000	0.0000	0.00E+00
347	0.00	0.000	1.982	0.1584	0.0000	0.0000	0.00E+00
348	1.00	0.000	3.607	0.1558	0.0000	0.0000	0.00E+00
349	7.00	0.000	3.614	0.1592	0.0000	0.0000	0.00E+00
350	3.40	0.000	2.929	0.1597	0.0000	0.0000	0.00E+00
351	0.00	0.000	3.311	0.1563	0.0000	0.0000	0.00E+00
352	0.00	0.000	3.161	0.1531	0.0000	0.0000	0.00E+00
353	0.00	0.000	3.293	0.1498	0.0000	0.0000	0.00E+00
354	0.00	0.000	3.846	0.1459	0.0000	0.0000	0.00E+00
355	0.40	0.000	2.907	0.1434	0.0000	0.0000	0.00E+00
356	0.00	0.000	2.639	0.1407	0.0000	0.0000	0.00E+00
357	0.00	0.000	3.165	0.1375	0.0000	0.0000	0.00E+00
358	0.40	0.000	2.527	0.1354	0.0000	0.0000	0.00E+00
359	3.80	0.000	1.787	0.1374	0.0000	0.0000	0.00E+00
360	7.80	0.000	1.609	0.1437	0.0000	0.0000	0.00E+00
361	0.00	0.000	1.432	0.1422	0.0000	0.0000	0.00E+00
362	0.00	0.000	1.763	0.1405	0.0000	0.0000	0.00E+00
363	1.60	0.000	2.697	0.1393	0.0000	0.0000	0.00E+00
364	0.00	0.000	1.628	0.1377	0.0000	0.0000	0.00E+00

365

0.00      0.000      0.909      0.1368      0.0000      0.0000      0.00E+00

\* = Frozen (air or soil)

Annual Totals for Year 4			
	mm*	cubic meters	percent
Precipitation	583.49	46,095.7	100.00
Runoff	0.000	0.0000	0.00
Evapotranspiration	609.932	48,184.6	104.53
Percolation/Leakage through Layer 2	0.000000	0.0000	0.00
Change in Water Storage	-26.4422	-2,088.9	-4.53
Soil Water at Start of Year	3,665.0706	289,540.6	628.13
Soil Water at End of Year	3,638.6284	287,451.6	623.60
Snow Water at Start of Year	0.0000	0.0000	0.00
Snow Water at End of Year	0.0000	0.0000	0.00
Annual Water Budget Balance	0.0000	0.0000	0.00

\*Note: head on liners expressed in cm

**Daily Output for Year 5**

**Column key:**

**Title:** Welby Landfill - Current Cap

**Simulated On:** 16/05/2022 10:56

Leak #1: leakage thru Layer 2

Day	Freezing Status*		Rain (mm)	Runoff (mm)	ET (mm)	Evap. Zone			
	Air	Soil				Water (cm/cm)	Head #1 (cm)	Drain #1 (mm)	Leak #1 (mm)
1			0.00	0.000	0.643	0.1355	0.0000	0.0000	0.00E+00
2			0.00	0.000	0.381	0.1351	0.0000	0.0000	0.00E+00
3			0.00	0.000	0.090	0.1350	0.0000	0.0000	0.00E+00
4	*Note: head		0.80	0.000	0.824	0.1350	0.0000	0.0000	0.00E+00
5			5.20	0.000	1.454	0.1388	0.0000	0.0000	0.00E+00
6			0.00	0.000	0.423	0.1384	0.0000	0.0000	0.00E+00
7			0.20	0.000	1.247	0.1373	0.0000	0.0000	0.00E+00
8			0.00	0.000	0.734	0.1366	0.0000	0.0000	0.00E+00
9			0.20	0.000	0.916	0.1358	0.0000	0.0000	0.00E+00
10			0.00	0.000	0.536	0.1353	0.0000	0.0000	0.00E+00
11			0.00	0.000	0.189	0.1351	0.0000	0.0000	0.00E+00
12			0.00	0.000	0.081	0.1350	0.0000	0.0000	0.00E+00
13			0.00	0.000	0.021	0.1350	0.0000	0.0000	0.00E+00
14			0.00	0.000	0.006	0.1350	0.0000	0.0000	0.00E+00
15			0.00	0.000	0.001	0.1350	0.0000	0.0000	0.00E+00
16			2.00	0.000	1.493	0.1355	0.0000	0.0000	0.00E+00
17			1.00	0.000	1.056	0.1355	0.0000	0.0000	0.00E+00
18			0.00	0.000	0.282	0.1352	0.0000	0.0000	0.00E+00
19			0.00	0.000	0.134	0.1350	0.0000	0.0000	0.00E+00
20			0.00	0.000	0.030	0.1350	0.0000	0.0000	0.00E+00
21			15.20	0.000	1.746	0.1486	0.0000	0.0000	0.00E+00
22			0.00	0.000	2.435	0.1461	0.0000	0.0000	0.00E+00
23			16.20	0.000	3.415	0.1590	0.0000	0.0000	0.00E+00

24	0.20	0.000	2.656	0.1566	0.0000	0.0000	0.00E+00
25	4.60	0.000	4.108	0.1571	0.0000	0.0000	0.00E+00
26	0.80	0.000	3.598	0.1542	0.0000	0.0000	0.00E+00
27	0.20	0.000	2.243	0.1522	0.0000	0.0000	0.00E+00
28	0.00	0.000	2.362	0.1498	0.0000	0.0000	0.00E+00
29	0.00	0.000	3.841	0.1459	0.0000	0.0000	0.00E+00
30	2.60	0.000	3.679	0.1448	0.0000	0.0000	0.00E+00
31	0.00	0.000	3.162	0.1416	0.0000	0.0000	0.00E+00
32	0.00	0.000	2.680	0.1389	0.0000	0.0000	0.00E+00
33	36.20	0.000	4.141	0.1713	0.0000	0.0000	0.00E+00
34	21.40	0.000	3.694	0.1892	0.0000	0.0000	0.00E+00
35	0.00	0.000	2.778	0.1864	0.0000	0.0000	0.00E+00
36	0.00	0.000	3.050	0.1833	0.0000	0.0000	0.00E+00
37	0.00	0.000	3.605	0.1797	0.0000	0.0000	0.00E+00
38	0.00	0.000	4.440	0.1752	0.0000	0.0000	0.00E+00
39	0.00	0.000	5.119	0.1700	0.0000	0.0000	0.00E+00
40	0.00	0.000	2.799	0.1672	0.0000	0.0000	0.00E+00
41	0.00	0.000	3.692	0.1634	0.0000	0.0000	0.00E+00
42	0.00	0.000	4.032	0.1594	0.0000	0.0000	0.00E+00
43	0.00	0.000	3.477	0.1559	0.0000	0.0000	0.00E+00
44	0.00	0.000	2.943	0.1529	0.0000	0.0000	0.00E+00
45	0.00	0.000	2.771	0.1501	0.0000	0.0000	0.00E+00
46	0.00	0.000	3.837	0.1462	0.0000	0.0000	0.00E+00
47	0.20	0.000	3.580	0.1428	0.0000	0.0000	0.00E+00
48	0.00	0.000	4.361	0.1384	0.0000	0.0000	0.00E+00
49	0.20	0.000	3.016	0.1355	0.0000	0.0000	0.00E+00
50	0.00	0.000	0.418	0.1351	0.0000	0.0000	0.00E+00
51	18.80	0.000	2.559	0.1515	0.0000	0.0000	0.00E+00
52	42.60	0.003	2.027	0.1925	0.0000	0.0000	0.00E+00
53	5.60	0.000	3.634	0.1945	0.0000	0.0000	0.00E+00
54	0.00	0.000	4.160	0.1903	0.0000	0.0000	0.00E+00

55	0.00	0.000	4.645	0.1856	0.0000	0.0000	0.00E+00
56	0.00	0.000	3.419	0.1821	0.0000	0.0000	0.00E+00
57	0.40	0.000	3.314	0.1792	0.0000	0.0000	0.00E+00
58	0.60	0.000	4.344	0.1754	0.0000	0.0000	0.00E+00
59	0.20	0.000	3.769	0.1718	0.0000	0.0000	0.00E+00
60	0.20	0.000	3.714	0.1682	0.0000	0.0000	0.00E+00
61	0.20	0.000	3.446	0.1650	0.0000	0.0000	0.00E+00
62	0.60	0.000	3.618	0.1619	0.0000	0.0000	0.00E+00
63	0.20	0.000	4.802	0.1573	0.0000	0.0000	0.00E+00
64	0.20	0.000	4.346	0.1531	0.0000	0.0000	0.00E+00
65	0.20	0.000	3.585	0.1497	0.0000	0.0000	0.00E+00
66	0.00	0.000	4.087	0.1455	0.0000	0.0000	0.00E+00
67	0.20	0.000	4.114	0.1416	0.0000	0.0000	0.00E+00
68	0.00	0.000	4.589	0.1369	0.0000	0.0000	0.00E+00
69	0.20	0.000	1.698	0.1354	0.0000	0.0000	0.00E+00
70	0.00	0.000	0.399	0.1350	0.0000	0.0000	0.00E+00
71	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
72	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
73	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
74	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
75	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
76	6.40	0.000	1.479	0.1400	0.0000	0.0000	0.00E+00
77	0.60	0.000	0.820	0.1397	0.0000	0.0000	0.00E+00
78	1.20	0.000	2.204	0.1387	0.0000	0.0000	0.00E+00
79	0.20	0.000	0.869	0.1381	0.0000	0.0000	0.00E+00
80	0.00	0.000	0.670	0.1374	0.0000	0.0000	0.00E+00
81	0.40	0.000	0.771	0.1370	0.0000	0.0000	0.00E+00
82	37.20	0.000	2.697	0.1719	0.0000	0.0000	0.00E+00
83	2.20	0.000	1.613	0.1725	0.0000	0.0000	0.00E+00
84	0.20	0.000	2.787	0.1698	0.0000	0.0000	0.00E+00
85	0.20	0.000	2.634	0.1674	0.0000	0.0000	0.00E+00

86	0.40	0.000	3.339	0.1644	0.0000	0.0000	0.00E+00
87	0.00	0.000	2.871	0.1615	0.0000	0.0000	0.00E+00
88	0.40	0.000	2.601	0.1593	0.0000	0.0000	0.00E+00
89	0.00	0.000	1.647	0.1576	0.0000	0.0000	0.00E+00
90	0.20	0.000	2.298	0.1555	0.0000	0.0000	0.00E+00
91	0.20	0.000	3.272	0.1524	0.0000	0.0000	0.00E+00
92	0.00	0.000	1.921	0.1505	0.0000	0.0000	0.00E+00
93	0.00	0.000	1.418	0.1490	0.0000	0.0000	0.00E+00
94	4.80	0.000	1.828	0.1520	0.0000	0.0000	0.00E+00
95	0.00	0.000	2.275	0.1497	0.0000	0.0000	0.00E+00
96	0.20	0.000	1.679	0.1482	0.0000	0.0000	0.00E+00
97	0.20	0.000	2.014	0.1464	0.0000	0.0000	0.00E+00
98	0.40	0.000	2.271	0.1445	0.0000	0.0000	0.00E+00
99	0.00	0.000	2.382	0.1421	0.0000	0.0000	0.00E+00
100	0.20	0.000	2.839	0.1394	0.0000	0.0000	0.00E+00
101	1.00	0.000	2.787	0.1376	0.0000	0.0000	0.00E+00
102	2.00	0.000	2.765	0.1369	0.0000	0.0000	0.00E+00
103	0.20	0.000	1.180	0.1359	0.0000	0.0000	0.00E+00
104	0.20	0.000	0.817	0.1353	0.0000	0.0000	0.00E+00
105	0.20	0.000	0.369	0.1351	0.0000	0.0000	0.00E+00
106	1.40	0.000	1.147	0.1353	0.0000	0.0000	0.00E+00
107	0.20	0.000	0.281	0.1353	0.0000	0.0000	0.00E+00
108	0.00	0.000	0.176	0.1351	0.0000	0.0000	0.00E+00
109	0.00	0.000	0.065	0.1350	0.0000	0.0000	0.00E+00
110	0.00	0.000	0.011	0.1350	0.0000	0.0000	0.00E+00
111	0.20	0.000	0.203	0.1350	0.0000	0.0000	0.00E+00
112	0.00	0.000	0.001	0.1350	0.0000	0.0000	0.00E+00
113	0.40	0.000	0.400	0.1350	0.0000	0.0000	0.00E+00
114	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
115	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
116	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00



117	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
118	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
119	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
120	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
121	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
122	1.00	0.000	0.773	0.1352	0.0000	0.0000	0.00E+00
123	0.20	0.000	0.308	0.1351	0.0000	0.0000	0.00E+00
124	0.00	0.000	0.087	0.1350	0.0000	0.0000	0.00E+00
125	0.20	0.000	0.224	0.1350	0.0000	0.0000	0.00E+00
126	0.20	0.000	0.206	0.1350	0.0000	0.0000	0.00E+00
127	2.60	0.000	1.298	0.1363	0.0000	0.0000	0.00E+00
128	0.20	0.000	0.365	0.1361	0.0000	0.0000	0.00E+00
129	0.20	0.000	0.529	0.1358	0.0000	0.0000	0.00E+00
130	0.00	0.000	0.305	0.1355	0.0000	0.0000	0.00E+00
131	0.00	0.000	0.314	0.1352	0.0000	0.0000	0.00E+00
132	0.00	0.000	0.113	0.1351	0.0000	0.0000	0.00E+00
133	2.20	0.000	1.256	0.1360	0.0000	0.0000	0.00E+00
134	0.20	0.000	0.369	0.1359	0.0000	0.0000	0.00E+00
135	0.00	0.000	0.292	0.1356	0.0000	0.0000	0.00E+00
136	0.20	0.000	0.465	0.1353	0.0000	0.0000	0.00E+00
137	2.00	0.000	1.264	0.1360	0.0000	0.0000	0.00E+00
138	5.40	0.000	1.418	0.1401	0.0000	0.0000	0.00E+00
139	1.20	0.000	0.833	0.1404	0.0000	0.0000	0.00E+00
140	0.00	0.000	0.599	0.1398	0.0000	0.0000	0.00E+00
141	0.20	0.000	0.747	0.1393	0.0000	0.0000	0.00E+00
142	0.00	0.000	0.247	0.1390	0.0000	0.0000	0.00E+00
143	0.00	0.000	0.702	0.1383	0.0000	0.0000	0.00E+00
144	0.00	0.000	0.873	0.1374	0.0000	0.0000	0.00E+00
145	0.00	0.000	0.471	0.1370	0.0000	0.0000	0.00E+00
146	1.55	0.000	1.177	0.1373	0.0000	0.0000	0.00E+00
147	1.55	0.000	1.053	0.1378	0.0000	0.0000	0.00E+00

148	0.00	0.000	0.119	0.1377	0.0000	0.0000	0.00E+00
149	0.00	0.000	0.270	0.1374	0.0000	0.0000	0.00E+00
150	0.00	0.000	0.174	0.1373	0.0000	0.0000	0.00E+00
151	1.55	0.000	1.001	0.1378	0.0000	0.0000	0.00E+00
152	0.00	0.000	0.134	0.1377	0.0000	0.0000	0.00E+00
153	0.00	0.000	0.313	0.1374	0.0000	0.0000	0.00E+00
154	0.20	0.000	0.469	0.1371	0.0000	0.0000	0.00E+00
155	0.20	0.000	0.429	0.1369	0.0000	0.0000	0.00E+00
156	0.00	0.000	0.175	0.1367	0.0000	0.0000	0.00E+00
157	0.20	0.000	0.411	0.1365	0.0000	0.0000	0.00E+00
158	0.20	0.000	0.410	0.1363	0.0000	0.0000	0.00E+00
159	0.00	0.000	0.205	0.1361	0.0000	0.0000	0.00E+00
160	2.70	0.000	1.333	0.1374	0.0000	0.0000	0.00E+00
161	2.70	0.000	1.204	0.1390	0.0000	0.0000	0.00E+00
162	0.00	0.000	0.144	0.1388	0.0000	0.0000	0.00E+00
163	2.70	0.000	1.559	0.1400	0.0000	0.0000	0.00E+00
164	2.70	0.000	1.609	0.1411	0.0000	0.0000	0.00E+00
165	0.60	0.000	1.071	0.1406	0.0000	0.0000	0.00E+00
166	0.00	0.000	0.208	0.1404	0.0000	0.0000	0.00E+00
167	0.00	0.000	0.130	0.1402	0.0000	0.0000	0.00E+00
168	0.00	0.000	0.113	0.1401	0.0000	0.0000	0.00E+00
169	0.00	0.000	0.152	0.1400	0.0000	0.0000	0.00E+00
170	1.60	0.000	1.386	0.1402	0.0000	0.0000	0.00E+00
171	0.00	0.000	0.742	0.1394	0.0000	0.0000	0.00E+00
172	0.20	0.000	0.727	0.1389	0.0000	0.0000	0.00E+00
173	0.00	0.000	0.642	0.1383	0.0000	0.0000	0.00E+00
174	0.80	0.000	1.165	0.1379	0.0000	0.0000	0.00E+00
175	33.60	0.000	1.393	0.1704	0.0000	0.0000	0.00E+00
176	4.40	0.000	1.708	0.1731	0.0000	0.0000	0.00E+00
177	0.80	0.000	1.286	0.1727	0.0000	0.0000	0.00E+00
178	0.60	0.000	1.204	0.1720	0.0000	0.0000	0.00E+00

179	0.20	0.000	0.932	0.1713	0.0000	0.0000	0.00E+00
180	4.60	0.000	1.975	0.1740	0.0000	0.0000	0.00E+00
181	21.20	0.000	1.772	0.1936	0.0000	0.0000	0.00E+00
182	61.60	3.182	2.093	0.2505	0.0000	0.0000	0.00E+00
183	0.20	0.000	0.972	0.2497	0.0000	0.0000	0.00E+00
184	0.00	0.000	0.790	0.2489	0.0000	0.0000	0.00E+00
185	0.00	0.000	0.603	0.2483	0.0000	0.0000	0.00E+00
186	0.40	0.000	1.141	0.2475	0.0000	0.0000	0.00E+00
187	0.00	0.000	0.818	0.2467	0.0000	0.0000	0.00E+00
188	0.00	0.000	0.452	0.2463	0.0000	0.0000	0.00E+00
189	0.00	0.000	0.678	0.2456	0.0000	0.0000	0.00E+00
190	16.60	0.000	2.074	0.2602	0.0000	0.0000	0.00E+00
191	8.40	0.000	1.502	0.2672	0.0000	0.0000	0.00E+00
192	0.80	0.000	1.370	0.2666	0.0000	0.0000	0.00E+00
193	0.20	0.000	0.747	0.2661	0.0000	0.0000	0.00E+00
194	1.20	0.000	1.557	0.2657	0.0000	0.0000	0.00E+00
195	0.00	0.000	0.796	0.2649	0.0000	0.0000	0.00E+00
196	0.00	0.000	0.625	0.2643	0.0000	0.0000	0.00E+00
197	0.00	0.000	0.356	0.2639	0.0000	0.0000	0.00E+00
198	0.00	0.000	0.284	0.2636	0.0000	0.0000	0.00E+00
199	0.00	0.000	0.554	0.2631	0.0000	0.0000	0.00E+00
200	0.00	0.000	0.552	0.2625	0.0000	0.0000	0.00E+00
201	0.00	0.000	0.743	0.2618	0.0000	0.0000	0.00E+00
202	0.20	0.000	0.968	0.2610	0.0000	0.0000	0.00E+00
203	0.20	0.000	0.613	0.2606	0.0000	0.0000	0.00E+00
204	0.00	0.000	0.452	0.2601	0.0000	0.0000	0.00E+00
205	0.00	0.000	0.528	0.2596	0.0000	0.0000	0.00E+00
206	0.00	0.000	0.923	0.2587	0.0000	0.0000	0.00E+00
207	0.00	0.000	0.947	0.2577	0.0000	0.0000	0.00E+00
208	0.00	0.000	0.950	0.2567	0.0000	0.0000	0.00E+00
209	0.00	0.000	0.888	0.2558	0.0000	0.0000	0.00E+00

210	0.00	0.000	0.881	0.2550	0.0000	0.0000	0.00E+00
211	0.00	0.000	0.887	0.2541	0.0000	0.0000	0.00E+00
212	0.00	0.000	0.954	0.2531	0.0000	0.0000	0.00E+00
213	0.00	0.000	0.441	0.2527	0.0000	0.0000	0.00E+00
214	0.00	0.000	0.621	0.2520	0.0000	0.0000	0.00E+00
215	0.00	0.000	0.995	0.2510	0.0000	0.0000	0.00E+00
216	3.00	0.000	2.125	0.2519	0.0000	0.0000	0.00E+00
217	0.20	0.000	0.703	0.2514	0.0000	0.0000	0.00E+00
218	0.00	0.000	0.762	0.2506	0.0000	0.0000	0.00E+00
219	0.00	0.000	0.865	0.2498	0.0000	0.0000	0.00E+00
220	0.00	0.000	0.416	0.2493	0.0000	0.0000	0.00E+00
221	0.00	0.000	0.910	0.2484	0.0000	0.0000	0.00E+00
222	0.00	0.000	0.933	0.2475	0.0000	0.0000	0.00E+00
223	0.00	0.000	0.553	0.2469	0.0000	0.0000	0.00E+00
224	0.00	0.000	0.574	0.2463	0.0000	0.0000	0.00E+00
225	0.00	0.000	0.889	0.2454	0.0000	0.0000	0.00E+00
226	0.00	0.000	0.975	0.2444	0.0000	0.0000	0.00E+00
227	0.00	0.000	1.007	0.2434	0.0000	0.0000	0.00E+00
228	0.20	0.000	1.001	0.2426	0.0000	0.0000	0.00E+00
229	0.00	0.000	0.734	0.2419	0.0000	0.0000	0.00E+00
230	0.00	0.000	1.076	0.2408	0.0000	0.0000	0.00E+00
231	0.00	0.000	1.123	0.2397	0.0000	0.0000	0.00E+00
232	3.20	0.000	2.249	0.2406	0.0000	0.0000	0.00E+00
233	0.40	0.000	1.311	0.2397	0.0000	0.0000	0.00E+00
234	0.00	0.000	0.792	0.2389	0.0000	0.0000	0.00E+00
235	1.00	0.000	0.905	0.2390	0.0000	0.0000	0.00E+00
236	0.20	0.000	0.364	0.2388	0.0000	0.0000	0.00E+00
237	0.20	0.000	0.367	0.2387	0.0000	0.0000	0.00E+00
238	0.20	0.000	0.740	0.2381	0.0000	0.0000	0.00E+00
239	0.00	0.000	0.727	0.2374	0.0000	0.0000	0.00E+00
240	0.20	0.000	1.093	0.2365	0.0000	0.0000	0.00E+00

241	0.00	0.000	1.391	0.2351	0.0000	0.0000	0.00E+00
242	0.00	0.000	1.259	0.2338	0.0000	0.0000	0.00E+00
243	0.00	0.000	1.470	0.2323	0.0000	0.0000	0.00E+00
244	0.00	0.000	1.250	0.2311	0.0000	0.0000	0.00E+00
245	0.00	0.000	1.145	0.2299	0.0000	0.0000	0.00E+00
246	0.00	0.000	0.826	0.2291	0.0000	0.0000	0.00E+00
247	10.80	0.000	2.251	0.2377	0.0000	0.0000	0.00E+00
248	1.40	0.000	1.989	0.2371	0.0000	0.0000	0.00E+00
249	0.40	0.000	0.919	0.2366	0.0000	0.0000	0.00E+00
250	0.20	0.000	1.327	0.2354	0.0000	0.0000	0.00E+00
251	0.00	0.000	1.270	0.2342	0.0000	0.0000	0.00E+00
252	0.00	0.000	1.646	0.2325	0.0000	0.0000	0.00E+00
253	5.40	0.000	2.887	0.2350	0.0000	0.0000	0.00E+00
254	16.40	0.000	2.653	0.2489	0.0000	0.0000	0.00E+00
255	0.00	0.000	1.308	0.2476	0.0000	0.0000	0.00E+00
256	0.00	0.000	1.419	0.2462	0.0000	0.0000	0.00E+00
257	0.00	0.000	1.409	0.2447	0.0000	0.0000	0.00E+00
258	0.20	0.000	1.676	0.2433	0.0000	0.0000	0.00E+00
259	0.00	0.000	1.422	0.2418	0.0000	0.0000	0.00E+00
260	5.80	0.000	2.686	0.2450	0.0000	0.0000	0.00E+00
261	1.40	0.000	2.252	0.2441	0.0000	0.0000	0.00E+00
262	0.00	0.000	0.662	0.2434	0.0000	0.0000	0.00E+00
263	2.20	0.000	2.284	0.2433	0.0000	0.0000	0.00E+00
264	0.40	0.000	1.816	0.2419	0.0000	0.0000	0.00E+00
265	0.20	0.000	1.423	0.2407	0.0000	0.0000	0.00E+00
266	0.00	0.000	1.930	0.2387	0.0000	0.0000	0.00E+00
267	0.00	0.000	1.203	0.2375	0.0000	0.0000	0.00E+00
268	0.00	0.000	0.762	0.2367	0.0000	0.0000	0.00E+00
269	8.20	0.000	2.492	0.2425	0.0000	0.0000	0.00E+00
270	28.20	0.000	2.716	0.2683	0.0000	0.0000	0.00E+00
271	0.00	0.000	1.689	0.2665	0.0000	0.0000	0.00E+00

272	24.80	0.000	2.932	0.2886	0.0000	0.0000	0.00E+00
273	1.00	0.000	2.233	0.2874	0.0000	0.0000	0.00E+00
274	0.00	0.000	2.075	0.2853	0.0000	0.0000	0.00E+00
275	0.00	0.000	2.303	0.2830	0.0000	0.0000	0.00E+00
276	0.00	0.000	2.489	0.2805	0.0000	0.0000	0.00E+00
277	0.00	0.000	0.514	0.2799	0.0000	0.0000	0.00E+00
278	0.00	0.000	2.205	0.2777	0.0000	0.0000	0.00E+00
279	0.00	0.000	2.402	0.2753	0.0000	0.0000	0.00E+00
280	0.00	0.000	0.883	0.2744	0.0000	0.0000	0.00E+00
281	5.60	0.000	1.974	0.2781	0.0000	0.0000	0.00E+00
282	0.00	0.000	1.901	0.2761	0.0000	0.0000	0.00E+00
283	0.00	0.000	2.049	0.2741	0.0000	0.0000	0.00E+00
284	0.00	0.000	2.067	0.2720	0.0000	0.0000	0.00E+00
285	0.00	0.000	2.161	0.2698	0.0000	0.0000	0.00E+00
286	0.00	0.000	1.631	0.2681	0.0000	0.0000	0.00E+00
287	2.60	0.000	3.552	0.2672	0.0000	0.0000	0.00E+00
288	0.00	0.000	2.443	0.2647	0.0000	0.0000	0.00E+00
289	0.00	0.000	2.434	0.2622	0.0000	0.0000	0.00E+00
290	2.40	0.000	2.833	0.2618	0.0000	0.0000	0.00E+00
291	1.40	0.000	3.123	0.2601	0.0000	0.0000	0.00E+00
292	1.20	0.000	2.922	0.2583	0.0000	0.0000	0.00E+00
293	0.80	0.000	2.747	0.2564	0.0000	0.0000	0.00E+00
294	2.20	0.000	2.897	0.2557	0.0000	0.0000	0.00E+00
295	0.40	0.000	1.840	0.2542	0.0000	0.0000	0.00E+00
296	3.00	0.000	2.648	0.2546	0.0000	0.0000	0.00E+00
297	0.00	0.000	2.706	0.2518	0.0000	0.0000	0.00E+00
298	0.80	0.000	3.358	0.2492	0.0000	0.0000	0.00E+00
299	0.80	0.000	2.321	0.2476	0.0000	0.0000	0.00E+00
300	0.00	0.000	1.297	0.2462	0.0000	0.0000	1.21E+00
301	0.00	0.000	2.231	0.2438	0.0000	0.0000	5.12E-01
302	0.00	0.000	2.189	0.2413	0.0000	0.0000	0.00E+00

303	1.00	0.000	2.603	0.2391	0.0000	0.0000	0.00E+00
304	26.20	0.000	2.656	0.2624	0.0000	0.0000	0.00E+00
305	17.40	0.000	3.846	0.2756	0.0000	0.0000	1.00E+00
306	6.60	0.000	4.686	0.2771	0.0000	0.0000	0.00E+00
307	0.20	0.000	3.686	0.2733	0.0000	0.0000	6.77E-01
308	1.40	0.000	2.754	0.2719	0.0000	0.0000	4.11E-01
309	1.40	0.000	2.851	0.2703	0.0000	0.0000	0.00E+00
310	0.20	0.000	2.751	0.2676	0.0000	0.0000	0.00E+00
311	0.80	0.000	3.688	0.2647	0.0000	0.0000	0.00E+00
312	27.00	0.000	3.733	0.2882	0.0000	0.0000	0.00E+00
313	0.20	0.000	5.207	0.2831	0.0000	0.0000	0.00E+00
314	0.00	0.000	5.279	0.2778	0.0000	0.0000	0.00E+00
315	0.00	0.000	2.404	0.2753	0.0000	0.0000	0.00E+00
316	0.00	0.000	2.201	0.2730	0.0000	0.0000	0.00E+00
317	0.00	0.000	3.060	0.2699	0.0000	0.0000	0.00E+00
318	0.00	0.000	2.390	0.2675	0.0000	0.0000	0.00E+00
319	0.00	0.000	3.170	0.2643	0.0000	0.0000	0.00E+00
320	4.20	0.000	3.675	0.2649	0.0000	0.0000	0.00E+00
321	0.20	0.000	3.417	0.2616	0.0000	0.0000	0.00E+00
322	0.00	0.000	3.985	0.2576	0.0000	0.0000	0.00E+00
323	0.00	0.000	4.220	0.2533	0.0000	0.0000	0.00E+00
324	0.00	0.000	3.898	0.2494	0.0000	0.0000	0.00E+00
325	0.40	0.000	3.917	0.2458	0.0000	0.0000	0.00E+00
326	0.00	0.000	3.765	0.2420	0.0000	0.0000	0.00E+00
327	4.40	0.000	3.760	0.2427	0.0000	0.0000	0.00E+00
328	0.60	0.000	3.711	0.2395	0.0000	0.0000	0.00E+00
329	5.40	0.000	4.037	0.2409	0.0000	0.0000	0.00E+00
330	11.00	0.000	4.486	0.2475	0.0000	0.0000	0.00E+00
331	13.60	0.000	3.505	0.2577	0.0000	0.0000	0.00E+00
332	9.20	0.000	2.676	0.2643	0.0000	0.0000	0.00E+00
333	29.80	0.000	3.500	0.2908	0.0000	0.0000	0.00E+00

334	25.40	0.000	3.858	0.3126	0.0000	0.0000	0.00E+00
335	6.40	0.000	3.595	0.3154	0.0000	0.0000	0.00E+00
336	6.00	0.000	4.725	0.3167	0.0000	0.0000	0.00E+00
337	29.20	0.041	3.783	0.3424	0.0000	0.0000	0.00E+00
338	0.00	0.000	4.121	0.3382	0.0000	0.0000	0.00E+00
339	0.00	0.000	4.718	0.3334	0.0000	0.0000	0.00E+00
340	0.00	0.000	3.984	0.3273	0.0000	0.0000	0.00E+00
341	6.20	0.000	3.571	0.3239	0.0000	0.0000	0.00E+00
342	0.00	0.000	2.880	0.3155	0.0000	0.0000	0.00E+00
343	0.20	0.000	2.445	0.3086	0.0000	0.0000	5.93E-01
344	0.00	0.000	3.462	0.3014	0.0000	0.0000	0.00E+00
345	0.00	0.000	3.816	0.2946	0.0000	0.0000	0.00E+00
346	0.00	0.000	3.919	0.2881	0.0000	0.0000	0.00E+00
347	0.00	0.000	3.418	0.2825	0.0000	0.0000	0.00E+00
348	0.00	0.000	4.294	0.2762	0.0000	0.0000	0.00E+00
349	0.00	0.000	2.940	0.2716	0.0000	0.0000	0.00E+00
350	0.00	0.000	2.801	0.2675	0.0000	0.0000	1.06E+00
351	6.60	0.000	2.733	0.2699	0.0000	0.0000	1.55E+00
352	0.00	0.000	3.418	0.2652	0.0000	0.0000	1.35E+00
353	0.00	0.000	3.772	0.2602	0.0000	0.0000	1.09E+00
354	0.00	0.000	3.890	0.2553	0.0000	0.0000	8.98E-01
355	0.00	0.000	2.782	0.2515	0.0000	0.0000	7.73E-01
356	0.00	0.000	2.610	0.2479	0.0000	0.0000	5.76E-01
357	0.00	0.000	2.706	0.2442	0.0000	0.0000	2.30E-01
358	0.00	0.000	3.160	0.2402	0.0000	0.0000	3.91E-01
359	0.00	0.000	2.859	0.2366	0.0000	0.0000	5.53E-01
360	0.00	0.000	2.947	0.2330	0.0000	0.0000	7.92E-01
361	0.00	0.000	3.863	0.2286	0.0000	0.0000	1.05E+00
362	0.00	0.000	4.046	0.2240	0.0000	0.0000	1.29E+00
363	0.00	0.000	4.821	0.2190	0.0000	0.0000	1.32E+00
364	0.00	0.000	5.210	0.2137	0.0000	0.0000	1.55E+00



365

0.00      0.000      5.034      0.2086      0.0000      0.0000      1.89E+00

\* = Frozen (air or soil)

Annual Totals for Year 5			
	mm*	cubic meters	percent
Precipitation	808.65	63,883.4	100.00
Runoff	3.225	254.8	0.40
Evapotranspiration	685.179	54,129.1	84.73
Percolation/Leakage through Layer 2	20.746502	1,639.0	2.57
Change in Water Storage	99.4992	7,860.4	12.30
Soil Water at Start of Year	3,638.6284	287,451.6	449.96
Soil Water at End of Year	3,738.1276	295,312.1	462.27
Snow Water at Start of Year	0.0000	0.0000	0.00
Snow Water at End of Year	0.0000	0.0000	0.00
Annual Water Budget Balance	0.0000	0.0000	0.00

\*Note: head on liners expressed in cm

**Average Annual Totals Summary**

**Title:** Welby Landfill - Current Cap  
**Simulated on:** 16/05/2022 10:57

	Average Annual Totals for Years 1 -		
	(millimeters)**	[std dev]	(cubic meters)
Precipitation	690.03	[117.72]	54,512.7
Runoff	1.360	[1.205]	107.4
Evapotranspiration	658.188	[77.524]	51,996.9
Subprofile1			
Percolation/leakage through Layer 2	15.014499	[14.027049]	1,186.1
Water storage			
Change in water storage	15.4719	[48.7966]	1,222.3

\* Note: Average inches are converted to volume based on the user-specified area.

\*\*Note: head on liners expressed in cm

5*
(percent)
100.00
0.20
95.38
2.18
2.24

**Peak Values Summary**

**Title:** Welby Landfill - Current Cap  
**Simulated on:** 16/05/2022 10:57

	Peak Values for Years 1 - 5*	
	(millimeters)*	(cubic meters)
Precipitation	63.00	4,977.0
Runoff	3.182	251.3
Subprofile1		
Percolation/leakage through Layer 2	2.219519	175.3
Other Parameters		
Snow water	0.0000	0.0000
Maximum vegetation soil water	0.3424 (vol/vol)	
Minimum vegetation soil water	0.1350 (vol/vol)	

\*Note: head on liners expressed in cm

**Final Water Storage in Landfill Profile at End of Simulation Period**

**Title:** Welby Landfill - Current Cap  
**Simulated on:** 16/05/2022 10:57  
**Simulation period:** 5 years

Layer	Final Water Storage	
	(centimeters)	(vol/vol)
1	20.6544	0.2086
2	353.1584	0.2943
Snow water	0.0000	---

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**HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE**  
**HELP MODEL VERSION 4.0 BETA (2018)**  
**DEVELOPED BY USEPA NATIONAL RISK MANAGEMENT RESEARCH LABORATORY**

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**Title:** Welby Landfill - Proposed Cap                      **Simulated On:** 16/05/2022 10:52

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**Layer 1**

Type 1 - Vertical Percolation Layer (Cover Soil)

SiL - Silty Loam

Material Texture Number 9

Thickness	=	99 centimeters
Porosity	=	0.501 vol/vol
Field Capacity	=	0.284 vol/vol
Wilting Point	=	0.135 vol/vol
Initial Soil Water Content	=	0.1451 vol/vol
Effective Sat. Hyd. Conductivity	=	1.90E-04 cm/sec

**Layer 2**

Type 1 - Vertical Percolation Layer (Waste)

Municipal Solid Waste (MSW) (900 pcy)

Material Texture Number 18

Thickness	=	1200 centimeters
Porosity	=	0.671 vol/vol
Field Capacity	=	0.292 vol/vol
Wilting Point	=	0.077 vol/vol
Initial Soil Water Content	=	0.2919 vol/vol
Effective Sat. Hyd. Conductivity	=	1.00E-03 cm/sec

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**Note:** Initial moisture content of the layers and snow water were computed as nearly steady-state values by HELP.

**General Design and Evaporative Zone Data**

SCS Runoff Curve Number	=	88.2
Fraction of Area Allowing Runoff	=	72 %
Area projected on a horizontal plane	=	7.9 Hectares
Evaporative Zone Depth	=	99 cm
Initial Water in Evaporative Zone	=	14.37 cm
Upper Limit of Evaporative Storage	=	49.6 cm
Lower Limit of Evaporative Storage	=	13.36 cm
Initial Snow Water	=	0 cm
Initial Water in Layer Materials	=	364.7 cm
Total Initial Water	=	364.7 cm
Total Subsurface Inflow	=	0 mm/year

-----

**Note:** SCS Runoff Curve Number was calculated by HELP.

### Evapotranspiration and Weather Data

Station Latitude	=	31.33 Degrees
Maximum Leaf Area Index	=	2.45
Start of Growing Season (Julian Date)	=	244 days
End of Growing Season (Julian Date)	=	151 days
Average Wind Speed	=	12.4 kph
Average 1st Quarter Relative Humidity	=	67 %
Average 2nd Quarter Relative Humidity	=	71 %
Average 3rd Quarter Relative Humidity	=	64 %
Average 4th Quarter Relative Humidity	=	60 %

-----  
Note: Evapotranspiration data was obtained for ,

### Normal Mean Monthly Precipitation (mm)

<u>Jan/Jul</u>	<u>Feb/Aug</u>	<u>Mar/Sep</u>	<u>Apr/Oct</u>	<u>May/Nov</u>	<u>Jun/Dec</u>
64.99091	107.05	102.2455	55.83182	49.175	80.95
46.81227	56.01	37.22955	47.85091	72.07182	63.51455

-----  
Note: Precipitation was simulated using NOAA data for the following weather station  
MOSS VALE AWS, AS, 0, 0

### Normal Mean Monthly Temperature (Degrees Celsius)

<u>Jan/Jul</u>	<u>Feb/Aug</u>	<u>Mar/Sep</u>	<u>Apr/Oct</u>	<u>May/Nov</u>	<u>Jun/Dec</u>
20.3	19.1	17	13.9	10.1	7.9
7.2	8.1	11.1	13.7	16.3	18.2

-----  
Note: Temperature was simulated using NOAA data for the following weather station  
MOSS VALE AWS, AS, 0, 0  
Solar radiation was simulated using NSRDB data for the following location:  
2051109\_-34.43\_150.42





15:

15:

**Daily Output for Year 1**

**Column key:**

**Title:** Welby Landfill - Proposed Cap

**Simulated On:** 16/05/2022 10:52

Leak #1: leakage thru Layer 2

Day	Freezing Status*		Rain (mm)	Runoff (mm)	ET (mm)	Evap. Zone		Head #1 (cm)	Drain #1 (mm)	Leak #1 (mm)
	Air	Soil				Water (cm/cm)				
1			2.10	0.000	3.717	0.1435	0.0000	0.0000	0.00E+00	
2			2.10	0.000	3.379	0.1422	0.0000	0.0000	0.00E+00	
3			2.10	0.000	2.870	0.1414	0.0000	0.0000	0.00E+00	
4	*Note: head		2.10	0.000	2.664	0.1409	0.0000	0.0000	0.00E+00	
5			2.10	0.000	2.119	0.1409	0.0000	0.0000	0.00E+00	
6			2.10	0.000	2.225	0.1407	0.0000	0.0000	0.00E+00	
7			2.10	0.000	2.003	0.1408	0.0000	0.0000	0.00E+00	
8			2.10	0.000	2.136	0.1408	0.0000	0.0000	0.00E+00	
9			2.10	0.000	1.681	0.1412	0.0000	0.0000	0.00E+00	
10			2.10	0.000	1.831	0.1415	0.0000	0.0000	0.00E+00	
11			2.10	0.000	1.769	0.1418	0.0000	0.0000	0.00E+00	
12			2.10	0.000	2.179	0.1417	0.0000	0.0000	0.00E+00	
13			2.10	0.000	2.418	0.1414	0.0000	0.0000	0.00E+00	
14			2.10	0.000	2.570	0.1409	0.0000	0.0000	0.00E+00	
15			2.10	0.000	2.526	0.1405	0.0000	0.0000	0.00E+00	
16			2.10	0.000	2.238	0.1404	0.0000	0.0000	0.00E+00	
17			2.10	0.000	2.218	0.1403	0.0000	0.0000	0.00E+00	
18			2.10	0.000	2.106	0.1402	0.0000	0.0000	0.00E+00	
19			2.10	0.000	2.074	0.1403	0.0000	0.0000	0.00E+00	
20			2.10	0.000	2.109	0.1403	0.0000	0.0000	0.00E+00	
21			2.10	0.000	2.115	0.1403	0.0000	0.0000	0.00E+00	
22			2.10	0.000	2.037	0.1403	0.0000	0.0000	0.00E+00	
23			2.10	0.000	2.106	0.1403	0.0000	0.0000	0.00E+00	

24	2.10	0.000	1.980	0.1404	0.0000	0.0000	0.00E+00
25	2.10	0.000	2.243	0.1403	0.0000	0.0000	0.00E+00
26	2.10	0.000	2.067	0.1403	0.0000	0.0000	0.00E+00
27	2.10	0.000	2.168	0.1402	0.0000	0.0000	0.00E+00
28	2.10	0.000	2.127	0.1402	0.0000	0.0000	0.00E+00
29	2.10	0.000	2.064	0.1403	0.0000	0.0000	0.00E+00
30	2.10	0.000	2.217	0.1401	0.0000	0.0000	0.00E+00
31	2.10	0.000	2.142	0.1401	0.0000	0.0000	0.00E+00
32	3.90	0.000	2.147	0.1419	0.0000	0.0000	0.00E+00
33	3.90	0.000	2.827	0.1430	0.0000	0.0000	0.00E+00
34	3.90	0.000	2.996	0.1439	0.0000	0.0000	0.00E+00
35	3.90	0.000	2.407	0.1454	0.0000	0.0000	0.00E+00
36	3.90	0.000	2.821	0.1465	0.0000	0.0000	0.00E+00
37	3.90	0.000	2.292	0.1481	0.0000	0.0000	0.00E+00
38	3.90	0.000	2.255	0.1497	0.0000	0.0000	0.00E+00
39	3.90	0.000	2.806	0.1509	0.0000	0.0000	0.00E+00
40	3.90	0.000	2.465	0.1523	0.0000	0.0000	0.00E+00
41	3.90	0.000	2.665	0.1536	0.0000	0.0000	0.00E+00
42	3.90	0.000	2.407	0.1551	0.0000	0.0000	0.00E+00
43	3.90	0.000	2.042	0.1569	0.0000	0.0000	0.00E+00
44	3.90	0.000	1.860	0.1590	0.0000	0.0000	0.00E+00
45	3.90	0.000	2.287	0.1606	0.0000	0.0000	0.00E+00
46	3.90	0.000	2.158	0.1624	0.0000	0.0000	0.00E+00
47	3.90	0.000	2.232	0.1641	0.0000	0.0000	0.00E+00
48	3.90	0.000	2.828	0.1652	0.0000	0.0000	0.00E+00
49	3.90	0.000	3.785	0.1653	0.0000	0.0000	0.00E+00
50	3.90	0.000	3.439	0.1657	0.0000	0.0000	0.00E+00
51	3.90	0.000	3.505	0.1661	0.0000	0.0000	0.00E+00
52	3.90	0.000	4.322	0.1657	0.0000	0.0000	0.00E+00
53	3.90	0.000	4.118	0.1655	0.0000	0.0000	0.00E+00
54	3.90	0.000	4.358	0.1650	0.0000	0.0000	0.00E+00

55	3.90	0.000	4.426	0.1645	0.0000	0.0000	0.00E+00
56	3.90	0.000	3.661	0.1647	0.0000	0.0000	0.00E+00
57	3.90	0.000	4.426	0.1642	0.0000	0.0000	0.00E+00
58	0.00	0.000	2.789	0.1614	0.0000	0.0000	0.00E+00
59	4.00	0.000	2.837	0.1626	0.0000	0.0000	0.00E+00
60	5.00	0.000	3.550	0.1640	0.0000	0.0000	0.00E+00
61	4.00	0.000	3.960	0.1641	0.0000	0.0000	0.00E+00
62	16.00	0.005	4.775	0.1754	0.0000	0.0000	0.00E+00
63	0.20	0.000	4.004	0.1716	0.0000	0.0000	0.00E+00
64	0.00	0.000	2.404	0.1691	0.0000	0.0000	0.00E+00
65	3.00	0.000	3.030	0.1691	0.0000	0.0000	0.00E+00
66	3.00	0.000	3.358	0.1687	0.0000	0.0000	0.00E+00
67	1.00	0.000	4.048	0.1657	0.0000	0.0000	0.00E+00
68	1.00	0.000	2.911	0.1637	0.0000	0.0000	0.00E+00
69	6.00	0.000	2.965	0.1668	0.0000	0.0000	0.00E+00
70	0.80	0.000	2.943	0.1646	0.0000	0.0000	0.00E+00
71	3.00	0.000	3.890	0.1637	0.0000	0.0000	0.00E+00
72	0.40	0.000	3.400	0.1607	0.0000	0.0000	0.00E+00
73	0.00	0.000	2.005	0.1587	0.0000	0.0000	0.00E+00
74	0.00	0.000	2.129	0.1565	0.0000	0.0000	0.00E+00
75	0.00	0.000	3.345	0.1531	0.0000	0.0000	0.00E+00
76	8.00	0.000	3.113	0.1581	0.0000	0.0000	0.00E+00
77	0.80	0.000	3.540	0.1553	0.0000	0.0000	0.00E+00
78	0.00	0.000	2.286	0.1530	0.0000	0.0000	0.00E+00
79	0.00	0.000	2.460	0.1505	0.0000	0.0000	0.00E+00
80	0.20	0.000	1.835	0.1489	0.0000	0.0000	0.00E+00
81	0.40	0.000	2.621	0.1466	0.0000	0.0000	0.00E+00
82	0.00	0.000	3.184	0.1434	0.0000	0.0000	0.00E+00
83	0.00	0.000	3.387	0.1400	0.0000	0.0000	0.00E+00
84	0.00	0.000	3.829	0.1361	0.0000	0.0000	0.00E+00
85	0.00	0.000	0.917	0.1352	0.0000	0.0000	0.00E+00

86	0.20	0.000	0.368	0.1350	0.0000	0.0000	0.00E+00
87	0.00	0.000	0.027	0.1350	0.0000	0.0000	0.00E+00
88	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
89	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
90	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
91	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
92	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
93	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
94	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
95	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
96	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
97	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
98	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
99	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
100	37.00	2.569	1.858	0.1679	0.0000	0.0000	0.00E+00
101	0.20	0.000	1.767	0.1663	0.0000	0.0000	0.00E+00
102	0.00	0.000	1.415	0.1649	0.0000	0.0000	0.00E+00
103	0.00	0.000	1.060	0.1638	0.0000	0.0000	0.00E+00
104	0.00	0.000	1.982	0.1618	0.0000	0.0000	0.00E+00
105	0.00	0.000	1.629	0.1602	0.0000	0.0000	0.00E+00
106	0.00	0.000	0.893	0.1593	0.0000	0.0000	0.00E+00
107	0.00	0.000	1.438	0.1578	0.0000	0.0000	0.00E+00
108	0.20	0.000	2.322	0.1557	0.0000	0.0000	0.00E+00
109	0.00	0.000	1.548	0.1541	0.0000	0.0000	0.00E+00
110	0.80	0.000	1.844	0.1531	0.0000	0.0000	0.00E+00
111	17.00	0.000	3.257	0.1669	0.0000	0.0000	0.00E+00
112	20.00	0.131	2.761	0.1842	0.0000	0.0000	0.00E+00
113	1.90	0.000	1.778	0.1843	0.0000	0.0000	0.00E+00
114	1.90	0.000	2.468	0.1838	0.0000	0.0000	0.00E+00
115	0.00	0.000	0.635	0.1831	0.0000	0.0000	0.00E+00
116	0.00	0.000	1.745	0.1814	0.0000	0.0000	0.00E+00

117	0.00	0.000	1.090	0.1803	0.0000	0.0000	0.00E+00
118	0.00	0.000	1.143	0.1791	0.0000	0.0000	0.00E+00
119	0.00	0.000	1.191	0.1779	0.0000	0.0000	0.00E+00
120	0.80	0.000	2.223	0.1765	0.0000	0.0000	0.00E+00
121	1.00	0.000	2.127	0.1753	0.0000	0.0000	0.00E+00
122	2.00	0.000	1.851	0.1755	0.0000	0.0000	0.00E+00
123	0.20	0.000	0.930	0.1747	0.0000	0.0000	0.00E+00
124	0.00	0.000	1.470	0.1733	0.0000	0.0000	0.00E+00
125	0.20	0.000	1.645	0.1718	0.0000	0.0000	0.00E+00
126	8.00	0.000	2.521	0.1773	0.0000	0.0000	0.00E+00
127	10.00	0.000	2.527	0.1849	0.0000	0.0000	0.00E+00
128	4.00	0.000	2.612	0.1863	0.0000	0.0000	0.00E+00
129	6.00	0.000	2.420	0.1899	0.0000	0.0000	0.00E+00
130	0.20	0.000	1.584	0.1885	0.0000	0.0000	0.00E+00
131	0.20	0.000	1.326	0.1874	0.0000	0.0000	0.00E+00
132	0.20	0.000	1.464	0.1861	0.0000	0.0000	0.00E+00
133	0.00	0.000	1.312	0.1848	0.0000	0.0000	0.00E+00
134	0.00	0.000	1.325	0.1834	0.0000	0.0000	0.00E+00
135	0.00	0.000	1.424	0.1820	0.0000	0.0000	0.00E+00
136	0.00	0.000	1.459	0.1805	0.0000	0.0000	0.00E+00
137	0.00	0.000	1.263	0.1792	0.0000	0.0000	0.00E+00
138	0.20	0.000	1.264	0.1782	0.0000	0.0000	0.00E+00
139	0.20	0.000	1.075	0.1773	0.0000	0.0000	0.00E+00
140	0.00	0.000	0.940	0.1763	0.0000	0.0000	0.00E+00
141	0.40	0.000	1.431	0.1753	0.0000	0.0000	0.00E+00
142	0.00	0.000	0.754	0.1745	0.0000	0.0000	0.00E+00
143	1.00	0.000	1.649	0.1739	0.0000	0.0000	0.00E+00
144	0.40	0.000	0.880	0.1734	0.0000	0.0000	0.00E+00
145	0.00	0.000	0.861	0.1725	0.0000	0.0000	0.00E+00
146	0.00	0.000	1.104	0.1714	0.0000	0.0000	0.00E+00
147	0.00	0.000	0.935	0.1705	0.0000	0.0000	0.00E+00

148	0.00	0.000	0.895	0.1695	0.0000	0.0000	0.00E+00
149	8.00	0.000	2.019	0.1756	0.0000	0.0000	0.00E+00
150	1.00	0.000	0.969	0.1756	0.0000	0.0000	0.00E+00
151	0.00	0.000	0.487	0.1751	0.0000	0.0000	0.00E+00
152	0.20	0.000	0.595	0.1747	0.0000	0.0000	0.00E+00
153	0.00	0.000	1.034	0.1737	0.0000	0.0000	0.00E+00
154	0.00	0.000	1.286	0.1724	0.0000	0.0000	0.00E+00
155	0.20	0.000	0.885	0.1717	0.0000	0.0000	0.00E+00
156	0.00	0.000	1.321	0.1704	0.0000	0.0000	0.00E+00
157	0.20	0.000	1.612	0.1689	0.0000	0.0000	0.00E+00
158	0.00	0.000	1.211	0.1677	0.0000	0.0000	0.00E+00
159	0.40	0.000	1.913	0.1662	0.0000	0.0000	0.00E+00
160	2.00	0.000	2.156	0.1660	0.0000	0.0000	0.00E+00
161	0.00	0.000	0.933	0.1651	0.0000	0.0000	0.00E+00
162	5.00	0.000	2.204	0.1679	0.0000	0.0000	0.00E+00
163	0.00	0.000	0.979	0.1669	0.0000	0.0000	0.00E+00
164	1.00	0.000	1.381	0.1665	0.0000	0.0000	0.00E+00
165	0.00	0.000	0.722	0.1658	0.0000	0.0000	0.00E+00
166	0.00	0.000	0.771	0.1650	0.0000	0.0000	0.00E+00
167	0.00	0.000	0.769	0.1642	0.0000	0.0000	0.00E+00
168	0.00	0.000	1.211	0.1630	0.0000	0.0000	0.00E+00
169	0.20	0.000	1.419	0.1618	0.0000	0.0000	0.00E+00
170	0.20	0.000	1.487	0.1605	0.0000	0.0000	0.00E+00
171	0.00	0.000	1.251	0.1592	0.0000	0.0000	0.00E+00
172	0.00	0.000	0.906	0.1583	0.0000	0.0000	0.00E+00
173	0.00	0.000	1.339	0.1570	0.0000	0.0000	0.00E+00
174	0.00	0.000	1.222	0.1557	0.0000	0.0000	0.00E+00
175	0.20	0.000	1.446	0.1545	0.0000	0.0000	0.00E+00
176	0.00	0.000	1.291	0.1532	0.0000	0.0000	0.00E+00
177	0.00	0.000	1.373	0.1518	0.0000	0.0000	0.00E+00
178	0.60	0.000	1.651	0.1507	0.0000	0.0000	0.00E+00

179	0.00	0.000	1.203	0.1495	0.0000	0.0000	0.00E+00
180	0.20	0.000	0.965	0.1487	0.0000	0.0000	0.00E+00
181	0.00	0.000	0.540	0.1482	0.0000	0.0000	0.00E+00
182	0.20	0.000	1.111	0.1473	0.0000	0.0000	0.00E+00
183	0.20	0.000	1.054	0.1464	0.0000	0.0000	0.00E+00
184	0.00	0.000	0.827	0.1456	0.0000	0.0000	0.00E+00
185	0.20	0.000	0.966	0.1448	0.0000	0.0000	0.00E+00
186	0.20	0.000	0.931	0.1441	0.0000	0.0000	0.00E+00
187	6.00	0.000	1.642	0.1485	0.0000	0.0000	0.00E+00
188	0.00	0.000	0.694	0.1478	0.0000	0.0000	0.00E+00
189	0.00	0.000	0.669	0.1471	0.0000	0.0000	0.00E+00
190	0.40	0.000	0.972	0.1465	0.0000	0.0000	0.00E+00
191	16.00	0.000	1.550	0.1611	0.0000	0.0000	0.00E+00
192	38.00	3.101	2.383	0.1939	0.0000	0.0000	0.00E+00
193	0.20	0.000	1.730	0.1924	0.0000	0.0000	0.00E+00
194	1.00	0.000	1.189	0.1922	0.0000	0.0000	0.00E+00
195	3.00	0.000	2.253	0.1930	0.0000	0.0000	0.00E+00
196	0.20	0.000	1.317	0.1918	0.0000	0.0000	0.00E+00
197	0.00	0.000	0.869	0.1910	0.0000	0.0000	0.00E+00
198	0.00	0.000	0.589	0.1904	0.0000	0.0000	0.00E+00
199	0.00	0.000	1.095	0.1892	0.0000	0.0000	0.00E+00
200	0.00	0.000	0.591	0.1887	0.0000	0.0000	0.00E+00
201	0.20	0.000	0.913	0.1879	0.0000	0.0000	0.00E+00
202	0.20	0.000	0.890	0.1872	0.0000	0.0000	0.00E+00
203	0.00	0.000	0.585	0.1866	0.0000	0.0000	0.00E+00
204	0.40	0.000	1.655	0.1854	0.0000	0.0000	0.00E+00
205	2.00	0.000	1.765	0.1856	0.0000	0.0000	0.00E+00
206	2.00	0.000	1.909	0.1857	0.0000	0.0000	0.00E+00
207	9.00	0.000	2.446	0.1923	0.0000	0.0000	0.00E+00
208	19.00	0.143	2.318	0.2090	0.0000	0.0000	0.00E+00
209	3.00	0.000	2.379	0.2097	0.0000	0.0000	0.00E+00



210	0.80	0.000	2.064	0.2084	0.0000	0.0000	0.00E+00
211	2.00	0.000	2.352	0.2080	0.0000	0.0000	0.00E+00
212	0.40	0.000	1.329	0.2071	0.0000	0.0000	0.00E+00
213	0.00	0.000	1.548	0.2055	0.0000	0.0000	0.00E+00
214	2.00	0.000	2.129	0.2054	0.0000	0.0000	0.00E+00
215	0.20	0.000	1.571	0.2040	0.0000	0.0000	0.00E+00
216	0.00	0.000	1.630	0.2024	0.0000	0.0000	0.00E+00
217	0.00	0.000	1.612	0.2007	0.0000	0.0000	0.00E+00
218	0.00	0.000	1.008	0.1997	0.0000	0.0000	0.00E+00
219	0.00	0.000	0.966	0.1987	0.0000	0.0000	0.00E+00
220	0.00	0.000	0.468	0.1983	0.0000	0.0000	0.00E+00
221	0.00	0.000	0.579	0.1977	0.0000	0.0000	0.00E+00
222	0.00	0.000	0.726	0.1970	0.0000	0.0000	0.00E+00
223	0.00	0.000	0.510	0.1964	0.0000	0.0000	0.00E+00
224	1.81	0.000	1.438	0.1968	0.0000	0.0000	0.00E+00
225	1.81	0.000	2.296	0.1963	0.0000	0.0000	0.00E+00
226	1.81	0.000	1.366	0.1968	0.0000	0.0000	0.00E+00
227	1.81	0.000	1.452	0.1971	0.0000	0.0000	0.00E+00
228	1.81	0.000	1.800	0.1971	0.0000	0.0000	0.00E+00
229	1.81	0.000	1.346	0.1976	0.0000	0.0000	0.00E+00
230	0.00	0.000	1.525	0.1961	0.0000	0.0000	0.00E+00
231	0.00	0.000	0.897	0.1952	0.0000	0.0000	0.00E+00
232	0.00	0.000	1.284	0.1939	0.0000	0.0000	0.00E+00
233	0.00	0.000	1.201	0.1927	0.0000	0.0000	0.00E+00
234	1.00	0.000	1.710	0.1919	0.0000	0.0000	0.00E+00
235	0.00	0.000	1.195	0.1907	0.0000	0.0000	0.00E+00
236	0.00	0.000	1.508	0.1892	0.0000	0.0000	0.00E+00
237	0.00	0.000	1.803	0.1874	0.0000	0.0000	0.00E+00
238	0.00	0.000	1.796	0.1856	0.0000	0.0000	0.00E+00
239	19.00	0.032	2.007	0.2027	0.0000	0.0000	0.00E+00
240	46.00	6.486	2.430	0.2402	0.0000	0.0000	0.00E+00

241	17.00	0.377	2.312	0.2546	0.0000	0.0000	0.00E+00
242	17.00	0.463	2.394	0.2689	0.0000	0.0000	0.00E+00
243	0.40	0.000	2.054	0.2672	0.0000	0.0000	0.00E+00
244	0.20	0.000	1.873	0.2655	0.0000	0.0000	0.00E+00
245	0.80	0.000	1.641	0.2647	0.0000	0.0000	0.00E+00
246	0.40	0.000	2.312	0.2628	0.0000	0.0000	0.00E+00
247	0.00	0.000	1.728	0.2610	0.0000	0.0000	0.00E+00
248	0.40	0.000	1.048	0.2604	0.0000	0.0000	0.00E+00
249	0.20	0.000	1.781	0.2588	0.0000	0.0000	0.00E+00
250	0.00	0.000	2.071	0.2567	0.0000	0.0000	0.00E+00
251	1.00	0.000	2.341	0.2553	0.0000	0.0000	0.00E+00
252	0.00	0.000	0.826	0.2545	0.0000	0.0000	0.00E+00
253	0.20	0.000	1.893	0.2528	0.0000	0.0000	0.00E+00
254	0.00	0.000	1.539	0.2512	0.0000	0.0000	0.00E+00
255	17.00	0.036	2.975	0.2653	0.0000	0.0000	0.00E+00
256	7.00	0.000	3.088	0.2693	0.0000	0.0000	0.00E+00
257	0.00	0.000	2.060	0.2672	0.0000	0.0000	0.00E+00
258	0.20	0.000	2.239	0.2652	0.0000	0.0000	0.00E+00
259	0.00	0.000	2.175	0.2630	0.0000	0.0000	0.00E+00
260	0.00	0.000	2.065	0.2609	0.0000	0.0000	0.00E+00
261	0.80	0.000	2.890	0.2588	0.0000	0.0000	0.00E+00
262	0.00	0.000	2.535	0.2562	0.0000	0.0000	0.00E+00
263	0.00	0.000	2.041	0.2541	0.0000	0.0000	0.00E+00
264	14.00	0.000	3.454	0.2648	0.0000	0.0000	0.00E+00
265	0.00	0.000	2.633	0.2621	0.0000	0.0000	0.00E+00
266	0.00	0.000	2.552	0.2596	0.0000	0.0000	0.00E+00
267	0.00	0.000	0.906	0.2586	0.0000	0.0000	0.00E+00
268	0.00	0.000	1.305	0.2573	0.0000	0.0000	0.00E+00
269	3.00	0.000	2.526	0.2578	0.0000	0.0000	0.00E+00
270	0.00	0.000	1.967	0.2558	0.0000	0.0000	0.00E+00
271	0.20	0.000	1.080	0.2549	0.0000	0.0000	0.00E+00

272	0.00	0.000	1.990	0.2529	0.0000	0.0000	0.00E+00
273	0.00	0.000	2.549	0.2503	0.0000	0.0000	0.00E+00
274	0.20	0.000	1.973	0.2486	0.0000	0.0000	0.00E+00
275	2.00	0.000	2.511	0.2480	0.0000	0.0000	0.00E+00
276	56.00	9.851	2.804	0.2918	0.0000	0.0000	0.00E+00
277	0.00	0.000	1.714	0.2901	0.0000	0.0000	0.00E+00
278	0.00	0.000	1.995	0.2881	0.0000	0.0000	0.00E+00
279	1.00	0.000	2.026	0.2870	0.0000	0.0000	0.00E+00
280	0.00	0.000	1.339	0.2857	0.0000	0.0000	0.00E+00
281	0.00	0.000	1.537	0.2841	0.0000	0.0000	0.00E+00
282	7.00	0.000	2.427	0.2888	0.0000	0.0000	0.00E+00
283	0.00	0.000	2.492	0.2862	0.0000	0.0000	0.00E+00
284	5.00	0.000	3.023	0.2882	0.0000	0.0000	0.00E+00
285	4.00	0.000	2.993	0.2893	0.0000	0.0000	0.00E+00
286	0.00	0.000	2.645	0.2866	0.0000	0.0000	0.00E+00
287	4.00	0.000	2.479	0.2881	0.0000	0.0000	0.00E+00
288	9.00	0.000	2.882	0.2943	0.0000	0.0000	0.00E+00
289	0.00	0.000	3.003	0.2913	0.0000	0.0000	0.00E+00
290	0.00	0.000	3.112	0.2881	0.0000	0.0000	0.00E+00
291	0.60	0.000	3.509	0.2852	0.0000	0.0000	0.00E+00
292	0.00	0.000	2.950	0.2822	0.0000	0.0000	0.00E+00
293	1.00	0.000	3.150	0.2800	0.0000	0.0000	0.00E+00
294	0.00	0.000	2.868	0.2771	0.0000	0.0000	0.00E+00
295	0.00	0.000	2.673	0.2744	0.0000	0.0000	0.00E+00
296	0.00	0.000	3.155	0.2712	0.0000	0.0000	0.00E+00
297	0.80	0.000	4.053	0.2680	0.0000	0.0000	0.00E+00
298	2.00	0.000	2.559	0.2673	0.0000	0.0000	0.00E+00
299	0.00	0.000	1.787	0.2652	0.0000	0.0000	0.00E+00
300	0.00	0.000	2.010	0.2628	0.0000	0.0000	6.80E-01
301	0.00	0.000	3.101	0.2588	0.0000	0.0000	8.82E-01
302	0.00	0.000	2.162	0.2563	0.0000	0.0000	0.00E+00

303	0.00	0.000	3.481	0.2524	0.0000	0.0000	5.72E-01
304	0.00	0.000	2.804	0.2492	0.0000	0.0000	4.82E-01
305	0.00	0.000	1.991	0.2468	0.0000	0.0000	0.00E+00
306	0.00	0.000	2.296	0.2439	0.0000	0.0000	9.05E-01
307	0.00	0.000	1.139	0.2421	0.0000	0.0000	4.88E-01
308	0.00	0.000	2.122	0.2394	0.0000	0.0000	5.56E-01
309	0.00	0.000	2.431	0.2364	0.0000	0.0000	5.20E-01
310	8.00	0.000	2.566	0.2415	0.0000	0.0000	5.54E-01
311	24.00	0.541	2.210	0.2626	0.0000	0.0000	0.00E+00
312	3.00	0.000	2.202	0.2633	0.0000	0.0000	0.00E+00
313	0.00	0.000	2.268	0.2610	0.0000	0.0000	0.00E+00
314	2.00	0.000	3.486	0.2595	0.0000	0.0000	0.00E+00
315	0.00	0.000	2.566	0.2569	0.0000	0.0000	0.00E+00
316	1.00	0.000	2.564	0.2554	0.0000	0.0000	0.00E+00
317	0.80	0.000	2.305	0.2538	0.0000	0.0000	0.00E+00
318	0.80	0.000	2.989	0.2516	0.0000	0.0000	0.00E+00
319	0.20	0.000	4.372	0.2474	0.0000	0.0000	0.00E+00
320	0.40	0.000	2.699	0.2451	0.0000	0.0000	0.00E+00
321	0.00	0.000	2.611	0.2425	0.0000	0.0000	0.00E+00
322	3.00	0.000	3.883	0.2416	0.0000	0.0000	0.00E+00
323	11.00	0.000	2.501	0.2502	0.0000	0.0000	0.00E+00
324	10.00	0.000	2.244	0.2580	0.0000	0.0000	0.00E+00
325	5.00	0.000	3.015	0.2600	0.0000	0.0000	0.00E+00
326	0.00	0.000	2.230	0.2577	0.0000	0.0000	0.00E+00
327	0.00	0.000	2.228	0.2555	0.0000	0.0000	0.00E+00
328	2.00	0.000	2.658	0.2548	0.0000	0.0000	0.00E+00
329	0.00	0.000	2.621	0.2521	0.0000	0.0000	0.00E+00
330	0.00	0.000	2.681	0.2494	0.0000	0.0000	0.00E+00
331	0.00	0.000	3.581	0.2458	0.0000	0.0000	0.00E+00
332	0.60	0.000	3.774	0.2426	0.0000	0.0000	0.00E+00
333	0.00	0.000	3.249	0.2393	0.0000	0.0000	0.00E+00

334	0.00	0.000	2.921	0.2363	0.0000	0.0000	0.00E+00
335	0.00	0.000	3.898	0.2324	0.0000	0.0000	0.00E+00
336	0.00	0.000	2.837	0.2295	0.0000	0.0000	0.00E+00
337	0.00	0.000	5.153	0.2243	0.0000	0.0000	0.00E+00
338	0.00	0.000	2.529	0.2218	0.0000	0.0000	0.00E+00
339	1.00	0.000	2.357	0.2204	0.0000	0.0000	0.00E+00
340	0.20	0.000	2.504	0.2181	0.0000	0.0000	0.00E+00
341	0.00	0.000	2.763	0.2153	0.0000	0.0000	0.00E+00
342	5.00	0.000	2.095	0.2182	0.0000	0.0000	0.00E+00
343	0.80	0.000	2.382	0.2166	0.0000	0.0000	0.00E+00
344	0.00	0.000	2.440	0.2142	0.0000	0.0000	0.00E+00
345	0.00	0.000	2.373	0.2118	0.0000	0.0000	0.00E+00
346	0.00	0.000	2.332	0.2094	0.0000	0.0000	0.00E+00
347	0.00	0.000	2.797	0.2066	0.0000	0.0000	0.00E+00
348	0.00	0.000	1.680	0.2049	0.0000	0.0000	0.00E+00
349	0.20	0.000	1.626	0.2035	0.0000	0.0000	0.00E+00
350	0.40	0.000	1.540	0.2023	0.0000	0.0000	0.00E+00
351	0.40	0.000	2.917	0.1998	0.0000	0.0000	0.00E+00
352	0.00	0.000	3.455	0.1963	0.0000	0.0000	0.00E+00
353	0.00	0.000	2.728	0.1935	0.0000	0.0000	0.00E+00
354	0.20	0.000	3.112	0.1906	0.0000	0.0000	0.00E+00
355	0.00	0.000	2.788	0.1878	0.0000	0.0000	0.00E+00
356	0.20	0.000	2.631	0.1853	0.0000	0.0000	0.00E+00
357	0.20	0.000	2.699	0.1828	0.0000	0.0000	0.00E+00
358	3.00	0.000	4.087	0.1817	0.0000	0.0000	0.00E+00
359	0.00	0.000	2.646	0.1790	0.0000	0.0000	0.00E+00
360	0.00	0.000	2.457	0.1765	0.0000	0.0000	0.00E+00
361	0.00	0.000	2.542	0.1740	0.0000	0.0000	0.00E+00
362	0.00	0.000	3.211	0.1707	0.0000	0.0000	0.00E+00
363	0.00	0.000	3.162	0.1675	0.0000	0.0000	0.00E+00
364	2.04	0.000	2.902	0.1666	0.0000	0.0000	0.00E+00

365

0.00      0.000      3.910      0.1627      0.0000      0.0000      0.00E+00

\* = Frozen (air or soil)

Annual Totals for Year 1			
	mm*	cubic meters	percent
Precipitation	799.00	63,121.0	100.00
Runoff	23.735	1,875.0	2.97
Evapotranspiration	751.640	59,379.6	94.07
Percolation/Leakage through Layer 2	5.638644	445.5	0.71
Change in Water Storage	17.9866	1,420.9	2.25
Soil Water at Start of Year	3,647.0248	288,115.0	456.45
Soil Water at End of Year	3,665.0114	289,535.9	458.70
Snow Water at Start of Year	0.0000	0.0000	0.00
Snow Water at End of Year	0.0000	0.0000	0.00
Annual Water Budget Balance	0.0000	0.0000	0.00

\*Note: head on liners expressed in cm

**Daily Output for Year 2**

**Column key:**

**Title:** Welby Landfill - Proposed Cap

**Simulated On:** 16/05/2022 10:52

Leak #1: leakage thru Layer 2

Day	Freezing Status*		Rain (mm)	Runoff (mm)	ET (mm)	Evap. Zone		Head #1 (cm)	Drain #1 (mm)	Leak #1 (mm)
	Air	Soil				Water (cm/cm)				
1			0.00	0.000	3.976	0.1587	0.0000	0.0000	0.00E+00	
2			0.00	0.000	3.401	0.1544	0.0000	0.0000	4.45E-01	
3			0.00	0.000	3.162	0.1512	0.0000	0.0000	3.65E-01	
4	*Note: head		0.00	0.000	2.703	0.1484	0.0000	0.0000	0.00E+00	
5			0.00	0.000	3.435	0.1450	0.0000	0.0000	0.00E+00	
6			0.00	0.000	3.689	0.1412	0.0000	0.0000	0.00E+00	
7			12.00	0.000	4.630	0.1487	0.0000	0.0000	0.00E+00	
8			0.00	0.000	2.593	0.1461	0.0000	0.0000	0.00E+00	
9			0.00	0.000	3.288	0.1428	0.0000	0.0000	0.00E+00	
10			0.00	0.000	2.410	0.1403	0.0000	0.0000	0.00E+00	
11			0.00	0.000	2.603	0.1377	0.0000	0.0000	0.00E+00	
12			0.00	0.000	1.815	0.1359	0.0000	0.0000	0.00E+00	
13			0.20	0.000	0.775	0.1353	0.0000	0.0000	6.09E-01	
14			0.00	0.000	0.213	0.1351	0.0000	0.0000	0.00E+00	
15			0.00	0.000	0.047	0.1350	0.0000	0.0000	0.00E+00	
16			27.00	0.675	1.727	0.1599	0.0000	0.0000	0.00E+00	
17			0.20	0.000	2.140	0.1579	0.0000	0.0000	0.00E+00	
18			0.00	0.000	3.133	0.1547	0.0000	0.0000	0.00E+00	
19			0.00	0.000	3.692	0.1510	0.0000	0.0000	0.00E+00	
20			0.00	0.000	3.503	0.1475	0.0000	0.0000	0.00E+00	
21			0.00	0.000	3.359	0.1441	0.0000	0.0000	0.00E+00	
22			27.00	0.675	4.088	0.1665	0.0000	0.0000	0.00E+00	
23			0.00	0.000	3.471	0.1630	0.0000	0.0000	0.00E+00	

24	0.00	0.000	2.908	0.1601	0.0000	0.0000	0.00E+00
25	5.00	0.000	2.387	0.1627	0.0000	0.0000	0.00E+00
26	0.20	0.000	2.894	0.1600	0.0000	0.0000	0.00E+00
27	0.00	0.000	3.552	0.1564	0.0000	0.0000	0.00E+00
28	0.00	0.000	2.836	0.1536	0.0000	0.0000	0.00E+00
29	0.00	0.000	3.064	0.1505	0.0000	0.0000	0.00E+00
30	1.00	0.000	3.483	0.1480	0.0000	0.0000	0.00E+00
31	1.00	0.000	3.130	0.1458	0.0000	0.0000	0.00E+00
32	4.00	0.000	2.735	0.1471	0.0000	0.0000	0.00E+00
33	5.00	0.000	2.438	0.1497	0.0000	0.0000	0.00E+00
34	0.80	0.000	2.397	0.1481	0.0000	0.0000	0.00E+00
35	25.00	0.470	4.096	0.1687	0.0000	0.0000	0.00E+00
36	51.00	8.175	3.882	0.2080	0.0000	0.0000	0.00E+00
37	15.00	0.088	4.010	0.2190	0.0000	0.0000	0.00E+00
38	10.00	0.000	2.595	0.2265	0.0000	0.0000	0.00E+00
39	0.00	0.000	2.489	0.2240	0.0000	0.0000	0.00E+00
40	0.00	0.000	2.700	0.2213	0.0000	0.0000	0.00E+00
41	0.60	0.000	2.927	0.2189	0.0000	0.0000	0.00E+00
42	10.00	0.000	3.078	0.2259	0.0000	0.0000	0.00E+00
43	1.00	0.000	3.637	0.2233	0.0000	0.0000	0.00E+00
44	0.20	0.000	3.517	0.2199	0.0000	0.0000	0.00E+00
45	0.00	0.000	4.149	0.2157	0.0000	0.0000	0.00E+00
46	0.00	0.000	4.813	0.2109	0.0000	0.0000	0.00E+00
47	9.00	0.000	5.247	0.2146	0.0000	0.0000	0.00E+00
48	0.00	0.000	3.194	0.2114	0.0000	0.0000	0.00E+00
49	7.00	0.000	3.951	0.2145	0.0000	0.0000	0.00E+00
50	1.00	0.000	4.255	0.2112	0.0000	0.0000	0.00E+00
51	0.00	0.000	3.814	0.2074	0.0000	0.0000	0.00E+00
52	0.20	0.000	4.502	0.2030	0.0000	0.0000	0.00E+00
53	0.00	0.000	3.874	0.1991	0.0000	0.0000	0.00E+00
54	0.00	0.000	4.678	0.1944	0.0000	0.0000	0.00E+00



55	0.00	0.000	4.891	0.1894	0.0000	0.0000	0.00E+00
56	0.00	0.000	4.816	0.1846	0.0000	0.0000	0.00E+00
57	8.00	0.000	3.159	0.1895	0.0000	0.0000	0.00E+00
58	0.20	0.000	3.533	0.1861	0.0000	0.0000	0.00E+00
59	20.00	0.077	2.789	0.2034	0.0000	0.0000	0.00E+00
60	0.00	0.000	2.701	0.2007	0.0000	0.0000	0.00E+00
61	0.00	0.000	3.017	0.1976	0.0000	0.0000	0.00E+00
62	0.00	0.000	2.461	0.1951	0.0000	0.0000	0.00E+00
63	0.00	0.000	2.378	0.1927	0.0000	0.0000	0.00E+00
64	1.00	0.000	2.350	0.1914	0.0000	0.0000	0.00E+00
65	1.00	0.000	4.623	0.1877	0.0000	0.0000	0.00E+00
66	0.00	0.000	3.916	0.1838	0.0000	0.0000	0.00E+00
67	0.20	0.000	2.542	0.1814	0.0000	0.0000	0.00E+00
68	2.00	0.000	2.444	0.1809	0.0000	0.0000	0.00E+00
69	0.20	0.000	4.106	0.1770	0.0000	0.0000	0.00E+00
70	0.00	0.000	4.292	0.1727	0.0000	0.0000	0.00E+00
71	0.20	0.000	4.253	0.1686	0.0000	0.0000	0.00E+00
72	0.00	0.000	3.293	0.1652	0.0000	0.0000	0.00E+00
73	0.20	0.000	4.321	0.1611	0.0000	0.0000	0.00E+00
74	0.00	0.000	4.134	0.1569	0.0000	0.0000	0.00E+00
75	0.20	0.000	3.942	0.1531	0.0000	0.0000	0.00E+00
76	0.00	0.000	4.774	0.1483	0.0000	0.0000	0.00E+00
77	0.00	0.000	4.295	0.1440	0.0000	0.0000	0.00E+00
78	0.00	0.000	4.478	0.1394	0.0000	0.0000	0.00E+00
79	0.00	0.000	2.946	0.1365	0.0000	0.0000	0.00E+00
80	0.00	0.000	1.447	0.1350	0.0000	0.0000	0.00E+00
81	0.40	0.000	0.400	0.1350	0.0000	0.0000	0.00E+00
82	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
83	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
84	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
85	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00

86	30.00	1.132	2.929	0.1612	0.0000	0.0000	0.00E+00
87	0.00	0.000	1.832	0.1594	0.0000	0.0000	0.00E+00
88	25.00	0.678	2.388	0.1815	0.0000	0.0000	0.00E+00
89	11.00	0.000	3.098	0.1895	0.0000	0.0000	0.00E+00
90	2.00	0.000	3.493	0.1880	0.0000	0.0000	0.00E+00
91	0.20	0.000	2.945	0.1852	0.0000	0.0000	0.00E+00
92	0.20	0.000	2.478	0.1829	0.0000	0.0000	0.00E+00
93	0.20	0.000	3.608	0.1795	0.0000	0.0000	0.00E+00
94	0.00	0.000	2.916	0.1765	0.0000	0.0000	0.00E+00
95	0.20	0.000	3.113	0.1736	0.0000	0.0000	0.00E+00
96	0.00	0.000	2.752	0.1708	0.0000	0.0000	0.00E+00
97	0.40	0.000	3.134	0.1680	0.0000	0.0000	0.00E+00
98	0.00	0.000	3.045	0.1650	0.0000	0.0000	0.00E+00
99	0.00	0.000	1.954	0.1630	0.0000	0.0000	0.00E+00
100	0.20	0.000	3.449	0.1597	0.0000	0.0000	0.00E+00
101	0.00	0.000	2.956	0.1567	0.0000	0.0000	0.00E+00
102	0.20	0.000	2.837	0.1541	0.0000	0.0000	0.00E+00
103	0.20	0.000	3.041	0.1512	0.0000	0.0000	0.00E+00
104	6.00	0.000	3.677	0.1535	0.0000	0.0000	0.00E+00
105	0.80	0.000	2.353	0.1520	0.0000	0.0000	0.00E+00
106	0.20	0.000	2.231	0.1499	0.0000	0.0000	0.00E+00
107	0.20	0.000	2.204	0.1479	0.0000	0.0000	0.00E+00
108	16.00	0.000	2.260	0.1618	0.0000	0.0000	0.00E+00
109	0.20	0.000	1.287	0.1607	0.0000	0.0000	0.00E+00
110	0.00	0.000	1.730	0.1589	0.0000	0.0000	0.00E+00
111	0.80	0.000	2.382	0.1573	0.0000	0.0000	0.00E+00
112	13.00	0.000	2.836	0.1676	0.0000	0.0000	0.00E+00
113	14.00	0.000	2.338	0.1794	0.0000	0.0000	0.00E+00
114	0.20	0.000	1.148	0.1784	0.0000	0.0000	0.00E+00
115	0.00	0.000	1.282	0.1771	0.0000	0.0000	0.00E+00
116	0.20	0.000	2.108	0.1752	0.0000	0.0000	0.00E+00

117	0.00	0.000	1.395	0.1738	0.0000	0.0000	0.00E+00
118	0.00	0.000	1.469	0.1723	0.0000	0.0000	0.00E+00
119	0.00	0.000	1.453	0.1708	0.0000	0.0000	0.00E+00
120	0.20	0.000	1.194	0.1698	0.0000	0.0000	0.00E+00
121	0.20	0.000	1.538	0.1685	0.0000	0.0000	0.00E+00
122	0.20	0.000	1.534	0.1671	0.0000	0.0000	0.00E+00
123	0.40	0.000	1.451	0.1661	0.0000	0.0000	0.00E+00
124	0.20	0.000	1.655	0.1646	0.0000	0.0000	0.00E+00
125	0.20	0.000	1.840	0.1629	0.0000	0.0000	0.00E+00
126	0.20	0.000	1.589	0.1615	0.0000	0.0000	0.00E+00
127	0.00	0.000	1.462	0.1601	0.0000	0.0000	0.00E+00
128	0.00	0.000	0.567	0.1595	0.0000	0.0000	0.00E+00
129	0.00	0.000	1.311	0.1582	0.0000	0.0000	0.00E+00
130	0.20	0.000	1.643	0.1567	0.0000	0.0000	0.00E+00
131	0.00	0.000	1.232	0.1555	0.0000	0.0000	0.00E+00
132	0.20	0.000	1.420	0.1542	0.0000	0.0000	0.00E+00
133	0.20	0.000	1.220	0.1532	0.0000	0.0000	0.00E+00
134	3.00	0.000	2.379	0.1538	0.0000	0.0000	0.00E+00
135	0.00	0.000	1.301	0.1525	0.0000	0.0000	0.00E+00
136	0.20	0.000	1.466	0.1512	0.0000	0.0000	0.00E+00
137	1.00	0.000	1.818	0.1504	0.0000	0.0000	0.00E+00
138	0.00	0.000	0.978	0.1494	0.0000	0.0000	0.00E+00
139	0.20	0.000	1.254	0.1484	0.0000	0.0000	0.00E+00
140	2.00	0.000	1.971	0.1484	0.0000	0.0000	0.00E+00
141	0.00	0.000	0.968	0.1474	0.0000	0.0000	0.00E+00
142	0.00	0.000	1.066	0.1463	0.0000	0.0000	0.00E+00
143	0.00	0.000	1.058	0.1453	0.0000	0.0000	0.00E+00
144	4.00	0.000	2.299	0.1470	0.0000	0.0000	0.00E+00
145	2.00	0.000	1.525	0.1475	0.0000	0.0000	0.00E+00
146	3.00	0.000	1.942	0.1485	0.0000	0.0000	0.00E+00
147	0.40	0.000	0.986	0.1479	0.0000	0.0000	0.00E+00

148	0.20	0.000	1.040	0.1471	0.0000	0.0000	0.00E+00
149	12.00	0.000	2.205	0.1570	0.0000	0.0000	0.00E+00
150	0.40	0.000	1.286	0.1561	0.0000	0.0000	0.00E+00
151	0.40	0.000	1.289	0.1552	0.0000	0.0000	0.00E+00
152	0.20	0.000	0.709	0.1547	0.0000	0.0000	0.00E+00
153	4.00	0.000	1.888	0.1568	0.0000	0.0000	0.00E+00
154	0.40	0.000	0.701	0.1565	0.0000	0.0000	0.00E+00
155	0.20	0.000	0.485	0.1562	0.0000	0.0000	0.00E+00
156	0.20	0.000	1.126	0.1553	0.0000	0.0000	0.00E+00
157	0.00	0.000	0.228	0.1550	0.0000	0.0000	0.00E+00
158	0.00	0.000	0.646	0.1544	0.0000	0.0000	0.00E+00
159	3.00	0.000	2.156	0.1552	0.0000	0.0000	0.00E+00
160	0.00	0.000	0.956	0.1543	0.0000	0.0000	0.00E+00
161	0.00	0.000	1.005	0.1533	0.0000	0.0000	0.00E+00
162	0.00	0.000	0.667	0.1526	0.0000	0.0000	0.00E+00
163	0.00	0.000	0.309	0.1523	0.0000	0.0000	0.00E+00
164	0.00	0.000	0.669	0.1516	0.0000	0.0000	0.00E+00
165	0.00	0.000	0.809	0.1508	0.0000	0.0000	0.00E+00
166	0.00	0.000	0.848	0.1499	0.0000	0.0000	0.00E+00
167	0.00	0.000	0.614	0.1493	0.0000	0.0000	0.00E+00
168	0.00	0.000	0.278	0.1490	0.0000	0.0000	0.00E+00
169	2.00	0.000	1.753	0.1493	0.0000	0.0000	0.00E+00
170	25.00	0.433	2.198	0.1719	0.0000	0.0000	0.00E+00
171	0.20	0.000	0.980	0.1711	0.0000	0.0000	0.00E+00
172	0.00	0.000	0.800	0.1703	0.0000	0.0000	0.00E+00
173	0.00	0.000	0.844	0.1694	0.0000	0.0000	0.00E+00
174	0.00	0.000	0.651	0.1688	0.0000	0.0000	0.00E+00
175	0.00	0.000	0.949	0.1678	0.0000	0.0000	0.00E+00
176	0.00	0.000	0.956	0.1668	0.0000	0.0000	0.00E+00
177	0.00	0.000	0.935	0.1659	0.0000	0.0000	0.00E+00
178	0.00	0.000	0.465	0.1654	0.0000	0.0000	0.00E+00

179	0.00	0.000	0.416	0.1650	0.0000	0.0000	0.00E+00
180	0.20	0.000	0.884	0.1643	0.0000	0.0000	0.00E+00
181	0.00	0.000	0.633	0.1637	0.0000	0.0000	0.00E+00
182	0.00	0.000	0.677	0.1630	0.0000	0.0000	0.00E+00
183	0.20	0.000	0.919	0.1623	0.0000	0.0000	0.00E+00
184	0.00	0.000	0.835	0.1614	0.0000	0.0000	0.00E+00
185	0.00	0.000	0.910	0.1605	0.0000	0.0000	0.00E+00
186	0.00	0.000	0.857	0.1596	0.0000	0.0000	0.00E+00
187	4.00	0.000	2.057	0.1616	0.0000	0.0000	0.00E+00
188	0.00	0.000	0.958	0.1606	0.0000	0.0000	0.00E+00
189	0.00	0.000	0.657	0.1600	0.0000	0.0000	0.00E+00
190	0.00	0.000	0.978	0.1590	0.0000	0.0000	0.00E+00
191	0.00	0.000	0.867	0.1581	0.0000	0.0000	0.00E+00
192	0.00	0.000	0.522	0.1576	0.0000	0.0000	0.00E+00
193	0.00	0.000	0.838	0.1567	0.0000	0.0000	0.00E+00
194	0.00	0.000	0.282	0.1564	0.0000	0.0000	0.00E+00
195	0.00	0.000	0.912	0.1555	0.0000	0.0000	0.00E+00
196	0.00	0.000	0.967	0.1546	0.0000	0.0000	0.00E+00
197	0.00	0.000	0.850	0.1537	0.0000	0.0000	0.00E+00
198	0.00	0.000	0.914	0.1528	0.0000	0.0000	0.00E+00
199	0.20	0.000	1.066	0.1519	0.0000	0.0000	0.00E+00
200	0.00	0.000	0.978	0.1509	0.0000	0.0000	0.00E+00
201	0.20	0.000	1.018	0.1501	0.0000	0.0000	0.00E+00
202	0.00	0.000	0.930	0.1491	0.0000	0.0000	0.00E+00
203	0.00	0.000	0.848	0.1483	0.0000	0.0000	0.00E+00
204	0.00	0.000	0.373	0.1479	0.0000	0.0000	0.00E+00
205	0.00	0.000	0.982	0.1469	0.0000	0.0000	0.00E+00
206	7.00	0.000	1.793	0.1522	0.0000	0.0000	0.00E+00
207	0.00	0.000	0.871	0.1513	0.0000	0.0000	0.00E+00
208	0.00	0.000	0.761	0.1505	0.0000	0.0000	0.00E+00
209	0.20	0.000	1.027	0.1497	0.0000	0.0000	0.00E+00

210	0.00	0.000	0.990	0.1487	0.0000	0.0000	0.00E+00
211	5.00	0.000	1.994	0.1517	0.0000	0.0000	0.00E+00
212	0.40	0.000	1.324	0.1508	0.0000	0.0000	0.00E+00
213	0.40	0.000	1.380	0.1498	0.0000	0.0000	0.00E+00
214	0.40	0.000	1.352	0.1488	0.0000	0.0000	0.00E+00
215	0.20	0.000	1.349	0.1477	0.0000	0.0000	0.00E+00
216	3.00	0.000	2.209	0.1485	0.0000	0.0000	0.00E+00
217	0.20	0.000	1.184	0.1475	0.0000	0.0000	0.00E+00
218	0.00	0.000	0.926	0.1466	0.0000	0.0000	0.00E+00
219	0.00	0.000	1.219	0.1453	0.0000	0.0000	0.00E+00
220	0.00	0.000	1.165	0.1441	0.0000	0.0000	0.00E+00
221	0.20	0.000	1.410	0.1429	0.0000	0.0000	0.00E+00
222	0.00	0.000	1.196	0.1417	0.0000	0.0000	0.00E+00
223	0.00	0.000	1.396	0.1403	0.0000	0.0000	0.00E+00
224	0.00	0.000	1.043	0.1392	0.0000	0.0000	0.00E+00
225	2.00	0.000	1.712	0.1395	0.0000	0.0000	0.00E+00
226	0.20	0.000	1.094	0.1386	0.0000	0.0000	0.00E+00
227	0.00	0.000	0.531	0.1381	0.0000	0.0000	0.00E+00
228	0.00	0.000	0.440	0.1377	0.0000	0.0000	0.00E+00
229	0.20	0.000	0.653	0.1372	0.0000	0.0000	0.00E+00
230	0.00	0.000	0.409	0.1368	0.0000	0.0000	0.00E+00
231	0.20	0.000	0.397	0.1366	0.0000	0.0000	0.00E+00
232	0.00	0.000	0.098	0.1365	0.0000	0.0000	0.00E+00
233	0.00	0.000	0.063	0.1364	0.0000	0.0000	0.00E+00
234	0.00	0.000	0.051	0.1364	0.0000	0.0000	0.00E+00
235	0.20	0.000	0.240	0.1363	0.0000	0.0000	0.00E+00
236	0.00	0.000	0.032	0.1363	0.0000	0.0000	0.00E+00
237	0.20	0.000	0.226	0.1363	0.0000	0.0000	0.00E+00
238	0.20	0.000	0.221	0.1363	0.0000	0.0000	0.00E+00
239	0.20	0.000	0.216	0.1362	0.0000	0.0000	0.00E+00
240	0.20	0.000	0.213	0.1362	0.0000	0.0000	0.00E+00

241	2.00	0.000	1.113	0.1371	0.0000	0.0000	0.00E+00
242	4.00	0.000	1.317	0.1398	0.0000	0.0000	0.00E+00
243	0.00	0.000	0.097	0.1397	0.0000	0.0000	0.00E+00
244	0.00	0.000	0.379	0.1393	0.0000	0.0000	0.00E+00
245	0.20	0.000	0.608	0.1389	0.0000	0.0000	0.00E+00
246	2.00	0.000	1.236	0.1397	0.0000	0.0000	0.00E+00
247	4.00	0.000	1.327	0.1424	0.0000	0.0000	0.00E+00
248	0.00	0.000	0.887	0.1415	0.0000	0.0000	0.00E+00
249	0.00	0.000	1.020	0.1405	0.0000	0.0000	0.00E+00
250	0.00	0.000	1.363	0.1391	0.0000	0.0000	0.00E+00
251	0.00	0.000	0.785	0.1383	0.0000	0.0000	0.00E+00
252	0.00	0.000	0.559	0.1377	0.0000	0.0000	0.00E+00
253	0.00	0.000	0.465	0.1373	0.0000	0.0000	0.00E+00
254	0.00	0.000	0.410	0.1369	0.0000	0.0000	0.00E+00
255	0.00	0.000	0.405	0.1365	0.0000	0.0000	0.00E+00
256	0.20	0.000	0.441	0.1362	0.0000	0.0000	0.00E+00
257	0.00	0.000	0.036	0.1362	0.0000	0.0000	0.00E+00
258	0.00	0.000	0.024	0.1362	0.0000	0.0000	0.00E+00
259	0.00	0.000	0.021	0.1361	0.0000	0.0000	0.00E+00
260	4.00	0.000	1.361	0.1388	0.0000	0.0000	0.00E+00
261	8.00	0.000	1.406	0.1455	0.0000	0.0000	0.00E+00
262	1.25	0.000	1.517	0.1452	0.0000	0.0000	0.00E+00
263	1.25	0.000	1.759	0.1447	0.0000	0.0000	0.00E+00
264	1.25	0.000	1.943	0.1440	0.0000	0.0000	0.00E+00
265	1.25	0.000	1.999	0.1432	0.0000	0.0000	0.00E+00
266	0.00	0.000	1.553	0.1416	0.0000	0.0000	0.00E+00
267	2.00	0.000	2.592	0.1410	0.0000	0.0000	0.00E+00
268	0.00	0.000	1.567	0.1395	0.0000	0.0000	0.00E+00
269	0.00	0.000	0.910	0.1385	0.0000	0.0000	0.00E+00
270	0.00	0.000	0.535	0.1380	0.0000	0.0000	0.00E+00
271	0.00	0.000	0.462	0.1375	0.0000	0.0000	0.00E+00

272	0.00	0.000	0.303	0.1372	0.0000	0.0000	0.00E+00
273	0.00	0.000	0.312	0.1369	0.0000	0.0000	0.00E+00
274	0.20	0.000	0.552	0.1366	0.0000	0.0000	0.00E+00
275	0.00	0.000	0.381	0.1362	0.0000	0.0000	0.00E+00
276	0.00	0.000	0.331	0.1358	0.0000	0.0000	0.00E+00
277	0.00	0.000	0.123	0.1357	0.0000	0.0000	0.00E+00
278	0.20	0.000	0.304	0.1356	0.0000	0.0000	0.00E+00
279	0.00	0.000	0.083	0.1355	0.0000	0.0000	0.00E+00
280	0.00	0.000	0.067	0.1355	0.0000	0.0000	0.00E+00
281	0.00	0.000	0.110	0.1354	0.0000	0.0000	0.00E+00
282	0.00	0.000	0.054	0.1353	0.0000	0.0000	0.00E+00
283	0.40	0.000	0.459	0.1352	0.0000	0.0000	0.00E+00
284	0.20	0.000	0.282	0.1352	0.0000	0.0000	0.00E+00
285	0.00	0.000	0.067	0.1351	0.0000	0.0000	0.00E+00
286	0.00	0.000	0.067	0.1350	0.0000	0.0000	0.00E+00
287	0.00	0.000	0.021	0.1350	0.0000	0.0000	0.00E+00
288	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
289	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
290	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
291	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
292	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
293	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
294	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
295	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
296	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
297	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
298	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
299	0.60	0.000	0.555	0.1350	0.0000	0.0000	0.00E+00
300	0.00	0.000	0.025	0.1350	0.0000	0.0000	0.00E+00
301	0.00	0.000	0.014	0.1350	0.0000	0.0000	0.00E+00
302	0.00	0.000	0.004	0.1350	0.0000	0.0000	0.00E+00



303	0.00	0.000	0.001	0.1350	0.0000	0.0000	0.00E+00
304	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
305	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
306	0.60	0.000	0.548	0.1351	0.0000	0.0000	0.00E+00
307	0.00	0.000	0.029	0.1350	0.0000	0.0000	0.00E+00
308	0.00	0.000	0.017	0.1350	0.0000	0.0000	0.00E+00
309	0.00	0.000	0.005	0.1350	0.0000	0.0000	0.00E+00
310	0.00	0.000	0.001	0.1350	0.0000	0.0000	0.00E+00
311	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
312	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
313	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
314	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
315	0.40	0.000	0.400	0.1350	0.0000	0.0000	0.00E+00
316	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
317	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
318	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
319	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
320	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
321	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
322	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
323	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
324	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
325	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
326	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
327	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
328	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
329	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
330	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
331	0.40	0.000	0.399	0.1350	0.0000	0.0000	0.00E+00
332	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
333	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00

334	9.00	0.000	1.322	0.1428	0.0000	0.0000	0.00E+00
335	13.00	0.000	1.791	0.1541	0.0000	0.0000	0.00E+00
336	0.20	0.000	0.632	0.1536	0.0000	0.0000	0.00E+00
337	0.00	0.000	0.349	0.1533	0.0000	0.0000	0.00E+00
338	0.20	0.000	1.217	0.1523	0.0000	0.0000	0.00E+00
339	0.00	0.000	1.365	0.1509	0.0000	0.0000	0.00E+00
340	5.00	0.000	1.750	0.1542	0.0000	0.0000	0.00E+00
341	0.00	0.000	1.007	0.1532	0.0000	0.0000	0.00E+00
342	0.00	0.000	0.874	0.1523	0.0000	0.0000	0.00E+00
343	0.00	0.000	1.358	0.1509	0.0000	0.0000	0.00E+00
344	16.00	0.000	1.717	0.1653	0.0000	0.0000	0.00E+00
345	6.00	0.000	1.740	0.1696	0.0000	0.0000	0.00E+00
346	0.00	0.000	0.417	0.1692	0.0000	0.0000	0.00E+00
347	0.00	0.000	0.364	0.1688	0.0000	0.0000	0.00E+00
348	0.00	0.000	1.380	0.1674	0.0000	0.0000	0.00E+00
349	0.00	0.000	0.621	0.1668	0.0000	0.0000	0.00E+00
350	0.00	0.000	0.459	0.1664	0.0000	0.0000	0.00E+00
351	0.00	0.000	0.736	0.1656	0.0000	0.0000	0.00E+00
352	0.20	0.000	0.657	0.1651	0.0000	0.0000	0.00E+00
353	0.20	0.000	1.572	0.1638	0.0000	0.0000	0.00E+00
354	0.00	0.000	1.644	0.1621	0.0000	0.0000	0.00E+00
355	0.00	0.000	1.073	0.1610	0.0000	0.0000	0.00E+00
356	0.00	0.000	1.064	0.1599	0.0000	0.0000	0.00E+00
357	0.00	0.000	0.442	0.1595	0.0000	0.0000	0.00E+00
358	0.60	0.000	0.856	0.1592	0.0000	0.0000	0.00E+00
359	2.00	0.000	1.977	0.1593	0.0000	0.0000	0.00E+00
360	0.00	0.000	0.382	0.1589	0.0000	0.0000	0.00E+00
361	1.00	0.000	1.488	0.1584	0.0000	0.0000	0.00E+00
362	7.00	0.000	3.061	0.1624	0.0000	0.0000	0.00E+00
363	0.00	0.000	1.993	0.1603	0.0000	0.0000	0.00E+00
364	0.00	0.000	2.336	0.1580	0.0000	0.0000	0.00E+00

365

0.00      0.000      1.822      0.1561      0.0000      0.0000      0.00E+00

\* = Frozen (air or soil)

Annual Totals for Year 2			
	mm*	cubic meters	percent
Precipitation	556.00	43,924.0	100.00
Runoff	12.401	979.7	2.23
Evapotranspiration	549.212	43,387.8	98.78
Percolation/Leakage through Layer 2	1.418691	112.1	0.26
Change in Water Storage	-7.0322	-555.5	-1.26
Soil Water at Start of Year	3,665.0114	289,535.9	659.17
Soil Water at End of Year	3,657.9792	288,980.4	657.91
Snow Water at Start of Year	0.0000	0.0000	0.00
Snow Water at End of Year	0.0000	0.0000	0.00
Annual Water Budget Balance	0.0000	0.0000	0.00

\*Note: head on liners expressed in cm

**Daily Output for Year 3**

**Column key:**

**Title:** Welby Landfill - Proposed Cap

**Simulated On:** 16/05/2022 10:52

Leak #1: leakage thru Layer 2

Day	Freezing Status*		Rain (mm)	Runoff (mm)	ET (mm)	Evap. Zone		Head #1 (cm)	Drain #1 (mm)	Leak #1 (mm)
	Air	Soil				Water (cm/cm)				
1			13.00	0.000	3.109	0.1661	0.0000	0.0000	0.00E+00	
2			17.00	0.005	2.986	0.1803	0.0000	0.0000	0.00E+00	
3			0.20	0.000	2.579	0.1779	0.0000	0.0000	0.00E+00	
4	*Note: head		0.00	0.000	2.261	0.1756	0.0000	0.0000	0.00E+00	
5			0.60	0.000	2.830	0.1733	0.0000	0.0000	0.00E+00	
6			0.40	0.000	2.911	0.1708	0.0000	0.0000	0.00E+00	
7			1.00	0.000	3.570	0.1682	0.0000	0.0000	0.00E+00	
8			0.00	0.000	2.892	0.1653	0.0000	0.0000	0.00E+00	
9			0.00	0.000	2.436	0.1628	0.0000	0.0000	0.00E+00	
10			0.00	0.000	2.731	0.1601	0.0000	0.0000	0.00E+00	
11			2.00	0.000	3.668	0.1584	0.0000	0.0000	0.00E+00	
12			3.00	0.000	2.996	0.1584	0.0000	0.0000	0.00E+00	
13			0.00	0.000	1.865	0.1565	0.0000	0.0000	0.00E+00	
14			0.00	0.000	3.438	0.1530	0.0000	0.0000	0.00E+00	
15			0.00	0.000	3.745	0.1493	0.0000	0.0000	0.00E+00	
16			0.00	0.000	4.327	0.1449	0.0000	0.0000	0.00E+00	
17			0.00	0.000	4.864	0.1400	0.0000	0.0000	0.00E+00	
18			0.00	0.000	4.217	0.1357	0.0000	0.0000	0.00E+00	
19			0.00	0.000	0.608	0.1351	0.0000	0.0000	0.00E+00	
20			0.00	0.000	0.099	0.1350	0.0000	0.0000	0.00E+00	
21			0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00	
22			0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00	
23			0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00	

24	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
25	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
26	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
27	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
28	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
29	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
30	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
31	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
32	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
33	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
34	1.00	0.000	0.956	0.1350	0.0000	0.0000	0.00E+00
35	0.40	0.000	0.422	0.1350	0.0000	0.0000	0.00E+00
36	0.00	0.000	0.016	0.1350	0.0000	0.0000	0.00E+00
37	0.00	0.000	0.005	0.1350	0.0000	0.0000	0.00E+00
38	0.00	0.000	0.001	0.1350	0.0000	0.0000	0.00E+00
39	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
40	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
41	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
42	10.00	0.000	1.726	0.1434	0.0000	0.0000	0.00E+00
43	0.00	0.000	2.743	0.1406	0.0000	0.0000	0.00E+00
44	0.00	0.000	3.596	0.1370	0.0000	0.0000	0.00E+00
45	1.00	0.000	1.941	0.1360	0.0000	0.0000	0.00E+00
46	0.00	0.000	0.727	0.1353	0.0000	0.0000	0.00E+00
47	25.00	0.430	2.937	0.1571	0.0000	0.0000	0.00E+00
48	0.20	0.000	1.843	0.1555	0.0000	0.0000	0.00E+00
49	5.00	0.000	3.647	0.1568	0.0000	0.0000	0.00E+00
50	0.00	0.000	3.258	0.1535	0.0000	0.0000	0.00E+00
51	0.40	0.000	3.692	0.1502	0.0000	0.0000	0.00E+00
52	8.00	0.000	3.815	0.1544	0.0000	0.0000	0.00E+00
53	23.00	0.320	3.469	0.1738	0.0000	0.0000	0.00E+00
54	6.00	0.000	2.667	0.1772	0.0000	0.0000	0.00E+00

55	15.00	0.002	3.178	0.1892	0.0000	0.0000	0.00E+00
56	2.00	0.000	2.884	0.1883	0.0000	0.0000	0.00E+00
57	0.00	0.000	2.721	0.1855	0.0000	0.0000	0.00E+00
58	0.00	0.000	3.604	0.1819	0.0000	0.0000	0.00E+00
59	0.00	0.000	2.434	0.1794	0.0000	0.0000	0.00E+00
60	0.20	0.000	2.260	0.1773	0.0000	0.0000	0.00E+00
61	0.00	0.000	2.725	0.1746	0.0000	0.0000	0.00E+00
62	0.00	0.000	2.384	0.1722	0.0000	0.0000	0.00E+00
63	0.00	0.000	3.437	0.1687	0.0000	0.0000	0.00E+00
64	0.00	0.000	3.768	0.1649	0.0000	0.0000	0.00E+00
65	0.20	0.000	4.146	0.1609	0.0000	0.0000	0.00E+00
66	4.00	0.000	4.730	0.1602	0.0000	0.0000	0.00E+00
67	0.20	0.000	3.414	0.1569	0.0000	0.0000	0.00E+00
68	17.00	0.000	4.102	0.1700	0.0000	0.0000	0.00E+00
69	1.00	0.000	3.832	0.1671	0.0000	0.0000	0.00E+00
70	2.00	0.000	4.414	0.1647	0.0000	0.0000	0.00E+00
71	36.00	2.559	4.341	0.1940	0.0000	0.0000	0.00E+00
72	0.40	0.000	4.148	0.1903	0.0000	0.0000	0.00E+00
73	0.00	0.000	2.412	0.1878	0.0000	0.0000	0.00E+00
74	11.00	0.000	4.445	0.1944	0.0000	0.0000	0.00E+00
75	0.00	0.000	3.023	0.1914	0.0000	0.0000	0.00E+00
76	1.00	0.000	3.686	0.1887	0.0000	0.0000	0.00E+00
77	0.20	0.000	3.105	0.1857	0.0000	0.0000	0.00E+00
78	0.00	0.000	2.727	0.1830	0.0000	0.0000	0.00E+00
79	0.00	0.000	2.882	0.1801	0.0000	0.0000	0.00E+00
80	0.00	0.000	2.005	0.1780	0.0000	0.0000	0.00E+00
81	0.00	0.000	1.705	0.1763	0.0000	0.0000	0.00E+00
82	0.00	0.000	2.524	0.1738	0.0000	0.0000	0.00E+00
83	0.20	0.000	2.674	0.1713	0.0000	0.0000	0.00E+00
84	0.00	0.000	2.667	0.1686	0.0000	0.0000	0.00E+00
85	0.20	0.000	1.908	0.1669	0.0000	0.0000	0.00E+00

86	0.40	0.000	2.744	0.1645	0.0000	0.0000	0.00E+00
87	0.00	0.000	1.460	0.1630	0.0000	0.0000	0.00E+00
88	9.00	0.000	3.617	0.1685	0.0000	0.0000	0.00E+00
89	2.00	0.000	3.091	0.1674	0.0000	0.0000	0.00E+00
90	3.00	0.000	2.341	0.1680	0.0000	0.0000	0.00E+00
91	0.40	0.000	1.989	0.1664	0.0000	0.0000	0.00E+00
92	0.20	0.000	2.394	0.1642	0.0000	0.0000	0.00E+00
93	0.20	0.000	1.263	0.1631	0.0000	0.0000	0.00E+00
94	1.00	0.000	1.667	0.1624	0.0000	0.0000	0.00E+00
95	1.00	0.000	1.457	0.1620	0.0000	0.0000	0.00E+00
96	0.00	0.000	1.002	0.1610	0.0000	0.0000	0.00E+00
97	0.20	0.000	1.491	0.1597	0.0000	0.0000	0.00E+00
98	0.20	0.000	1.724	0.1581	0.0000	0.0000	0.00E+00
99	0.20	0.000	1.753	0.1566	0.0000	0.0000	0.00E+00
100	0.00	0.000	1.712	0.1548	0.0000	0.0000	0.00E+00
101	0.20	0.000	1.870	0.1531	0.0000	0.0000	0.00E+00
102	1.00	0.000	2.267	0.1519	0.0000	0.0000	0.00E+00
103	0.00	0.000	1.794	0.1501	0.0000	0.0000	0.00E+00
104	6.00	0.000	2.848	0.1532	0.0000	0.0000	0.00E+00
105	0.00	0.000	0.818	0.1524	0.0000	0.0000	0.00E+00
106	0.00	0.000	0.516	0.1519	0.0000	0.0000	0.00E+00
107	1.00	0.000	1.763	0.1511	0.0000	0.0000	0.00E+00
108	6.00	0.000	2.655	0.1545	0.0000	0.0000	0.00E+00
109	3.00	0.000	2.534	0.1550	0.0000	0.0000	0.00E+00
110	0.20	0.000	0.786	0.1544	0.0000	0.0000	0.00E+00
111	0.20	0.000	1.435	0.1531	0.0000	0.0000	0.00E+00
112	0.20	0.000	1.294	0.1520	0.0000	0.0000	0.00E+00
113	0.40	0.000	1.709	0.1507	0.0000	0.0000	0.00E+00
114	0.20	0.000	1.507	0.1494	0.0000	0.0000	0.00E+00
115	3.00	0.000	2.474	0.1499	0.0000	0.0000	0.00E+00
116	7.00	0.000	2.530	0.1544	0.0000	0.0000	0.00E+00

117	5.00	0.000	2.575	0.1569	0.0000	0.0000	0.00E+00
118	63.00	11.675	2.675	0.2060	0.0000	0.0000	0.00E+00
119	0.40	0.000	1.469	0.2049	0.0000	0.0000	0.00E+00
120	0.20	0.000	1.109	0.2040	0.0000	0.0000	0.00E+00
121	0.40	0.000	1.187	0.2032	0.0000	0.0000	0.00E+00
122	0.00	0.000	1.205	0.2020	0.0000	0.0000	0.00E+00
123	0.20	0.000	1.323	0.2009	0.0000	0.0000	0.00E+00
124	0.20	0.000	1.196	0.1999	0.0000	0.0000	0.00E+00
125	0.40	0.000	1.419	0.1988	0.0000	0.0000	0.00E+00
126	1.00	0.000	1.487	0.1983	0.0000	0.0000	0.00E+00
127	0.40	0.000	0.923	0.1978	0.0000	0.0000	0.00E+00
128	0.00	0.000	1.016	0.1968	0.0000	0.0000	0.00E+00
129	0.00	0.000	1.062	0.1957	0.0000	0.0000	0.00E+00
130	0.00	0.000	1.040	0.1947	0.0000	0.0000	0.00E+00
131	0.00	0.000	0.908	0.1938	0.0000	0.0000	0.00E+00
132	0.20	0.000	1.160	0.1928	0.0000	0.0000	0.00E+00
133	3.00	0.000	1.559	0.1942	0.0000	0.0000	0.00E+00
134	22.00	0.273	2.321	0.2138	0.0000	0.0000	0.00E+00
135	17.00	0.101	2.179	0.2287	0.0000	0.0000	0.00E+00
136	12.00	0.000	2.144	0.2387	0.0000	0.0000	0.00E+00
137	21.00	0.993	2.316	0.2565	0.0000	0.0000	0.00E+00
138	2.00	0.000	2.060	0.2565	0.0000	0.0000	0.00E+00
139	0.00	0.000	0.957	0.2555	0.0000	0.0000	0.00E+00
140	0.00	0.000	0.840	0.2547	0.0000	0.0000	0.00E+00
141	0.00	0.000	0.870	0.2538	0.0000	0.0000	0.00E+00
142	0.00	0.000	0.364	0.2534	0.0000	0.0000	0.00E+00
143	0.00	0.000	0.451	0.2530	0.0000	0.0000	0.00E+00
144	0.20	0.000	0.618	0.2525	0.0000	0.0000	0.00E+00
145	9.00	0.000	2.191	0.2594	0.0000	0.0000	0.00E+00
146	13.00	0.001	2.208	0.2703	0.0000	0.0000	0.00E+00
147	5.00	0.000	2.109	0.2732	0.0000	0.0000	0.00E+00



148	3.00	0.000	1.877	0.2744	0.0000	0.0000	0.00E+00
149	0.20	0.000	0.997	0.2736	0.0000	0.0000	0.00E+00
150	0.20	0.000	0.830	0.2729	0.0000	0.0000	0.00E+00
151	0.00	0.000	0.822	0.2721	0.0000	0.0000	0.00E+00
152	0.20	0.000	0.523	0.2718	0.0000	0.0000	0.00E+00
153	5.00	0.000	1.594	0.2752	0.0000	0.0000	0.00E+00
154	0.40	0.000	1.312	0.2743	0.0000	0.0000	0.00E+00
155	0.00	0.000	0.936	0.2733	0.0000	0.0000	0.00E+00
156	5.00	0.000	1.835	0.2765	0.0000	0.0000	0.00E+00
157	0.00	0.000	0.385	0.2762	0.0000	0.0000	0.00E+00
158	0.00	0.000	0.559	0.2756	0.0000	0.0000	0.00E+00
159	0.00	0.000	0.684	0.2749	0.0000	0.0000	0.00E+00
160	0.00	0.000	0.655	0.2742	0.0000	0.0000	0.00E+00
161	0.20	0.000	0.473	0.2740	0.0000	0.0000	0.00E+00
162	0.20	0.000	0.919	0.2732	0.0000	0.0000	0.00E+00
163	0.40	0.000	0.673	0.2730	0.0000	0.0000	0.00E+00
164	7.00	0.000	2.072	0.2779	0.0000	0.0000	0.00E+00
165	0.00	0.000	0.647	0.2773	0.0000	0.0000	0.00E+00
166	0.00	0.000	0.622	0.2767	0.0000	0.0000	0.00E+00
167	0.00	0.000	0.799	0.2758	0.0000	0.0000	0.00E+00
168	0.00	0.000	0.436	0.2754	0.0000	0.0000	0.00E+00
169	0.20	0.000	0.866	0.2747	0.0000	0.0000	0.00E+00
170	0.00	0.000	0.716	0.2740	0.0000	0.0000	0.00E+00
171	0.20	0.000	0.817	0.2734	0.0000	0.0000	0.00E+00
172	6.00	0.000	2.006	0.2774	0.0000	0.0000	0.00E+00
173	1.00	0.000	1.370	0.2770	0.0000	0.0000	0.00E+00
174	0.00	0.000	0.268	0.2768	0.0000	0.0000	0.00E+00
175	2.70	0.000	1.363	0.2781	0.0000	0.0000	0.00E+00
176	0.40	0.000	0.556	0.2780	0.0000	0.0000	0.00E+00
177	5.20	0.000	1.692	0.2815	0.0000	0.0000	0.00E+00
178	1.40	0.000	1.312	0.2816	0.0000	0.0000	0.00E+00

179	0.00	0.000	0.398	0.2812	0.0000	0.0000	0.00E+00
180	3.00	0.000	1.378	0.2828	0.0000	0.0000	0.00E+00
181	4.00	0.000	1.978	0.2849	0.0000	0.0000	0.00E+00
182	2.40	0.000	1.893	0.2854	0.0000	0.0000	0.00E+00
183	2.80	0.000	1.947	0.2863	0.0000	0.0000	0.00E+00
184	1.51	0.000	1.763	0.2860	0.0000	0.0000	0.00E+00
185	0.80	0.000	1.387	0.2854	0.0000	0.0000	0.00E+00
186	0.00	0.000	0.681	0.2847	0.0000	0.0000	0.00E+00
187	0.20	0.000	1.070	0.2838	0.0000	0.0000	0.00E+00
188	0.00	0.000	0.905	0.2829	0.0000	0.0000	0.00E+00
189	0.00	0.000	0.936	0.2819	0.0000	0.0000	0.00E+00
190	0.00	0.000	0.887	0.2810	0.0000	0.0000	0.00E+00
191	0.00	0.000	0.358	0.2806	0.0000	0.0000	0.00E+00
192	0.20	0.000	1.097	0.2797	0.0000	0.0000	0.00E+00
193	0.40	0.000	1.349	0.2788	0.0000	0.0000	0.00E+00
194	0.20	0.000	0.870	0.2781	0.0000	0.0000	0.00E+00
195	0.20	0.000	0.753	0.2775	0.0000	0.0000	0.00E+00
196	0.00	0.000	0.383	0.2772	0.0000	0.0000	0.00E+00
197	0.00	0.000	0.603	0.2764	0.0000	0.0000	0.00E+00
198	0.00	0.000	0.919	0.2755	0.0000	0.0000	0.00E+00
199	0.00	0.000	0.538	0.2750	0.0000	0.0000	0.00E+00
200	0.20	0.000	0.482	0.2747	0.0000	0.0000	0.00E+00
201	0.20	0.000	0.916	0.2740	0.0000	0.0000	0.00E+00
202	0.20	0.000	1.250	0.2729	0.0000	0.0000	0.00E+00
203	0.40	0.000	1.470	0.2717	0.0000	0.0000	0.00E+00
204	1.00	0.000	1.666	0.2705	0.0000	0.0000	6.26E-01
205	5.80	0.000	2.256	0.2737	0.0000	0.0000	4.46E-01
206	0.00	0.000	0.991	0.2725	0.0000	0.0000	0.00E+00
207	0.00	0.000	0.996	0.2715	0.0000	0.0000	0.00E+00
208	0.20	0.000	1.163	0.2705	0.0000	0.0000	0.00E+00
209	0.00	0.000	0.627	0.2698	0.0000	0.0000	0.00E+00

210	0.00	0.000	0.978	0.2685	0.0000	0.0000	6.45E-01
211	0.00	0.000	0.865	0.2673	0.0000	0.0000	4.28E-01
212	0.00	0.000	0.500	0.2665	0.0000	0.0000	0.00E+00
213	0.00	0.000	1.106	0.2648	0.0000	0.0000	6.32E-01
214	0.00	0.000	1.086	0.2634	0.0000	0.0000	4.36E-01
215	0.00	0.000	1.077	0.2620	0.0000	0.0000	0.00E+00
216	0.00	0.000	1.220	0.2606	0.0000	0.0000	0.00E+00
217	0.00	0.000	1.312	0.2592	0.0000	0.0000	6.11E-01
218	5.80	0.000	2.318	0.2626	0.0000	0.0000	8.38E-01
219	0.00	0.000	1.094	0.2615	0.0000	0.0000	0.00E+00
220	0.20	0.000	0.752	0.2607	0.0000	0.0000	0.00E+00
221	0.00	0.000	0.783	0.2596	0.0000	0.0000	0.00E+00
222	0.00	0.000	1.179	0.2581	0.0000	0.0000	0.00E+00
223	0.60	0.000	1.766	0.2563	0.0000	0.0000	6.80E-01
224	0.40	0.000	1.415	0.2549	0.0000	0.0000	3.09E-01
225	0.00	0.000	1.650	0.2530	0.0000	0.0000	0.00E+00
226	2.00	0.000	2.449	0.2522	0.0000	0.0000	6.59E-01
227	0.00	0.000	1.305	0.2504	0.0000	0.0000	3.77E-01
228	0.20	0.000	1.511	0.2486	0.0000	0.0000	0.00E+00
229	0.00	0.000	1.467	0.2466	0.0000	0.0000	1.04E+00
230	0.00	0.000	1.510	0.2446	0.0000	0.0000	0.00E+00
231	1.60	0.000	2.100	0.2436	0.0000	0.0000	1.08E+00
232	0.00	0.000	1.387	0.2419	0.0000	0.0000	0.00E+00
233	0.20	0.000	1.547	0.2401	0.0000	0.0000	5.52E-01
234	0.80	0.000	1.436	0.2393	0.0000	0.0000	6.21E-01
235	0.60	0.000	1.536	0.2384	0.0000	0.0000	0.00E+00
236	20.00	0.114	1.970	0.2565	0.0000	0.0000	0.00E+00
237	1.81	0.000	2.518	0.2557	0.0000	0.0000	0.00E+00
238	1.81	0.000	2.449	0.2549	0.0000	0.0000	0.00E+00
239	0.00	0.000	1.569	0.2532	0.0000	0.0000	0.00E+00
240	0.00	0.000	1.693	0.2514	0.0000	0.0000	0.00E+00

241	0.00	0.000	0.994	0.2504	0.0000	0.0000	0.00E+00
242	0.00	0.000	2.011	0.2484	0.0000	0.0000	0.00E+00
243	0.00	0.000	1.483	0.2469	0.0000	0.0000	0.00E+00
244	0.00	0.000	1.722	0.2452	0.0000	0.0000	0.00E+00
245	0.00	0.000	1.542	0.2436	0.0000	0.0000	0.00E+00
246	0.00	0.000	1.842	0.2418	0.0000	0.0000	0.00E+00
247	0.00	0.000	1.872	0.2399	0.0000	0.0000	0.00E+00
248	0.00	0.000	1.621	0.2382	0.0000	0.0000	0.00E+00
249	0.00	0.000	1.264	0.2369	0.0000	0.0000	0.00E+00
250	0.00	0.000	1.208	0.2357	0.0000	0.0000	0.00E+00
251	0.00	0.000	1.094	0.2346	0.0000	0.0000	0.00E+00
252	0.20	0.000	1.183	0.2336	0.0000	0.0000	0.00E+00
253	0.00	0.000	0.938	0.2326	0.0000	0.0000	0.00E+00
254	0.00	0.000	0.885	0.2318	0.0000	0.0000	0.00E+00
255	2.80	0.000	1.619	0.2329	0.0000	0.0000	0.00E+00
256	7.80	0.000	1.593	0.2392	0.0000	0.0000	0.00E+00
257	0.00	0.000	0.770	0.2384	0.0000	0.0000	0.00E+00
258	3.60	0.000	1.508	0.2406	0.0000	0.0000	0.00E+00
259	0.00	0.000	0.705	0.2398	0.0000	0.0000	0.00E+00
260	0.00	0.000	0.687	0.2390	0.0000	0.0000	0.00E+00
261	0.00	0.000	0.672	0.2382	0.0000	0.0000	0.00E+00
262	0.00	0.000	0.660	0.2375	0.0000	0.0000	0.00E+00
263	1.80	0.000	1.310	0.2379	0.0000	0.0000	0.00E+00
264	0.00	0.000	0.637	0.2372	0.0000	0.0000	0.00E+00
265	0.00	0.000	0.627	0.2364	0.0000	0.0000	6.17E-01
266	0.00	0.000	0.630	0.2357	0.0000	0.0000	5.27E-01
267	0.00	0.000	0.613	0.2349	0.0000	0.0000	0.00E+00
268	0.00	0.000	0.616	0.2343	0.0000	0.0000	0.00E+00
269	0.00	0.000	0.615	0.2337	0.0000	0.0000	0.00E+00
270	0.40	0.000	0.895	0.2332	0.0000	0.0000	0.00E+00
271	0.00	0.000	0.581	0.2326	0.0000	0.0000	0.00E+00

272	0.00	0.000	0.578	0.2320	0.0000	0.0000	0.00E+00
273	0.00	0.000	0.564	0.2314	0.0000	0.0000	0.00E+00
274	0.00	0.000	0.552	0.2309	0.0000	0.0000	0.00E+00
275	12.80	0.000	1.225	0.2426	0.0000	0.0000	0.00E+00
276	13.80	0.000	1.179	0.2553	0.0000	0.0000	0.00E+00
277	0.60	0.000	3.114	0.2528	0.0000	0.0000	0.00E+00
278	0.00	0.000	2.497	0.2503	0.0000	0.0000	0.00E+00
279	1.60	0.000	3.410	0.2484	0.0000	0.0000	0.00E+00
280	2.00	0.000	3.146	0.2473	0.0000	0.0000	0.00E+00
281	0.00	0.000	2.663	0.2445	0.0000	0.0000	0.00E+00
282	2.40	0.000	3.376	0.2436	0.0000	0.0000	0.00E+00
283	0.00	0.000	2.481	0.2410	0.0000	0.0000	0.00E+00
284	0.40	0.000	2.687	0.2387	0.0000	0.0000	0.00E+00
285	0.00	0.000	2.270	0.2364	0.0000	0.0000	0.00E+00
286	3.40	0.000	2.356	0.2375	0.0000	0.0000	0.00E+00
287	0.20	0.000	1.703	0.2359	0.0000	0.0000	0.00E+00
288	0.00	0.000	1.419	0.2344	0.0000	0.0000	0.00E+00
289	0.00	0.000	1.337	0.2330	0.0000	0.0000	0.00E+00
290	0.20	0.000	1.403	0.2318	0.0000	0.0000	0.00E+00
291	0.00	0.000	1.217	0.2306	0.0000	0.0000	0.00E+00
292	6.80	0.000	1.780	0.2356	0.0000	0.0000	0.00E+00
293	1.56	0.000	1.668	0.2355	0.0000	0.0000	0.00E+00
294	0.00	0.000	1.143	0.2344	0.0000	0.0000	0.00E+00
295	0.00	0.000	1.006	0.2333	0.0000	0.0000	0.00E+00
296	0.00	0.000	1.124	0.2320	0.0000	0.0000	0.00E+00
297	0.00	0.000	1.056	0.2310	0.0000	0.0000	0.00E+00
298	1.20	0.000	1.686	0.2305	0.0000	0.0000	0.00E+00
299	1.80	0.000	1.707	0.2306	0.0000	0.0000	0.00E+00
300	1.40	0.000	1.654	0.2303	0.0000	0.0000	0.00E+00
301	0.60	0.000	1.324	0.2296	0.0000	0.0000	0.00E+00
302	0.60	0.000	1.437	0.2286	0.0000	0.0000	0.00E+00

303	0.00	0.000	1.215	0.2272	0.0000	0.0000	0.00E+00
304	0.00	0.000	1.232	0.2259	0.0000	0.0000	0.00E+00
305	2.00	0.000	1.681	0.2262	0.0000	0.0000	0.00E+00
306	0.00	0.000	1.261	0.2249	0.0000	0.0000	0.00E+00
307	4.80	0.000	1.798	0.2280	0.0000	0.0000	0.00E+00
308	0.00	0.000	1.388	0.2266	0.0000	0.0000	0.00E+00
309	0.00	0.000	1.417	0.2250	0.0000	0.0000	6.95E-01
310	0.00	0.000	1.785	0.2231	0.0000	0.0000	4.40E-01
311	0.60	0.000	2.100	0.2216	0.0000	0.0000	0.00E+00
312	0.00	0.000	1.479	0.2201	0.0000	0.0000	0.00E+00
313	0.00	0.000	2.001	0.2181	0.0000	0.0000	0.00E+00
314	0.40	0.000	1.717	0.2167	0.0000	0.0000	0.00E+00
315	5.20	0.000	1.961	0.2200	0.0000	0.0000	0.00E+00
316	0.00	0.000	1.374	0.2186	0.0000	0.0000	0.00E+00
317	1.40	0.000	2.237	0.2177	0.0000	0.0000	0.00E+00
318	0.20	0.000	2.545	0.2153	0.0000	0.0000	0.00E+00
319	0.00	0.000	1.752	0.2134	0.0000	0.0000	0.00E+00
320	0.00	0.000	1.633	0.2118	0.0000	0.0000	0.00E+00
321	6.60	0.000	1.937	0.2165	0.0000	0.0000	0.00E+00
322	1.00	0.000	2.251	0.2152	0.0000	0.0000	0.00E+00
323	0.20	0.000	3.434	0.2119	0.0000	0.0000	0.00E+00
324	0.00	0.000	3.243	0.2087	0.0000	0.0000	0.00E+00
325	6.20	0.000	2.542	0.2124	0.0000	0.0000	0.00E+00
326	15.00	0.000	1.773	0.2257	0.0000	0.0000	0.00E+00
327	7.80	0.000	2.519	0.2311	0.0000	0.0000	0.00E+00
328	7.40	0.000	2.245	0.2363	0.0000	0.0000	0.00E+00
329	4.60	0.000	1.998	0.2389	0.0000	0.0000	0.00E+00
330	4.80	0.000	2.786	0.2409	0.0000	0.0000	0.00E+00
331	3.00	0.000	3.645	0.2402	0.0000	0.0000	0.00E+00
332	0.00	0.000	3.475	0.2367	0.0000	0.0000	0.00E+00
333	0.00	0.000	2.460	0.2342	0.0000	0.0000	0.00E+00

334	0.20	0.000	2.957	0.2314	0.0000	0.0000	0.00E+00
335	0.00	0.000	2.990	0.2284	0.0000	0.0000	0.00E+00
336	2.80	0.000	3.871	0.2273	0.0000	0.0000	0.00E+00
337	2.80	0.000	4.319	0.2258	0.0000	0.0000	0.00E+00
338	15.40	0.000	3.814	0.2375	0.0000	0.0000	0.00E+00
339	0.00	0.000	2.538	0.2349	0.0000	0.0000	0.00E+00
340	1.60	0.000	3.431	0.2331	0.0000	0.0000	0.00E+00
341	0.00	0.000	3.539	0.2295	0.0000	0.0000	0.00E+00
342	0.00	0.000	3.591	0.2258	0.0000	0.0000	0.00E+00
343	0.00	0.000	3.294	0.2225	0.0000	0.0000	0.00E+00
344	0.00	0.000	4.576	0.2179	0.0000	0.0000	0.00E+00
345	0.00	0.000	5.178	0.2127	0.0000	0.0000	0.00E+00
346	0.00	0.000	4.033	0.2086	0.0000	0.0000	0.00E+00
347	2.60	0.000	4.519	0.2066	0.0000	0.0000	0.00E+00
348	0.00	0.000	2.597	0.2040	0.0000	0.0000	0.00E+00
349	2.04	0.000	2.735	0.2033	0.0000	0.0000	0.00E+00
350	0.00	0.000	2.567	0.2007	0.0000	0.0000	0.00E+00
351	0.00	0.000	3.909	0.1968	0.0000	0.0000	0.00E+00
352	0.00	0.000	4.604	0.1921	0.0000	0.0000	0.00E+00
353	0.00	0.000	5.009	0.1871	0.0000	0.0000	0.00E+00
354	4.60	0.000	3.645	0.1880	0.0000	0.0000	0.00E+00
355	2.00	0.000	3.549	0.1865	0.0000	0.0000	0.00E+00
356	0.80	0.000	3.084	0.1842	0.0000	0.0000	0.00E+00
357	0.00	0.000	2.789	0.1813	0.0000	0.0000	0.00E+00
358	0.00	0.000	2.423	0.1789	0.0000	0.0000	0.00E+00
359	0.20	0.000	2.556	0.1765	0.0000	0.0000	0.00E+00
360	0.00	0.000	2.673	0.1738	0.0000	0.0000	0.00E+00
361	0.40	0.000	2.274	0.1719	0.0000	0.0000	0.00E+00
362	0.00	0.000	2.006	0.1698	0.0000	0.0000	0.00E+00
363	0.00	0.000	2.036	0.1678	0.0000	0.0000	0.00E+00
364	0.00	0.000	2.409	0.1653	0.0000	0.0000	0.00E+00

365

0.00      0.000      2.730      0.1626      0.0000      0.0000      0.00E+00

\* = Frozen (air or soil)

Annual Totals for Year 3			
	mm*	cubic meters	percent
Precipitation	703.03	55,539.4	100.00
Runoff	16.474	1,301.5	2.34
Evapotranspiration	667.887	52,763.1	95.00
Percolation/Leakage through Layer 2	12.261207	968.6	1.74
Change in Water Storage	6.4077	506.2	0.91
Soil Water at Start of Year	3,657.9792	288,980.4	520.32
Soil Water at End of Year	3,664.3869	289,486.6	521.23
Snow Water at Start of Year	0.0000	0.0000	0.00
Snow Water at End of Year	0.0000	0.0000	0.00
Annual Water Budget Balance	0.0000	0.0000	0.00

\*Note: head on liners expressed in cm



**Daily Output for Year 4**

**Column key:**

**Title:** Welby Landfill - Proposed Cap

**Simulated On:** 16/05/2022 10:52

Leak #1: leakage thru Layer 2

Day	Freezing Status*		Rain (mm)	Runoff (mm)	ET (mm)	Evap. Zone		Head #1 (cm)	Drain #1 (mm)	Leak #1 (mm)
	Air	Soil				Water (cm/cm)				
1			0.00	0.000	2.170	0.1604	0.0000	0.0000	0.00E+00	
2			0.00	0.000	1.953	0.1584	0.0000	0.0000	0.00E+00	
3			0.00	0.000	2.113	0.1557	0.0000	0.0000	6.30E-01	
4	*Note: head		0.00	0.000	2.571	0.1531	0.0000	0.0000	0.00E+00	
5			1.00	0.000	2.888	0.1512	0.0000	0.0000	0.00E+00	
6			2.10	0.000	3.030	0.1503	0.0000	0.0000	0.00E+00	
7			2.10	0.000	2.075	0.1503	0.0000	0.0000	0.00E+00	
8			2.10	0.000	2.061	0.1503	0.0000	0.0000	0.00E+00	
9			2.10	0.000	2.013	0.1504	0.0000	0.0000	0.00E+00	
10			2.10	0.000	2.563	0.1499	0.0000	0.0000	0.00E+00	
11			2.10	0.000	2.891	0.1491	0.0000	0.0000	0.00E+00	
12			0.00	0.000	3.098	0.1460	0.0000	0.0000	0.00E+00	
13			0.00	0.000	3.927	0.1421	0.0000	0.0000	0.00E+00	
14			13.00	0.000	3.238	0.1519	0.0000	0.0000	0.00E+00	
15			0.40	0.000	3.807	0.1485	0.0000	0.0000	0.00E+00	
16			0.00	0.000	4.228	0.1442	0.0000	0.0000	0.00E+00	
17			6.60	0.000	5.162	0.1457	0.0000	0.0000	0.00E+00	
18			0.40	0.000	3.909	0.1421	0.0000	0.0000	0.00E+00	
19			0.00	0.000	3.746	0.1383	0.0000	0.0000	0.00E+00	
20			0.00	0.000	1.864	0.1364	0.0000	0.0000	0.00E+00	
21			0.00	0.000	1.142	0.1353	0.0000	0.0000	0.00E+00	
22			17.00	0.000	2.943	0.1495	0.0000	0.0000	0.00E+00	
23			0.00	0.000	2.016	0.1474	0.0000	0.0000	0.00E+00	

24	11.80	0.000	2.852	0.1565	0.0000	0.0000	0.00E+00
25	7.40	0.000	3.483	0.1604	0.0000	0.0000	0.00E+00
26	2.10	0.000	3.159	0.1594	0.0000	0.0000	0.00E+00
27	2.10	0.000	4.287	0.1572	0.0000	0.0000	0.00E+00
28	2.10	0.000	4.283	0.1550	0.0000	0.0000	0.00E+00
29	2.10	0.000	4.233	0.1528	0.0000	0.0000	0.00E+00
30	2.10	0.000	4.287	0.1506	0.0000	0.0000	0.00E+00
31	0.40	0.000	3.306	0.1477	0.0000	0.0000	0.00E+00
32	0.00	0.000	3.683	0.1439	0.0000	0.0000	0.00E+00
33	0.00	0.000	3.469	0.1404	0.0000	0.0000	0.00E+00
34	7.00	0.000	3.829	0.1436	0.0000	0.0000	0.00E+00
35	0.40	0.000	2.432	0.1416	0.0000	0.0000	0.00E+00
36	0.00	0.000	2.254	0.1393	0.0000	0.0000	0.00E+00
37	0.00	0.000	2.257	0.1370	0.0000	0.0000	0.00E+00
38	0.00	0.000	1.287	0.1357	0.0000	0.0000	0.00E+00
39	0.00	0.000	0.495	0.1352	0.0000	0.0000	0.00E+00
40	2.40	0.000	1.842	0.1358	0.0000	0.0000	0.00E+00
41	0.00	0.000	0.448	0.1353	0.0000	0.0000	0.00E+00
42	0.00	0.000	0.239	0.1351	0.0000	0.0000	0.00E+00
43	11.60	0.000	1.697	0.1451	0.0000	0.0000	0.00E+00
44	0.60	0.000	2.480	0.1432	0.0000	0.0000	0.00E+00
45	0.40	0.000	2.723	0.1409	0.0000	0.0000	0.00E+00
46	0.00	0.000	2.463	0.1384	0.0000	0.0000	0.00E+00
47	0.00	0.000	1.827	0.1365	0.0000	0.0000	0.00E+00
48	0.00	0.000	0.819	0.1357	0.0000	0.0000	0.00E+00
49	0.00	0.000	0.516	0.1352	0.0000	0.0000	0.00E+00
50	0.00	0.000	0.129	0.1350	0.0000	0.0000	0.00E+00
51	0.00	0.000	0.034	0.1350	0.0000	0.0000	0.00E+00
52	0.00	0.000	0.007	0.1350	0.0000	0.0000	0.00E+00
53	0.00	0.000	0.002	0.1350	0.0000	0.0000	0.00E+00
54	6.20	0.000	1.551	0.1397	0.0000	0.0000	0.00E+00

55	0.00	0.000	0.496	0.1392	0.0000	0.0000	0.00E+00
56	19.20	0.030	3.005	0.1555	0.0000	0.0000	0.00E+00
57	24.60	0.521	2.038	0.1778	0.0000	0.0000	0.00E+00
58	1.00	0.000	3.074	0.1757	0.0000	0.0000	0.00E+00
59	0.00	0.000	1.724	0.1739	0.0000	0.0000	0.00E+00
60	0.00	0.000	1.941	0.1720	0.0000	0.0000	0.00E+00
61	0.00	0.000	2.062	0.1699	0.0000	0.0000	0.00E+00
62	0.00	0.000	2.281	0.1676	0.0000	0.0000	0.00E+00
63	0.00	0.000	3.718	0.1638	0.0000	0.0000	0.00E+00
64	0.00	0.000	3.832	0.1600	0.0000	0.0000	0.00E+00
65	0.00	0.000	3.390	0.1566	0.0000	0.0000	0.00E+00
66	0.00	0.000	3.155	0.1534	0.0000	0.0000	0.00E+00
67	28.20	0.845	4.528	0.1764	0.0000	0.0000	0.00E+00
68	0.00	0.000	4.339	0.1720	0.0000	0.0000	0.00E+00
69	0.00	0.000	5.301	0.1667	0.0000	0.0000	0.00E+00
70	0.00	0.000	4.176	0.1625	0.0000	0.0000	0.00E+00
71	0.00	0.000	2.724	0.1597	0.0000	0.0000	0.00E+00
72	0.00	0.000	3.690	0.1560	0.0000	0.0000	0.00E+00
73	8.00	0.000	3.135	0.1609	0.0000	0.0000	0.00E+00
74	0.00	0.000	3.224	0.1576	0.0000	0.0000	0.00E+00
75	0.00	0.000	3.911	0.1537	0.0000	0.0000	0.00E+00
76	10.60	0.000	4.797	0.1596	0.0000	0.0000	0.00E+00
77	0.00	0.000	4.023	0.1555	0.0000	0.0000	0.00E+00
78	0.00	0.000	3.653	0.1518	0.0000	0.0000	0.00E+00
79	0.00	0.000	3.355	0.1484	0.0000	0.0000	0.00E+00
80	0.00	0.000	2.400	0.1460	0.0000	0.0000	0.00E+00
81	0.00	0.000	2.560	0.1434	0.0000	0.0000	0.00E+00
82	3.00	0.000	3.276	0.1431	0.0000	0.0000	0.00E+00
83	0.00	0.000	1.052	0.1421	0.0000	0.0000	0.00E+00
84	0.20	0.000	2.996	0.1392	0.0000	0.0000	0.00E+00
85	0.20	0.000	1.802	0.1376	0.0000	0.0000	0.00E+00

86	0.20	0.000	1.780	0.1360	0.0000	0.0000	0.00E+00
87	0.00	0.000	0.801	0.1352	0.0000	0.0000	0.00E+00
88	1.40	0.000	1.349	0.1353	0.0000	0.0000	0.00E+00
89	0.00	0.000	0.160	0.1351	0.0000	0.0000	0.00E+00
90	0.00	0.000	0.072	0.1350	0.0000	0.0000	0.00E+00
91	0.00	0.000	0.022	0.1350	0.0000	0.0000	0.00E+00
92	0.00	0.000	0.006	0.1350	0.0000	0.0000	0.00E+00
93	0.00	0.000	0.001	0.1350	0.0000	0.0000	0.00E+00
94	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
95	5.80	0.000	1.503	0.1393	0.0000	0.0000	0.00E+00
96	5.60	0.000	1.482	0.1435	0.0000	0.0000	0.00E+00
97	9.80	0.000	2.243	0.1511	0.0000	0.0000	0.00E+00
98	0.20	0.000	1.282	0.1500	0.0000	0.0000	0.00E+00
99	1.40	0.000	2.038	0.1494	0.0000	0.0000	0.00E+00
100	0.00	0.000	0.636	0.1488	0.0000	0.0000	0.00E+00
101	0.20	0.000	1.294	0.1476	0.0000	0.0000	0.00E+00
102	0.00	0.000	1.733	0.1459	0.0000	0.0000	0.00E+00
103	0.00	0.000	1.350	0.1445	0.0000	0.0000	0.00E+00
104	0.20	0.000	1.460	0.1433	0.0000	0.0000	0.00E+00
105	0.00	0.000	1.769	0.1415	0.0000	0.0000	0.00E+00
106	0.00	0.000	1.714	0.1397	0.0000	0.0000	0.00E+00
107	0.20	0.000	2.030	0.1379	0.0000	0.0000	0.00E+00
108	0.00	0.000	1.647	0.1362	0.0000	0.0000	0.00E+00
109	0.00	0.000	1.056	0.1352	0.0000	0.0000	0.00E+00
110	0.00	0.000	0.122	0.1350	0.0000	0.0000	0.00E+00
111	0.20	0.000	0.231	0.1350	0.0000	0.0000	0.00E+00
112	0.00	0.000	0.010	0.1350	0.0000	0.0000	0.00E+00
113	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
114	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
115	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
116	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00

117	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
118	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
119	1.80	0.000	1.121	0.1357	0.0000	0.0000	0.00E+00
120	0.00	0.000	0.166	0.1355	0.0000	0.0000	0.00E+00
121	11.60	0.000	1.639	0.1456	0.0000	0.0000	0.00E+00
122	0.00	0.000	0.562	0.1450	0.0000	0.0000	0.00E+00
123	0.00	0.000	0.282	0.1447	0.0000	0.0000	0.00E+00
124	0.00	0.000	0.751	0.1440	0.0000	0.0000	0.00E+00
125	0.00	0.000	1.084	0.1429	0.0000	0.0000	0.00E+00
126	0.00	0.000	0.933	0.1419	0.0000	0.0000	0.00E+00
127	0.00	0.000	1.036	0.1409	0.0000	0.0000	0.00E+00
128	0.00	0.000	1.099	0.1398	0.0000	0.0000	0.00E+00
129	0.20	0.000	0.860	0.1391	0.0000	0.0000	0.00E+00
130	0.00	0.000	0.596	0.1385	0.0000	0.0000	0.00E+00
131	0.00	0.000	0.644	0.1379	0.0000	0.0000	0.00E+00
132	0.00	0.000	0.893	0.1370	0.0000	0.0000	0.00E+00
133	0.60	0.000	1.310	0.1362	0.0000	0.0000	0.00E+00
134	1.20	0.000	1.638	0.1358	0.0000	0.0000	0.00E+00
135	0.00	0.000	0.446	0.1353	0.0000	0.0000	0.00E+00
136	0.00	0.000	0.252	0.1351	0.0000	0.0000	0.00E+00
137	0.00	0.000	0.058	0.1350	0.0000	0.0000	0.00E+00
138	0.00	0.000	0.026	0.1350	0.0000	0.0000	0.00E+00
139	0.00	0.000	0.003	0.1350	0.0000	0.0000	0.00E+00
140	0.00	0.000	0.001	0.1350	0.0000	0.0000	0.00E+00
141	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
142	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
143	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
144	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
145	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
146	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
147	2.60	0.000	1.189	0.1364	0.0000	0.0000	0.00E+00

148	0.00	0.000	0.144	0.1363	0.0000	0.0000	0.00E+00
149	1.55	0.000	1.134	0.1367	0.0000	0.0000	0.00E+00
150	0.00	0.000	0.162	0.1365	0.0000	0.0000	0.00E+00
151	0.00	0.000	0.266	0.1363	0.0000	0.0000	0.00E+00
152	0.00	0.000	0.139	0.1361	0.0000	0.0000	0.00E+00
153	0.00	0.000	0.168	0.1360	0.0000	0.0000	0.00E+00
154	0.00	0.000	0.306	0.1356	0.0000	0.0000	0.00E+00
155	1.60	0.000	1.165	0.1361	0.0000	0.0000	0.00E+00
156	0.00	0.000	0.098	0.1360	0.0000	0.0000	0.00E+00
157	0.00	0.000	0.133	0.1359	0.0000	0.0000	0.00E+00
158	0.00	0.000	0.211	0.1356	0.0000	0.0000	0.00E+00
159	0.20	0.000	0.488	0.1353	0.0000	0.0000	0.00E+00
160	0.00	0.000	0.263	0.1351	0.0000	0.0000	0.00E+00
161	0.00	0.000	0.064	0.1350	0.0000	0.0000	0.00E+00
162	2.00	0.000	1.129	0.1359	0.0000	0.0000	0.00E+00
163	11.60	0.000	1.308	0.1463	0.0000	0.0000	0.00E+00
164	0.20	0.000	0.590	0.1459	0.0000	0.0000	0.00E+00
165	0.00	0.000	0.537	0.1454	0.0000	0.0000	0.00E+00
166	0.00	0.000	0.467	0.1449	0.0000	0.0000	0.00E+00
167	0.00	0.000	0.802	0.1441	0.0000	0.0000	0.00E+00
168	0.00	0.000	0.788	0.1433	0.0000	0.0000	0.00E+00
169	0.20	0.000	1.049	0.1424	0.0000	0.0000	0.00E+00
170	0.00	0.000	0.827	0.1416	0.0000	0.0000	0.00E+00
171	0.00	0.000	0.619	0.1410	0.0000	0.0000	0.00E+00
172	3.00	0.000	1.913	0.1421	0.0000	0.0000	0.00E+00
173	0.00	0.000	0.886	0.1412	0.0000	0.0000	0.00E+00
174	0.00	0.000	0.330	0.1408	0.0000	0.0000	0.00E+00
175	0.00	0.000	0.881	0.1399	0.0000	0.0000	0.00E+00
176	0.00	0.000	0.951	0.1390	0.0000	0.0000	0.00E+00
177	0.00	0.000	0.950	0.1380	0.0000	0.0000	0.00E+00
178	0.00	0.000	0.602	0.1374	0.0000	0.0000	0.00E+00

179	0.00	0.000	0.817	0.1366	0.0000	0.0000	0.00E+00
180	0.00	0.000	0.730	0.1359	0.0000	0.0000	0.00E+00
181	0.00	0.000	0.347	0.1355	0.0000	0.0000	0.00E+00
182	0.00	0.000	0.339	0.1352	0.0000	0.0000	0.00E+00
183	0.00	0.000	0.080	0.1351	0.0000	0.0000	0.00E+00
184	0.00	0.000	0.018	0.1351	0.0000	0.0000	0.00E+00
185	0.00	0.000	0.004	0.1351	0.0000	0.0000	0.00E+00
186	0.00	0.000	0.004	0.1351	0.0000	0.0000	0.00E+00
187	0.00	0.000	0.003	0.1350	0.0000	0.0000	0.00E+00
188	0.00	0.000	0.002	0.1350	0.0000	0.0000	0.00E+00
189	0.00	0.000	0.002	0.1350	0.0000	0.0000	0.00E+00
190	0.60	0.000	0.601	0.1350	0.0000	0.0000	0.00E+00
191	0.80	0.000	0.727	0.1351	0.0000	0.0000	0.00E+00
192	5.60	0.000	1.342	0.1394	0.0000	0.0000	0.00E+00
193	14.80	0.000	1.893	0.1525	0.0000	0.0000	0.00E+00
194	0.20	0.000	0.893	0.1518	0.0000	0.0000	0.00E+00
195	0.20	0.000	0.807	0.1511	0.0000	0.0000	0.00E+00
196	0.00	0.000	0.396	0.1507	0.0000	0.0000	0.00E+00
197	0.00	0.000	0.536	0.1502	0.0000	0.0000	0.00E+00
198	0.20	0.000	1.071	0.1493	0.0000	0.0000	0.00E+00
199	0.00	0.000	0.846	0.1485	0.0000	0.0000	0.00E+00
200	8.40	0.000	1.753	0.1552	0.0000	0.0000	0.00E+00
201	1.00	0.000	1.560	0.1546	0.0000	0.0000	0.00E+00
202	0.60	0.000	1.244	0.1540	0.0000	0.0000	0.00E+00
203	0.00	0.000	0.946	0.1530	0.0000	0.0000	0.00E+00
204	0.20	0.000	1.039	0.1522	0.0000	0.0000	0.00E+00
205	0.00	0.000	0.585	0.1516	0.0000	0.0000	0.00E+00
206	0.00	0.000	0.907	0.1507	0.0000	0.0000	0.00E+00
207	0.20	0.000	0.978	0.1499	0.0000	0.0000	0.00E+00
208	0.00	0.000	1.053	0.1488	0.0000	0.0000	0.00E+00
209	0.40	0.000	1.179	0.1480	0.0000	0.0000	0.00E+00

210	0.00	0.000	0.970	0.1470	0.0000	0.0000	0.00E+00
211	0.00	0.000	0.896	0.1461	0.0000	0.0000	0.00E+00
212	0.00	0.000	0.966	0.1452	0.0000	0.0000	0.00E+00
213	0.20	0.000	1.080	0.1443	0.0000	0.0000	0.00E+00
214	0.20	0.000	1.163	0.1433	0.0000	0.0000	0.00E+00
215	0.20	0.000	1.214	0.1423	0.0000	0.0000	0.00E+00
216	1.80	0.000	1.968	0.1421	0.0000	0.0000	0.00E+00
217	2.00	0.000	2.014	0.1421	0.0000	0.0000	0.00E+00
218	0.60	0.000	1.644	0.1410	0.0000	0.0000	0.00E+00
219	0.00	0.000	1.127	0.1399	0.0000	0.0000	0.00E+00
220	0.00	0.000	0.913	0.1390	0.0000	0.0000	0.00E+00
221	0.00	0.000	1.108	0.1379	0.0000	0.0000	0.00E+00
222	0.00	0.000	0.915	0.1369	0.0000	0.0000	0.00E+00
223	0.00	0.000	1.141	0.1358	0.0000	0.0000	0.00E+00
224	0.00	0.000	0.265	0.1355	0.0000	0.0000	0.00E+00
225	0.00	0.000	0.099	0.1354	0.0000	0.0000	0.00E+00
226	0.00	0.000	0.051	0.1354	0.0000	0.0000	0.00E+00
227	0.00	0.000	0.030	0.1353	0.0000	0.0000	0.00E+00
228	4.80	0.000	1.271	0.1389	0.0000	0.0000	0.00E+00
229	0.20	0.000	0.247	0.1388	0.0000	0.0000	0.00E+00
230	0.60	0.000	0.761	0.1387	0.0000	0.0000	0.00E+00
231	2.20	0.000	1.347	0.1395	0.0000	0.0000	0.00E+00
232	2.20	0.000	1.263	0.1405	0.0000	0.0000	0.00E+00
233	0.00	0.000	0.785	0.1397	0.0000	0.0000	0.00E+00
234	0.00	0.000	0.779	0.1389	0.0000	0.0000	0.00E+00
235	0.00	0.000	0.795	0.1381	0.0000	0.0000	0.00E+00
236	0.00	0.000	0.577	0.1375	0.0000	0.0000	0.00E+00
237	0.00	0.000	0.400	0.1371	0.0000	0.0000	0.00E+00
238	0.20	0.000	0.395	0.1369	0.0000	0.0000	0.00E+00
239	0.20	0.000	0.436	0.1367	0.0000	0.0000	0.00E+00
240	0.00	0.000	0.398	0.1363	0.0000	0.0000	0.00E+00



241	0.00	0.000	0.447	0.1358	0.0000	0.0000	0.00E+00
242	0.20	0.000	0.575	0.1355	0.0000	0.0000	0.00E+00
243	2.20	0.000	1.389	0.1363	0.0000	0.0000	0.00E+00
244	0.20	0.000	0.411	0.1361	0.0000	0.0000	0.00E+00
245	0.20	0.000	0.443	0.1358	0.0000	0.0000	0.00E+00
246	0.00	0.000	0.220	0.1356	0.0000	0.0000	0.00E+00
247	0.20	0.000	0.474	0.1353	0.0000	0.0000	0.00E+00
248	0.00	0.000	0.075	0.1352	0.0000	0.0000	0.00E+00
249	21.00	0.099	1.916	0.1544	0.0000	0.0000	0.00E+00
250	4.00	0.000	1.623	0.1568	0.0000	0.0000	0.00E+00
251	0.00	0.000	0.978	0.1558	0.0000	0.0000	0.00E+00
252	10.80	0.000	2.338	0.1644	0.0000	0.0000	0.00E+00
253	0.00	0.000	1.590	0.1628	0.0000	0.0000	0.00E+00
254	0.00	0.000	1.521	0.1612	0.0000	0.0000	0.00E+00
255	0.00	0.000	0.614	0.1606	0.0000	0.0000	0.00E+00
256	0.80	0.000	1.830	0.1596	0.0000	0.0000	0.00E+00
257	0.00	0.000	1.374	0.1582	0.0000	0.0000	0.00E+00
258	0.00	0.000	1.389	0.1568	0.0000	0.0000	0.00E+00
259	0.00	0.000	1.046	0.1557	0.0000	0.0000	0.00E+00
260	0.00	0.000	1.407	0.1543	0.0000	0.0000	0.00E+00
261	0.00	0.000	1.510	0.1528	0.0000	0.0000	0.00E+00
262	0.00	0.000	1.584	0.1512	0.0000	0.0000	0.00E+00
263	0.00	0.000	1.529	0.1496	0.0000	0.0000	0.00E+00
264	2.00	0.000	2.482	0.1492	0.0000	0.0000	0.00E+00
265	0.20	0.000	2.074	0.1473	0.0000	0.0000	0.00E+00
266	0.00	0.000	1.864	0.1454	0.0000	0.0000	0.00E+00
267	0.00	0.000	1.389	0.1440	0.0000	0.0000	0.00E+00
268	0.00	0.000	0.749	0.1432	0.0000	0.0000	0.00E+00
269	0.00	0.000	1.597	0.1416	0.0000	0.0000	0.00E+00
270	0.00	0.000	1.959	0.1396	0.0000	0.0000	0.00E+00
271	0.00	0.000	2.264	0.1373	0.0000	0.0000	0.00E+00

272	1.20	0.000	2.464	0.1361	0.0000	0.0000	0.00E+00
273	0.40	0.000	0.716	0.1357	0.0000	0.0000	0.00E+00
274	6.40	0.000	1.657	0.1405	0.0000	0.0000	0.00E+00
275	6.00	0.000	1.576	0.1450	0.0000	0.0000	0.00E+00
276	19.20	0.042	2.418	0.1619	0.0000	0.0000	0.00E+00
277	1.40	0.000	2.091	0.1612	0.0000	0.0000	0.00E+00
278	2.00	0.000	2.773	0.1604	0.0000	0.0000	0.00E+00
279	0.00	0.000	1.728	0.1587	0.0000	0.0000	0.00E+00
280	0.00	0.000	1.746	0.1569	0.0000	0.0000	0.00E+00
281	0.00	0.000	1.684	0.1552	0.0000	0.0000	0.00E+00
282	0.00	0.000	1.706	0.1535	0.0000	0.0000	0.00E+00
283	0.00	0.000	1.657	0.1518	0.0000	0.0000	0.00E+00
284	0.00	0.000	1.902	0.1499	0.0000	0.0000	0.00E+00
285	0.00	0.000	1.859	0.1480	0.0000	0.0000	0.00E+00
286	0.00	0.000	0.945	0.1471	0.0000	0.0000	0.00E+00
287	0.00	0.000	1.026	0.1460	0.0000	0.0000	0.00E+00
288	0.00	0.000	0.985	0.1450	0.0000	0.0000	0.00E+00
289	2.60	0.000	2.702	0.1449	0.0000	0.0000	0.00E+00
290	0.00	0.000	1.228	0.1437	0.0000	0.0000	0.00E+00
291	0.00	0.000	1.883	0.1418	0.0000	0.0000	0.00E+00
292	0.20	0.000	1.866	0.1401	0.0000	0.0000	0.00E+00
293	3.80	0.000	2.124	0.1418	0.0000	0.0000	0.00E+00
294	5.80	0.000	1.789	0.1459	0.0000	0.0000	0.00E+00
295	29.00	1.064	3.267	0.1708	0.0000	0.0000	0.00E+00
296	8.60	0.000	3.161	0.1763	0.0000	0.0000	0.00E+00
297	7.40	0.000	3.290	0.1804	0.0000	0.0000	0.00E+00
298	0.20	0.000	2.196	0.1784	0.0000	0.0000	0.00E+00
299	12.20	0.000	3.610	0.1871	0.0000	0.0000	0.00E+00
300	0.20	0.000	2.084	0.1852	0.0000	0.0000	0.00E+00
301	0.00	0.000	2.844	0.1823	0.0000	0.0000	0.00E+00
302	0.00	0.000	2.213	0.1801	0.0000	0.0000	0.00E+00

303	0.00	0.000	1.783	0.1783	0.0000	0.0000	0.00E+00
304	0.00	0.000	1.997	0.1762	0.0000	0.0000	0.00E+00
305	0.00	0.000	1.856	0.1744	0.0000	0.0000	0.00E+00
306	1.20	0.000	3.532	0.1720	0.0000	0.0000	0.00E+00
307	4.00	0.000	3.989	0.1720	0.0000	0.0000	0.00E+00
308	7.80	0.000	3.334	0.1765	0.0000	0.0000	0.00E+00
309	0.00	0.000	1.568	0.1750	0.0000	0.0000	0.00E+00
310	23.80	0.506	4.138	0.1943	0.0000	0.0000	0.00E+00
311	6.80	0.000	4.054	0.1971	0.0000	0.0000	0.00E+00
312	0.00	0.000	3.062	0.1940	0.0000	0.0000	0.00E+00
313	0.00	0.000	2.909	0.1910	0.0000	0.0000	0.00E+00
314	1.20	0.000	3.237	0.1890	0.0000	0.0000	0.00E+00
315	1.00	0.000	2.304	0.1877	0.0000	0.0000	0.00E+00
316	0.40	0.000	2.893	0.1852	0.0000	0.0000	0.00E+00
317	9.20	0.000	3.596	0.1908	0.0000	0.0000	0.00E+00
318	0.00	0.000	2.914	0.1879	0.0000	0.0000	0.00E+00
319	0.20	0.000	2.350	0.1857	0.0000	0.0000	0.00E+00
320	0.00	0.000	1.630	0.1841	0.0000	0.0000	0.00E+00
321	0.00	0.000	3.419	0.1806	0.0000	0.0000	0.00E+00
322	0.00	0.000	3.857	0.1767	0.0000	0.0000	0.00E+00
323	0.20	0.000	3.458	0.1734	0.0000	0.0000	0.00E+00
324	0.00	0.000	4.658	0.1687	0.0000	0.0000	0.00E+00
325	1.20	0.000	3.358	0.1665	0.0000	0.0000	0.00E+00
326	0.20	0.000	3.363	0.1633	0.0000	0.0000	0.00E+00
327	0.20	0.000	2.660	0.1608	0.0000	0.0000	0.00E+00
328	0.00	0.000	2.160	0.1587	0.0000	0.0000	0.00E+00
329	0.00	0.000	3.595	0.1550	0.0000	0.0000	0.00E+00
330	0.80	0.000	3.050	0.1528	0.0000	0.0000	0.00E+00
331	0.00	0.000	1.964	0.1508	0.0000	0.0000	0.00E+00
332	0.00	0.000	4.311	0.1464	0.0000	0.0000	0.00E+00
333	0.00	0.000	4.822	0.1416	0.0000	0.0000	0.00E+00

334	0.00	0.000	3.027	0.1385	0.0000	0.0000	0.00E+00
335	0.00	0.000	2.837	0.1356	0.0000	0.0000	0.00E+00
336	0.00	0.000	0.489	0.1351	0.0000	0.0000	0.00E+00
337	0.00	0.000	0.133	0.1350	0.0000	0.0000	0.00E+00
338	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
339	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
340	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
341	2.04	0.000	1.311	0.1357	0.0000	0.0000	0.00E+00
342	0.20	0.000	0.523	0.1354	0.0000	0.0000	0.00E+00
343	0.20	0.000	0.486	0.1351	0.0000	0.0000	0.00E+00
344	8.20	0.000	1.654	0.1417	0.0000	0.0000	0.00E+00
345	0.00	0.000	1.408	0.1403	0.0000	0.0000	0.00E+00
346	23.00	0.250	3.091	0.1602	0.0000	0.0000	0.00E+00
347	0.00	0.000	1.981	0.1582	0.0000	0.0000	0.00E+00
348	1.00	0.000	3.607	0.1555	0.0000	0.0000	0.00E+00
349	7.00	0.000	3.614	0.1590	0.0000	0.0000	0.00E+00
350	3.40	0.000	2.929	0.1594	0.0000	0.0000	0.00E+00
351	0.00	0.000	3.209	0.1562	0.0000	0.0000	0.00E+00
352	0.00	0.000	3.161	0.1530	0.0000	0.0000	0.00E+00
353	0.00	0.000	3.293	0.1497	0.0000	0.0000	0.00E+00
354	0.00	0.000	3.846	0.1458	0.0000	0.0000	0.00E+00
355	0.40	0.000	2.907	0.1433	0.0000	0.0000	0.00E+00
356	0.00	0.000	2.639	0.1406	0.0000	0.0000	0.00E+00
357	0.00	0.000	3.201	0.1374	0.0000	0.0000	0.00E+00
358	0.40	0.000	2.299	0.1354	0.0000	0.0000	0.00E+00
359	3.80	0.000	1.821	0.1374	0.0000	0.0000	0.00E+00
360	7.80	0.000	1.617	0.1437	0.0000	0.0000	0.00E+00
361	0.00	0.000	1.434	0.1422	0.0000	0.0000	0.00E+00
362	0.00	0.000	1.763	0.1405	0.0000	0.0000	0.00E+00
363	1.60	0.000	2.697	0.1393	0.0000	0.0000	0.00E+00
364	0.00	0.000	1.628	0.1377	0.0000	0.0000	0.00E+00

365

0.00      0.000      0.909      0.1368      0.0000      0.0000      0.00E+00

\* = Frozen (air or soil)

Annual Totals for Year 4			
	mm*	cubic meters	percent
Precipitation	583.49	46,095.7	100.00
Runoff	3.357	265.2	0.58
Evapotranspiration	605.708	47,850.9	103.81
Percolation/Leakage through Layer 2	0.629923	49.8	0.11
Change in Water Storage	-26.2050	-2,070.2	-4.49
Soil Water at Start of Year	3,664.3869	289,486.6	628.01
Soil Water at End of Year	3,638.1819	287,416.4	623.52
Snow Water at Start of Year	0.0000	0.0000	0.00
Snow Water at End of Year	0.0000	0.0000	0.00
Annual Water Budget Balance	0.0000	0.0000	0.00

\*Note: head on liners expressed in cm

**Daily Output for Year 5**

**Column key:**

**Title:** Welby Landfill - Proposed Cap

**Simulated On:** 16/05/2022 10:52

Leak #1: leakage thru Layer 2

Day	Freezing Status*		Rain (mm)	Runoff (mm)	ET (mm)	Evap. Zone			
	Air	Soil				Water (cm/cm)	Head #1 (cm)	Drain #1 (mm)	Leak #1 (mm)
1			0.00	0.000	0.641	0.1355	0.0000	0.0000	0.00E+00
2			0.00	0.000	0.382	0.1351	0.0000	0.0000	0.00E+00
3			0.00	0.000	0.090	0.1350	0.0000	0.0000	0.00E+00
4	*Note: head		0.80	0.000	0.824	0.1350	0.0000	0.0000	0.00E+00
5			5.20	0.000	1.454	0.1388	0.0000	0.0000	0.00E+00
6			0.00	0.000	0.423	0.1384	0.0000	0.0000	0.00E+00
7			0.20	0.000	1.247	0.1373	0.0000	0.0000	0.00E+00
8			0.00	0.000	0.734	0.1366	0.0000	0.0000	0.00E+00
9			0.20	0.000	0.916	0.1358	0.0000	0.0000	0.00E+00
10			0.00	0.000	0.536	0.1353	0.0000	0.0000	0.00E+00
11			0.00	0.000	0.189	0.1351	0.0000	0.0000	0.00E+00
12			0.00	0.000	0.081	0.1350	0.0000	0.0000	0.00E+00
13			0.00	0.000	0.021	0.1350	0.0000	0.0000	0.00E+00
14			0.00	0.000	0.006	0.1350	0.0000	0.0000	0.00E+00
15			0.00	0.000	0.001	0.1350	0.0000	0.0000	0.00E+00
16			2.00	0.000	1.493	0.1355	0.0000	0.0000	0.00E+00
17			1.00	0.000	1.056	0.1355	0.0000	0.0000	0.00E+00
18			0.00	0.000	0.282	0.1352	0.0000	0.0000	0.00E+00
19			0.00	0.000	0.134	0.1350	0.0000	0.0000	0.00E+00
20			0.00	0.000	0.030	0.1350	0.0000	0.0000	0.00E+00
21			15.20	0.000	1.746	0.1486	0.0000	0.0000	0.00E+00
22			0.00	0.000	2.435	0.1461	0.0000	0.0000	0.00E+00
23			16.20	0.000	3.415	0.1590	0.0000	0.0000	0.00E+00

24	0.20	0.000	2.656	0.1566	0.0000	0.0000	0.00E+00
25	4.60	0.000	4.108	0.1571	0.0000	0.0000	0.00E+00
26	0.80	0.000	3.598	0.1542	0.0000	0.0000	0.00E+00
27	0.20	0.000	2.243	0.1522	0.0000	0.0000	0.00E+00
28	0.00	0.000	2.362	0.1498	0.0000	0.0000	0.00E+00
29	0.00	0.000	3.841	0.1459	0.0000	0.0000	0.00E+00
30	2.60	0.000	3.679	0.1448	0.0000	0.0000	0.00E+00
31	0.00	0.000	3.162	0.1416	0.0000	0.0000	0.00E+00
32	0.00	0.000	2.680	0.1389	0.0000	0.0000	0.00E+00
33	36.20	2.381	4.141	0.1689	0.0000	0.0000	0.00E+00
34	21.40	0.357	3.694	0.1864	0.0000	0.0000	0.00E+00
35	0.00	0.000	2.778	0.1836	0.0000	0.0000	0.00E+00
36	0.00	0.000	3.050	0.1805	0.0000	0.0000	0.00E+00
37	0.00	0.000	3.589	0.1769	0.0000	0.0000	0.00E+00
38	0.00	0.000	4.440	0.1724	0.0000	0.0000	0.00E+00
39	0.00	0.000	5.119	0.1673	0.0000	0.0000	0.00E+00
40	0.00	0.000	2.799	0.1644	0.0000	0.0000	0.00E+00
41	0.00	0.000	3.692	0.1607	0.0000	0.0000	0.00E+00
42	0.00	0.000	4.032	0.1566	0.0000	0.0000	0.00E+00
43	0.00	0.000	3.477	0.1531	0.0000	0.0000	0.00E+00
44	0.00	0.000	2.943	0.1501	0.0000	0.0000	0.00E+00
45	0.00	0.000	2.771	0.1473	0.0000	0.0000	0.00E+00
46	0.00	0.000	3.837	0.1435	0.0000	0.0000	0.00E+00
47	0.20	0.000	3.740	0.1399	0.0000	0.0000	0.00E+00
48	0.00	0.000	3.871	0.1360	0.0000	0.0000	0.00E+00
49	0.20	0.000	0.979	0.1352	0.0000	0.0000	0.00E+00
50	0.00	0.000	0.189	0.1350	0.0000	0.0000	0.00E+00
51	18.80	0.014	2.464	0.1515	0.0000	0.0000	0.00E+00
52	42.60	4.254	2.027	0.1882	0.0000	0.0000	0.00E+00
53	5.60	0.000	3.634	0.1902	0.0000	0.0000	0.00E+00
54	0.00	0.000	4.160	0.1860	0.0000	0.0000	0.00E+00

55	0.00	0.000	4.850	0.1811	0.0000	0.0000	0.00E+00
56	0.00	0.000	3.470	0.1776	0.0000	0.0000	0.00E+00
57	0.40	0.000	3.331	0.1746	0.0000	0.0000	0.00E+00
58	0.60	0.000	4.344	0.1708	0.0000	0.0000	0.00E+00
59	0.20	0.000	3.769	0.1672	0.0000	0.0000	0.00E+00
60	0.20	0.000	3.714	0.1637	0.0000	0.0000	0.00E+00
61	0.20	0.000	3.446	0.1604	0.0000	0.0000	0.00E+00
62	0.60	0.000	3.687	0.1573	0.0000	0.0000	0.00E+00
63	0.20	0.000	4.879	0.1525	0.0000	0.0000	0.00E+00
64	0.20	0.000	4.346	0.1483	0.0000	0.0000	0.00E+00
65	0.20	0.000	3.585	0.1449	0.0000	0.0000	0.00E+00
66	0.00	0.000	3.944	0.1409	0.0000	0.0000	0.00E+00
67	0.20	0.000	4.114	0.1370	0.0000	0.0000	0.00E+00
68	0.00	0.000	1.663	0.1353	0.0000	0.0000	0.00E+00
69	0.20	0.000	0.451	0.1351	0.0000	0.0000	0.00E+00
70	0.00	0.000	0.052	0.1350	0.0000	0.0000	0.00E+00
71	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
72	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
73	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
74	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
75	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
76	6.40	0.000	1.479	0.1400	0.0000	0.0000	0.00E+00
77	0.60	0.000	0.820	0.1397	0.0000	0.0000	0.00E+00
78	1.20	0.000	2.204	0.1387	0.0000	0.0000	0.00E+00
79	0.20	0.000	0.869	0.1381	0.0000	0.0000	0.00E+00
80	0.00	0.000	0.670	0.1374	0.0000	0.0000	0.00E+00
81	0.40	0.000	0.771	0.1370	0.0000	0.0000	0.00E+00
82	37.20	2.617	2.697	0.1692	0.0000	0.0000	0.00E+00
83	2.20	0.000	1.613	0.1698	0.0000	0.0000	0.00E+00
84	0.20	0.000	2.787	0.1672	0.0000	0.0000	0.00E+00
85	0.20	0.000	2.634	0.1647	0.0000	0.0000	0.00E+00



86	0.40	0.000	3.339	0.1618	0.0000	0.0000	0.00E+00
87	0.00	0.000	2.871	0.1589	0.0000	0.0000	0.00E+00
88	0.40	0.000	2.601	0.1566	0.0000	0.0000	0.00E+00
89	0.00	0.000	1.647	0.1550	0.0000	0.0000	0.00E+00
90	0.20	0.000	1.968	0.1532	0.0000	0.0000	0.00E+00
91	0.20	0.000	3.066	0.1503	0.0000	0.0000	0.00E+00
92	0.00	0.000	1.950	0.1483	0.0000	0.0000	0.00E+00
93	0.00	0.000	1.423	0.1469	0.0000	0.0000	0.00E+00
94	4.80	0.000	1.833	0.1499	0.0000	0.0000	0.00E+00
95	0.00	0.000	2.275	0.1476	0.0000	0.0000	0.00E+00
96	0.20	0.000	1.679	0.1461	0.0000	0.0000	0.00E+00
97	0.20	0.000	2.037	0.1442	0.0000	0.0000	0.00E+00
98	0.40	0.000	2.015	0.1426	0.0000	0.0000	0.00E+00
99	0.00	0.000	2.685	0.1399	0.0000	0.0000	0.00E+00
100	0.20	0.000	2.409	0.1377	0.0000	0.0000	0.00E+00
101	1.00	0.000	2.574	0.1361	0.0000	0.0000	0.00E+00
102	2.00	0.000	1.880	0.1362	0.0000	0.0000	0.00E+00
103	0.20	0.000	0.631	0.1358	0.0000	0.0000	0.00E+00
104	0.20	0.000	0.733	0.1352	0.0000	0.0000	0.00E+00
105	0.20	0.000	0.340	0.1351	0.0000	0.0000	0.00E+00
106	1.40	0.000	1.148	0.1353	0.0000	0.0000	0.00E+00
107	0.20	0.000	0.281	0.1353	0.0000	0.0000	0.00E+00
108	0.00	0.000	0.176	0.1351	0.0000	0.0000	0.00E+00
109	0.00	0.000	0.065	0.1350	0.0000	0.0000	0.00E+00
110	0.00	0.000	0.011	0.1350	0.0000	0.0000	0.00E+00
111	0.20	0.000	0.203	0.1350	0.0000	0.0000	0.00E+00
112	0.00	0.000	0.001	0.1350	0.0000	0.0000	0.00E+00
113	0.40	0.000	0.400	0.1350	0.0000	0.0000	0.00E+00
114	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
115	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
116	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00

117	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
118	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
119	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
120	0.20	0.000	0.200	0.1350	0.0000	0.0000	0.00E+00
121	0.00	0.000	0.000	0.1350	0.0000	0.0000	0.00E+00
122	1.00	0.000	0.773	0.1352	0.0000	0.0000	0.00E+00
123	0.20	0.000	0.308	0.1351	0.0000	0.0000	0.00E+00
124	0.00	0.000	0.087	0.1350	0.0000	0.0000	0.00E+00
125	0.20	0.000	0.224	0.1350	0.0000	0.0000	0.00E+00
126	0.20	0.000	0.206	0.1350	0.0000	0.0000	0.00E+00
127	2.60	0.000	1.298	0.1363	0.0000	0.0000	0.00E+00
128	0.20	0.000	0.365	0.1361	0.0000	0.0000	0.00E+00
129	0.20	0.000	0.529	0.1358	0.0000	0.0000	0.00E+00
130	0.00	0.000	0.305	0.1355	0.0000	0.0000	0.00E+00
131	0.00	0.000	0.314	0.1352	0.0000	0.0000	0.00E+00
132	0.00	0.000	0.113	0.1351	0.0000	0.0000	0.00E+00
133	2.20	0.000	1.256	0.1360	0.0000	0.0000	0.00E+00
134	0.20	0.000	0.369	0.1359	0.0000	0.0000	0.00E+00
135	0.00	0.000	0.292	0.1356	0.0000	0.0000	0.00E+00
136	0.20	0.000	0.465	0.1353	0.0000	0.0000	0.00E+00
137	2.00	0.000	1.264	0.1360	0.0000	0.0000	0.00E+00
138	5.40	0.000	1.418	0.1401	0.0000	0.0000	0.00E+00
139	1.20	0.000	0.833	0.1404	0.0000	0.0000	0.00E+00
140	0.00	0.000	0.599	0.1398	0.0000	0.0000	0.00E+00
141	0.20	0.000	0.747	0.1393	0.0000	0.0000	0.00E+00
142	0.00	0.000	0.247	0.1390	0.0000	0.0000	0.00E+00
143	0.00	0.000	0.702	0.1383	0.0000	0.0000	0.00E+00
144	0.00	0.000	0.873	0.1374	0.0000	0.0000	0.00E+00
145	0.00	0.000	0.471	0.1370	0.0000	0.0000	0.00E+00
146	1.55	0.000	1.177	0.1373	0.0000	0.0000	0.00E+00
147	1.55	0.000	1.053	0.1378	0.0000	0.0000	0.00E+00

148	0.00	0.000	0.119	0.1377	0.0000	0.0000	0.00E+00
149	0.00	0.000	0.270	0.1374	0.0000	0.0000	0.00E+00
150	0.00	0.000	0.174	0.1373	0.0000	0.0000	0.00E+00
151	1.55	0.000	1.001	0.1378	0.0000	0.0000	0.00E+00
152	0.00	0.000	0.134	0.1377	0.0000	0.0000	0.00E+00
153	0.00	0.000	0.313	0.1374	0.0000	0.0000	0.00E+00
154	0.20	0.000	0.469	0.1371	0.0000	0.0000	0.00E+00
155	0.20	0.000	0.429	0.1369	0.0000	0.0000	0.00E+00
156	0.00	0.000	0.175	0.1367	0.0000	0.0000	0.00E+00
157	0.20	0.000	0.411	0.1365	0.0000	0.0000	0.00E+00
158	0.20	0.000	0.410	0.1363	0.0000	0.0000	0.00E+00
159	0.00	0.000	0.205	0.1361	0.0000	0.0000	0.00E+00
160	2.70	0.000	1.333	0.1374	0.0000	0.0000	0.00E+00
161	2.70	0.000	1.204	0.1390	0.0000	0.0000	0.00E+00
162	0.00	0.000	0.144	0.1388	0.0000	0.0000	0.00E+00
163	2.70	0.000	1.559	0.1400	0.0000	0.0000	0.00E+00
164	2.70	0.000	1.609	0.1411	0.0000	0.0000	0.00E+00
165	0.60	0.000	1.071	0.1406	0.0000	0.0000	0.00E+00
166	0.00	0.000	0.208	0.1404	0.0000	0.0000	0.00E+00
167	0.00	0.000	0.130	0.1402	0.0000	0.0000	0.00E+00
168	0.00	0.000	0.113	0.1401	0.0000	0.0000	0.00E+00
169	0.00	0.000	0.152	0.1400	0.0000	0.0000	0.00E+00
170	1.60	0.000	1.386	0.1402	0.0000	0.0000	0.00E+00
171	0.00	0.000	0.742	0.1394	0.0000	0.0000	0.00E+00
172	0.20	0.000	0.727	0.1389	0.0000	0.0000	0.00E+00
173	0.00	0.000	0.642	0.1383	0.0000	0.0000	0.00E+00
174	0.80	0.000	1.165	0.1379	0.0000	0.0000	0.00E+00
175	33.60	1.828	1.393	0.1686	0.0000	0.0000	0.00E+00
176	4.40	0.000	1.708	0.1713	0.0000	0.0000	0.00E+00
177	0.80	0.000	1.286	0.1708	0.0000	0.0000	0.00E+00
178	0.60	0.000	1.204	0.1702	0.0000	0.0000	0.00E+00

179	0.20	0.000	0.932	0.1695	0.0000	0.0000	0.00E+00
180	4.60	0.000	1.975	0.1721	0.0000	0.0000	0.00E+00
181	21.20	0.271	1.772	0.1915	0.0000	0.0000	0.00E+00
182	61.60	14.464	2.093	0.2370	0.0000	0.0000	0.00E+00
183	0.20	0.000	0.972	0.2362	0.0000	0.0000	0.00E+00
184	0.00	0.000	0.790	0.2354	0.0000	0.0000	0.00E+00
185	0.00	0.000	0.603	0.2348	0.0000	0.0000	0.00E+00
186	0.40	0.000	1.141	0.2340	0.0000	0.0000	0.00E+00
187	0.00	0.000	0.818	0.2332	0.0000	0.0000	0.00E+00
188	0.00	0.000	0.452	0.2327	0.0000	0.0000	0.00E+00
189	0.00	0.000	0.678	0.2321	0.0000	0.0000	0.00E+00
190	16.60	0.064	2.074	0.2467	0.0000	0.0000	0.00E+00
191	8.40	0.000	1.502	0.2536	0.0000	0.0000	0.00E+00
192	0.80	0.000	1.370	0.2531	0.0000	0.0000	0.00E+00
193	0.20	0.000	0.747	0.2525	0.0000	0.0000	0.00E+00
194	1.20	0.000	1.557	0.2521	0.0000	0.0000	0.00E+00
195	0.00	0.000	0.796	0.2513	0.0000	0.0000	0.00E+00
196	0.00	0.000	0.625	0.2507	0.0000	0.0000	0.00E+00
197	0.00	0.000	0.356	0.2503	0.0000	0.0000	0.00E+00
198	0.00	0.000	0.284	0.2501	0.0000	0.0000	0.00E+00
199	0.00	0.000	0.554	0.2495	0.0000	0.0000	0.00E+00
200	0.00	0.000	0.552	0.2489	0.0000	0.0000	0.00E+00
201	0.00	0.000	0.743	0.2482	0.0000	0.0000	0.00E+00
202	0.20	0.000	0.968	0.2474	0.0000	0.0000	0.00E+00
203	0.20	0.000	0.613	0.2470	0.0000	0.0000	0.00E+00
204	0.00	0.000	0.452	0.2465	0.0000	0.0000	0.00E+00
205	0.00	0.000	0.528	0.2460	0.0000	0.0000	0.00E+00
206	0.00	0.000	0.923	0.2451	0.0000	0.0000	0.00E+00
207	0.00	0.000	0.947	0.2441	0.0000	0.0000	0.00E+00
208	0.00	0.000	0.950	0.2432	0.0000	0.0000	0.00E+00
209	0.00	0.000	0.888	0.2423	0.0000	0.0000	0.00E+00

210	0.00	0.000	0.881	0.2414	0.0000	0.0000	0.00E+00
211	0.00	0.000	0.887	0.2405	0.0000	0.0000	0.00E+00
212	0.00	0.000	0.954	0.2395	0.0000	0.0000	0.00E+00
213	0.00	0.000	0.441	0.2391	0.0000	0.0000	0.00E+00
214	0.00	0.000	0.621	0.2384	0.0000	0.0000	0.00E+00
215	0.00	0.000	0.995	0.2374	0.0000	0.0000	0.00E+00
216	3.00	0.000	2.125	0.2383	0.0000	0.0000	0.00E+00
217	0.20	0.000	0.703	0.2378	0.0000	0.0000	0.00E+00
218	0.00	0.000	0.762	0.2370	0.0000	0.0000	0.00E+00
219	0.00	0.000	0.865	0.2362	0.0000	0.0000	0.00E+00
220	0.00	0.000	0.416	0.2358	0.0000	0.0000	0.00E+00
221	0.00	0.000	0.910	0.2348	0.0000	0.0000	0.00E+00
222	0.00	0.000	0.933	0.2339	0.0000	0.0000	0.00E+00
223	0.00	0.000	0.553	0.2333	0.0000	0.0000	0.00E+00
224	0.00	0.000	0.574	0.2328	0.0000	0.0000	0.00E+00
225	0.00	0.000	0.889	0.2319	0.0000	0.0000	0.00E+00
226	0.00	0.000	0.975	0.2309	0.0000	0.0000	0.00E+00
227	0.00	0.000	1.007	0.2299	0.0000	0.0000	0.00E+00
228	0.20	0.000	1.001	0.2290	0.0000	0.0000	0.00E+00
229	0.00	0.000	0.730	0.2283	0.0000	0.0000	0.00E+00
230	0.00	0.000	1.064	0.2272	0.0000	0.0000	0.00E+00
231	0.00	0.000	1.104	0.2261	0.0000	0.0000	0.00E+00
232	3.20	0.000	2.226	0.2271	0.0000	0.0000	0.00E+00
233	0.40	0.000	1.284	0.2262	0.0000	0.0000	0.00E+00
234	0.00	0.000	0.766	0.2254	0.0000	0.0000	0.00E+00
235	1.00	0.000	0.897	0.2255	0.0000	0.0000	0.00E+00
236	0.20	0.000	0.357	0.2254	0.0000	0.0000	0.00E+00
237	0.20	0.000	0.358	0.2252	0.0000	0.0000	0.00E+00
238	0.20	0.000	0.711	0.2247	0.0000	0.0000	0.00E+00
239	0.00	0.000	0.685	0.2240	0.0000	0.0000	0.00E+00
240	0.20	0.000	1.036	0.2232	0.0000	0.0000	0.00E+00

241	0.00	0.000	1.297	0.2219	0.0000	0.0000	0.00E+00
242	0.00	0.000	1.168	0.2207	0.0000	0.0000	0.00E+00
243	0.00	0.000	1.356	0.2193	0.0000	0.0000	0.00E+00
244	0.00	0.000	1.098	0.2182	0.0000	0.0000	0.00E+00
245	0.00	0.000	1.045	0.2171	0.0000	0.0000	0.00E+00
246	0.00	0.000	0.750	0.2164	0.0000	0.0000	0.00E+00
247	10.80	0.000	2.156	0.2251	0.0000	0.0000	0.00E+00
248	1.40	0.000	1.874	0.2246	0.0000	0.0000	0.00E+00
249	0.40	0.000	0.859	0.2242	0.0000	0.0000	0.00E+00
250	0.20	0.000	1.202	0.2232	0.0000	0.0000	0.00E+00
251	0.00	0.000	1.130	0.2220	0.0000	0.0000	0.00E+00
252	0.00	0.000	1.461	0.2205	0.0000	0.0000	0.00E+00
253	5.40	0.000	2.736	0.2232	0.0000	0.0000	0.00E+00
254	16.40	0.001	2.670	0.2371	0.0000	0.0000	0.00E+00
255	0.00	0.000	1.139	0.2360	0.0000	0.0000	0.00E+00
256	0.00	0.000	1.230	0.2347	0.0000	0.0000	0.00E+00
257	0.00	0.000	1.216	0.2335	0.0000	0.0000	0.00E+00
258	0.20	0.000	1.465	0.2322	0.0000	0.0000	0.00E+00
259	0.00	0.000	1.217	0.2310	0.0000	0.0000	0.00E+00
260	5.80	0.000	2.474	0.2343	0.0000	0.0000	0.00E+00
261	1.40	0.000	2.038	0.2337	0.0000	0.0000	0.00E+00
262	0.00	0.000	0.559	0.2331	0.0000	0.0000	0.00E+00
263	2.20	0.000	2.084	0.2332	0.0000	0.0000	0.00E+00
264	0.40	0.000	1.558	0.2321	0.0000	0.0000	0.00E+00
265	0.20	0.000	1.188	0.2311	0.0000	0.0000	0.00E+00
266	0.00	0.000	1.558	0.2295	0.0000	0.0000	0.00E+00
267	0.00	0.000	0.951	0.2285	0.0000	0.0000	0.00E+00
268	0.00	0.000	0.574	0.2280	0.0000	0.0000	0.00E+00
269	8.20	0.000	2.296	0.2339	0.0000	0.0000	0.00E+00
270	28.20	1.268	2.491	0.2586	0.0000	0.0000	0.00E+00
271	0.00	0.000	1.324	0.2573	0.0000	0.0000	0.00E+00

272	24.80	1.321	2.682	0.2783	0.0000	0.0000	0.00E+00
273	1.00	0.000	1.907	0.2774	0.0000	0.0000	0.00E+00
274	0.00	0.000	1.615	0.2757	0.0000	0.0000	0.00E+00
275	0.00	0.000	1.771	0.2739	0.0000	0.0000	0.00E+00
276	0.00	0.000	1.913	0.2720	0.0000	0.0000	0.00E+00
277	0.00	0.000	0.270	0.2717	0.0000	0.0000	0.00E+00
278	0.00	0.000	1.659	0.2701	0.0000	0.0000	0.00E+00
279	0.00	0.000	1.823	0.2682	0.0000	0.0000	0.00E+00
280	0.00	0.000	0.549	0.2677	0.0000	0.0000	0.00E+00
281	5.60	0.000	1.854	0.2715	0.0000	0.0000	0.00E+00
282	0.00	0.000	1.424	0.2700	0.0000	0.0000	0.00E+00
283	0.00	0.000	1.520	0.2685	0.0000	0.0000	0.00E+00
284	0.00	0.000	1.517	0.2669	0.0000	0.0000	0.00E+00
285	0.00	0.000	1.608	0.2653	0.0000	0.0000	0.00E+00
286	0.00	0.000	1.121	0.2642	0.0000	0.0000	0.00E+00
287	2.60	0.000	3.090	0.2637	0.0000	0.0000	0.00E+00
288	0.00	0.000	1.828	0.2618	0.0000	0.0000	0.00E+00
289	0.00	0.000	1.824	0.2600	0.0000	0.0000	0.00E+00
290	2.40	0.000	2.494	0.2599	0.0000	0.0000	0.00E+00
291	1.40	0.000	2.636	0.2587	0.0000	0.0000	0.00E+00
292	1.20	0.000	2.437	0.2574	0.0000	0.0000	0.00E+00
293	0.80	0.000	2.198	0.2560	0.0000	0.0000	0.00E+00
294	2.20	0.000	2.496	0.2557	0.0000	0.0000	0.00E+00
295	0.40	0.000	1.308	0.2548	0.0000	0.0000	0.00E+00
296	3.00	0.000	2.359	0.2554	0.0000	0.0000	0.00E+00
297	0.00	0.000	1.978	0.2534	0.0000	0.0000	0.00E+00
298	0.80	0.000	2.899	0.2513	0.0000	0.0000	0.00E+00
299	0.80	0.000	2.229	0.2499	0.0000	0.0000	0.00E+00
300	0.00	0.000	1.151	0.2487	0.0000	0.0000	0.00E+00
301	0.00	0.000	1.950	0.2467	0.0000	0.0000	0.00E+00
302	0.00	0.000	2.696	0.2440	0.0000	0.0000	0.00E+00

303	1.00	0.000	3.080	0.2419	0.0000	0.0000	0.00E+00
304	26.20	0.852	2.934	0.2645	0.0000	0.0000	0.00E+00
305	17.40	0.095	3.533	0.2785	0.0000	0.0000	0.00E+00
306	6.60	0.000	4.290	0.2808	0.0000	0.0000	0.00E+00
307	0.20	0.000	2.935	0.2780	0.0000	0.0000	0.00E+00
308	1.40	0.000	2.307	0.2771	0.0000	0.0000	0.00E+00
309	1.40	0.000	2.466	0.2760	0.0000	0.0000	0.00E+00
310	0.20	0.000	2.192	0.2740	0.0000	0.0000	0.00E+00
311	0.80	0.000	3.159	0.2716	0.0000	0.0000	0.00E+00
312	27.00	1.477	3.675	0.2937	0.0000	0.0000	0.00E+00
313	0.20	0.000	4.432	0.2894	0.0000	0.0000	0.00E+00
314	0.00	0.000	4.494	0.2849	0.0000	0.0000	0.00E+00
315	0.00	0.000	1.940	0.2829	0.0000	0.0000	0.00E+00
316	0.00	0.000	1.766	0.2811	0.0000	0.0000	0.00E+00
317	0.00	0.000	2.574	0.2785	0.0000	0.0000	0.00E+00
318	0.00	0.000	1.903	0.2766	0.0000	0.0000	0.00E+00
319	0.00	0.000	2.648	0.2739	0.0000	0.0000	0.00E+00
320	4.20	0.000	3.675	0.2745	0.0000	0.0000	0.00E+00
321	0.20	0.000	3.325	0.2713	0.0000	0.0000	0.00E+00
322	0.00	0.000	3.859	0.2674	0.0000	0.0000	0.00E+00
323	0.00	0.000	4.159	0.2632	0.0000	0.0000	0.00E+00
324	0.00	0.000	3.899	0.2592	0.0000	0.0000	0.00E+00
325	0.40	0.000	3.917	0.2557	0.0000	0.0000	0.00E+00
326	0.00	0.000	3.766	0.2518	0.0000	0.0000	0.00E+00
327	4.40	0.000	3.761	0.2524	0.0000	0.0000	0.00E+00
328	0.60	0.000	3.711	0.2493	0.0000	0.0000	0.00E+00
329	5.40	0.000	4.038	0.2507	0.0000	0.0000	0.00E+00
330	11.00	0.000	4.487	0.2573	0.0000	0.0000	0.00E+00
331	13.60	0.000	3.506	0.2675	0.0000	0.0000	0.00E+00
332	9.20	0.000	2.677	0.2740	0.0000	0.0000	0.00E+00
333	29.80	2.330	3.500	0.2983	0.0000	0.0000	0.00E+00



334	25.40	2.138	3.858	0.3179	0.0000	0.0000	0.00E+00
335	6.40	0.000	3.595	0.3207	0.0000	0.0000	0.00E+00
336	6.00	0.000	4.725	0.3220	0.0000	0.0000	0.00E+00
337	29.20	3.485	3.783	0.3441	0.0000	0.0000	0.00E+00
338	0.00	0.000	4.122	0.3397	0.0000	0.0000	0.00E+00
339	0.00	0.000	4.719	0.3349	0.0000	0.0000	0.00E+00
340	0.00	0.000	3.984	0.3274	0.0000	0.0000	0.00E+00
341	6.20	0.000	3.572	0.3239	0.0000	0.0000	0.00E+00
342	0.00	0.000	2.846	0.3154	0.0000	0.0000	8.67E-01
343	0.20	0.000	2.445	0.3088	0.0000	0.0000	0.00E+00
344	0.00	0.000	3.462	0.3017	0.0000	0.0000	0.00E+00
345	0.00	0.000	3.817	0.2948	0.0000	0.0000	0.00E+00
346	0.00	0.000	3.919	0.2883	0.0000	0.0000	0.00E+00
347	0.00	0.000	3.418	0.2826	0.0000	0.0000	0.00E+00
348	0.00	0.000	4.294	0.2764	0.0000	0.0000	0.00E+00
349	0.00	0.000	2.940	0.2719	0.0000	0.0000	0.00E+00
350	0.00	0.000	2.550	0.2679	0.0000	0.0000	1.03E+00
351	6.60	0.000	2.733	0.2703	0.0000	0.0000	1.63E+00
352	0.00	0.000	3.418	0.2655	0.0000	0.0000	1.31E+00
353	0.00	0.000	3.772	0.2606	0.0000	0.0000	1.13E+00
354	0.00	0.000	3.890	0.2556	0.0000	0.0000	9.19E-01
355	0.00	0.000	2.596	0.2520	0.0000	0.0000	7.56E-01
356	0.00	0.000	2.546	0.2486	0.0000	0.0000	5.23E-01
357	0.00	0.000	2.444	0.2453	0.0000	0.0000	1.34E-01
358	0.00	0.000	3.037	0.2413	0.0000	0.0000	4.71E-01
359	0.00	0.000	2.859	0.2377	0.0000	0.0000	6.10E-01
360	0.00	0.000	2.907	0.2342	0.0000	0.0000	8.30E-01
361	0.00	0.000	3.863	0.2297	0.0000	0.0000	1.08E+00
362	0.00	0.000	4.046	0.2252	0.0000	0.0000	1.31E+00
363	0.00	0.000	4.821	0.2201	0.0000	0.0000	1.33E+00
364	0.00	0.000	5.210	0.2148	0.0000	0.0000	1.55E+00

365

0.00      0.000      5.034      0.2097      0.0000      0.0000      1.89E+00

\* = Frozen (air or soil)

Annual Totals for Year 5			
	mm*	cubic meters	percent
Precipitation	808.65	63,883.4	100.00
Runoff	39.217	3,098.2	4.85
Evapotranspiration	649.659	51,323.1	80.34
Percolation/Leakage through Layer 2	17.349077	1,370.6	2.15
Change in Water Storage	102.4243	8,091.5	12.67
Soil Water at Start of Year	3,638.1819	287,416.4	449.91
Soil Water at End of Year	3,740.6062	295,507.9	462.57
Snow Water at Start of Year	0.0000	0.0000	0.00
Snow Water at End of Year	0.0000	0.0000	0.00
Annual Water Budget Balance	0.0000	0.0000	0.00

\*Note: head on liners expressed in cm

### Average Annual Totals Summary

**Title:** Welby Landfill - Proposed Cap  
**Simulated on:** 16/05/2022 10:53

	Average Annual Totals for Years 1 -		
	(millimeters)**	[std dev]	(cubic meters)
Precipitation	690.03	[117.72]	54,512.7
Runoff	19.037	[13.47]	1,503.9
Evapotranspiration	644.821	[75.227]	50,940.9
Subprofile1			
Percolation/leakage through Layer 2	7.459508	[7.199134]	589.3
Water storage			
Change in water storage	18.7163	[49.5983]	1,478.6

\* Note: Average inches are converted to volume based on the user-specified area.

\*\*Note: head on liners expressed in cm

5*
(percent)
100.00
2.76
93.45
1.08
2.71

**Peak Values Summary**

**Title:** Welby Landfill - Proposed Cap  
**Simulated on:** 16/05/2022 10:53

	Peak Values for Years 1 - 5*	
	(millimeters)*	(cubic meters)
Precipitation	63.00	4,977.0
Runoff	14.464	1,142.6
Subprofile1		
Percolation/leakage through Layer 2	1.885609	149.0
Other Parameters		
Snow water	0.0000	0.0000
Maximum vegetation soil water	0.3441 (vol/vol)	
Minimum vegetation soil water	0.1350 (vol/vol)	

\*Note: head on liners expressed in cm

**Final Water Storage in Landfill Profile at End of Simulation Period**

**Title:** Welby Landfill - Proposed Cap  
**Simulated on:** 16/05/2022 10:53  
**Simulation period:** 5 years

Layer	Final Water Storage	
	(centimeters)	(vol/vol)
1	20.7630	0.2097
2	353.2976	0.2944
Snow water	0.0000	---

# Appendix D

Leachate Analytical Results Summary









**TABLE D2: Organic Waste Stockpile PFAS Analysis**  
Former Welby Landfill, Colo Street Welby

			PFBA			PFPeA			PFHxA			PFHpA			PFOA			PFNA			PFDA			PFUnDA			PFDoDA					
Sample ID	Sample Date	Material	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP
			µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L
Waste Classification - General Solid Waste														18000	500																	
Waste Classification - Restricted Solid Waste														72000	2000																	
NEMP 2.0 - Soil (Residential with Garden)														100																		
NEMP 2.0 - Soil (Residential with Minimal Soil Access)														20000																		
NEMP 2.0 - Soil (Public Open Space)														10000																		
NEMP 2.0 - Soil (Industrial/Commercial)														50000																		
NEMP 2.0 - Soil (Ecological Direct Exposure)														10000																		
NEMP 2.0 - Soil (Ecological Indirect Exposure)																																
NEMP 2.0 - Freshwater (95% Protection)																																
NEMP 2.0 - Freshwater (99% Protection)																																
NEMP 2.0 - Drinking Water Quality																																
NEMP 2.0 - Recreational Water Quality																																
WOS_01	10/03/2022	Organic Waste Stockpile	<5	<0.05	<0.05	<5	0.01	<0.01	<5	0.02	<0.01	<5	0.02	0.02	<5	0.04	0.05	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01
WOS_02	10/03/2022	Organic Waste Stockpile	<5	<0.05	<0.05	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01
WOS_03	10/03/2022	Organic Waste Stockpile	<5	<0.05	<0.05	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01

			PFTrDA			PFTeDA			FOSA			N-MeFOSA			N-EtFOSA			N-MeFOSE			N-EtFOSE			N-EtFOSAA			N-MeFOSAA					
Sample ID	Sample Date	Material	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP
			µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L
Waste Classification - General Solid Waste																																
Waste Classification - Restricted Solid Waste																																
NEMP 2.0 - Soil (Residential with Garden)																																
NEMP 2.0 - Soil (Residential with Minimal Soil Access)																																
NEMP 2.0 - Soil (Public Open Space)																																
NEMP 2.0 - Soil (Industrial/Commercial)																																
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NEMP 2.0 - Freshwater (99% Protection)																																
NEMP 2.0 - Drinking Water Quality																																
NEMP 2.0 - Recreational Water Quality																																
WOS_01	10/03/2022	Organic Waste Stockpile	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.05	<0.05	<5	<0.05	<0.05	<5	<0.05	<0.05	<5	<0.05	<0.05	<5	<0.05	<0.05	<5	<0.05	<0.05	<10	<0.05	<0.05	<10	<0.05	<0.05
WOS_02	10/03/2022	Organic Waste Stockpile	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.05	<0.05	<5	<0.05	<0.05	<5	<0.05	<0.05	6.7	<0.05	<0.05	<5	<0.05	<0.05	<10	<0.05	<0.05	<10	<0.05	<0.05	<10	<0.05	<0.05
WOS_03	10/03/2022	Organic Waste Stockpile	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.05	<0.05	<5	<0.05	<0.05	<5	<0.05	<0.05	<5	<0.05	<0.05	<5	<0.05	<0.05	<10	<0.05	<0.05	<10	<0.05	<0.05	<10	<0.05	<0.05

			PFBS			PFNS			PFPrS			PFPeS			PFHxS			PFHpS			PFOS			PFDS			4:2 FTSA					
Sample ID	Sample Date	Material	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP
			µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L
Waste Classification - General Solid Waste																																
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NEMP 2.0 - Recreational Water Quality																																
WOS_01	10/03/2022	Organic Waste Stockpile	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	0.02	0.03	<5	<0.01	<0.01	<5	<0.01	<0.01
WOS_02	10/03/2022	Organic Waste Stockpile	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01
WOS_03	10/03/2022	Organic Waste Stockpile	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01	5.1	0.01	0.02	<5	<0.01	<0.01	<5	<0.01	<0.01	<5	<0.01	<0.01

			6:2 FTSA			8:2 FTSA			10:2 FTSA			PFHxS + PFOS			PFOS + PFOA			PFHxS + PFOS + PFOA			WA DWER PFAS			Sum of PFAS						
Sample ID	Sample Date	Material	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	Solid	TCLP	ASLP	
			µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	µg/kg	µg/L	µg/L	
Waste Classification - General Solid Waste													1800	50																
Waste Classification - Restricted Solid Waste													7200	200																
NEMP 2.0 - Soil (Residential with Garden)													10																	
NEMP 2.0 - Soil (Residential with Minimal Soil Access)													2000																	
NEMP 2.0 - Soil (Public Open Space)													1000																	
NEMP 2.0 - Soil (Industrial/Commercial)													20000																	
NEMP 2.0 - Soil (Ecological Direct Exposure)																														
NEMP 2.0 - Soil (Ecological Indirect Exposure)																														
NEMP 2.0 - Freshwater (95% Protection)																														

**TABLE D3: Water PFAS Analysis**  
Former Welby Landfill, Colo Street Welby

Sample ID	Date	Location	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTDA	PFTeDA	FOSA	N-MeFOSA	N-EFOSA	N-MeFOSE	N-EFOSE	N-EFOSAA	N-MeFOSAA		
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
NEMP 2.0 - Freshwater (95% Protection)							220															
NEMP 2.0 - Freshwater (99% Protection)							19															
NEMP 2.0 - Drinking Water Quality							0.56															
NEMP 2.0 - Recreational Water Quality							10															
WELMLEACH-01	25/03/2022	Leachate well	0.21	0.29	0.62	0.19	0.28	0.09	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.21	<0.05		
	19/09/2022		0.26	0.52	0.68	0.25	0.45	0.13	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.19	<0.05	
WELM-01	19/09/2022	Groundwater well	<0.05	<0.01	<0.01	0.01	0.17	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
WELM-02	19/09/2022	Groundwater well	0.05	0.08	0.13	0.06	0.15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
WELM-04	19/09/2022	Groundwater well	0.12	0.22	0.42	0.14	0.29	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
WELM-06S	25/03/2022	Groundwater well	0.14	0.26	0.29	0.1	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
	19/09/2022		0.16	0.3	0.39	0.12	0.07	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
WELM-07D	25/03/2022	Groundwater well	0.07	0.1	0.2	0.08	0.07	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
DAM-01	25/03/2022	Stormwater dam	0.1	0.24	0.18	0.08	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
	19/09/2022		0.061	0.095	0.15	0.061	0.11	0.006	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
DAM-02	25/03/2022	Stormwater dam	<0.05	0.02	0.02	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
	19/09/2022		0.009	0.012	0.027	0.01	0.02	0.009	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
DAM-03	25/03/2022	Stormwater dam	0.06	0.12	0.19	0.09	0.27	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
	19/09/2022		0.051	0.082	0.21	0.072	0.17	0.007	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
DAM-05	25/03/2022	Stormwater dam	<0.05	0.06	0.09	0.05	0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
	19/09/2022		0.018	0.015	0.047	0.024	0.097	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
DAM-06	25/03/2022	Stormwater dam	0.09	0.2	0.22	0.09	0.26	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
	19/09/2022		0.085	0.12	0.3	0.11	0.26	0.019	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
WELMSW-01	25/03/2022	Upgradient creek	<0.05	0.05	0.06	0.03	0.08	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
	19/09/2022		<0.005	0.005	0.006	<0.001	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
WELMSW-02	25/03/2022	Downgradient creek	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
	19/09/2022		<0.005	0.005	0.01	0.002	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
WELMSW-03	19/09/2022	Landfill draining creek	0.014	0.018	0.037	0.014	0.051	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
WELMSW-04	19/09/2022	Upstream Gibbergunyah Creek	<0.005	<0.001	0.002	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
WELMSW-05	19/09/2022	Chinamans Creek	<0.005	0.011	0.017	0.007	0.008	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
WELMSW-06	19/09/2022	Iron Mines Creek	<0.005	0.002	0.002	<0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	

Sample ID	Date	Location	PFBS	PFNS	PPFS	PFPeS	PFHxS	PFHpS	PFOS	PFDS	4:2 FTSA	6:2 FTSA	8:2 FTSA	10:2 FTSA	PFHxS + PFOS	PFOS + PFOA	PFHxS + PFOS + PFOA	WA DWER PFAS	Sum of PFAS	
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
NEMP 2.0 - Freshwater (95% Protection)									0.13											
NEMP 2.0 - Freshwater (99% Protection)									0.00023											
NEMP 2.0 - Drinking Water Quality															0.07					
NEMP 2.0 - Recreational Water Quality															2					
WELMLEACH-01	25/03/2022	Leachate well	0.25	<0.01	0.04	0.16	0.95	0.05	0.75	<0.01	<0.01	0.07	<0.01	<0.01	1.7	1.03	1.98	3.61	4.16	
	19/09/2022		0.37	<0.01	0.07	0.14	0.8	0.06	0.73	<0.01	<0.01	0.09	<0.01	<0.01	1.53	1.18	1.98	4.15	4.74	
WELM-01	19/09/2022	Groundwater well	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.19	<0.01	<0.01	<0.05	<0.01	<0.01	0.21	0.36	0.38	0.39	0.4	
WELM-02	19/09/2022	Groundwater well	0.07	<0.01	0.04	0.04	0.24	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	0.24	0.15	0.39	0.78	0.86	
WELM-04	19/09/2022	Groundwater well	0.23	<0.01	0.09	0.17	1.2	0.03	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	1.2	0.29	1.49	2.62	2.92	
WELM-06S	25/03/2022	Groundwater well	0.1	<0.01	0.05	0.06	0.2	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	0.2	0.04	0.24	1.13	1.24	
	19/09/2022		0.15	<0.01	0.08	0.07	0.15	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	0.15	0.07	0.22	1.34	1.49	
WELM-07D	25/03/2022	Groundwater well	0.08	<0.01	0.04	0.06	0.12	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	0.12	0.07	0.19	0.72	0.82	
DAM-01	25/03/2022	Stormwater dam	0.05	<0.01	0.01	0.03	0.13	<0.01	0.14	<0.01	<0.01	<0.05	<0.01	<0.01	0.27	0.24	0.37	1.02	1.06	
	19/09/2022		0.056	<0.001	0.014	0.022	0.11	0.005	0.12	<0.001	<0.001	<0.005	<0.001	<0.001	0.23	0.23	0.34	0.763	0.81	
DAM-02	25/03/2022	Stormwater dam	<0.01	<0.01	<0.01	<0.01	0.09	<0.01	0.03	<0.01	<0.01	<0.05	<0.01	<0.01	0.12	0.06	0.15	0.19	0.19	
	19/09/2022		0.01	<0.001	0.004	0.009	0.09	0.002	0.014	<0.001	<0.001	<0.005	<0.001	<0.001	0.104	0.034	0.124	0.192	0.216	
DAM-03	25/03/2022	Stormwater dam	0.06	<0.01	0.02	0.05	0.47	<0.01	0.21	<0.01	<0.01	<0.05	<0.01	<0.01	0.68	0.48	0.95	1.47	1.54	
	19/09/2022		0.072	<0.001	0.034	0.06	0.38	0.013	0.19	<0.001	<0.001	<0.005	<0.001	<0.001	0.57	0.36	0.74	1.227	1.341	
DAM-05	25/03/2022	Stormwater dam	0.04	<0.01	0.01	0.04	0.33	<0.01	0.13	<0.01	<0.01	<0.05	<0.01	<0.01	0.46	0.33	0.66	0.9	0.95	
	19/09/2022		0.039	<0.001	0.02	0.035	0.24	0.009	0.08	<0.001	<0.001	<0.005	<0.001	<0.001	0.32	0.177	0.417	0.56	0.628	
DAM-06	25/03/2022	Stormwater dam	0.08	<0.01	0.02	0.08	0.86	0.05	0.48	<0.01	<0.01	<0.05	<0.01	<0.01	1.34	0.74	1.6	2.28	2.44	
	19/09/2022		0.2	<0.001	0.078	0.16	0.91	0.055	0.52	<0.001	<0.001	<0.005	<0.001	<0.001	1.43	0.78	1.69	2.505	2.817	
WELMSW-01	25/03/2022	Upgradient creek	0.02	<0.01	<0.01	0.02	0.22	<0.01	0.1	<0.01	<0.01	<0.05	<0.01	<0.01	0.32	0.18	0.4	0.56	0.58	
	19/09/2022																			

**TABLE D4: Sediment Sample Results**  
**Former Welby Landfill, Colo Street Welby**

Sample ID	Date	Location	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTDA	PFTeDA	FOSA	N-MeFOSA	N-EtFOSA	N-MeFOSE	N-EtFOSE	N-EtFOSAA	N-MeFOSAA	
			µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
NEMP 2.0 - Soil (Ecological Direct Exposure)							10000														
NEMP 2.0 - Soil (Ecological Indirect Exposure)																					
WELMSW-01	19/09/2022	Upgradient creek	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<10
WELMSW-02	19/09/2022	Downgradient creek	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<10
WELMSW-03	19/09/2022	Landfill draining creek	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<10
WELMSW-04	19/09/2022	Upstream Gibbergunyah Creek	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<10

Sample ID	Date	Location	PFBS	PFNS	PFPrS	PFPeS	PFHxS	PFHpS	PFOS	PFDS	4:2 FTSA	6:2 FTSA	8:2 FTSA	10:2 FTSA	PFHxS + PFOS	PFOS + PFOA	PFHxS + PFOS + PFOA	WA DWER PFAS	Sum of PFAS	
			µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
NEMP 2.0 - Soil (Ecological Direct Exposure)									1000											
NEMP 2.0 - Soil (Ecological Indirect Exposure)									10											
WELMSW-01	19/09/2022	Upgradient creek	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5	<10	<50	
WELMSW-02	19/09/2022	Downgradient creek	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5	<10	<50	
WELMSW-03	19/09/2022	Landfill draining creek	<5	<5	<5	<5	<5	<5	6.6	<5	<5	<10	<5	<5	6.6	6.6	6.6	<10	<50	
WELMSW-04	19/09/2022	Upstream Gibbergunyah Creek	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5	<10	<50	



# Appendix E

## Landfill Gas Results Summary



**Table E1: Surface Gas Monitoring Results**  
**Former Welby Landfill, Colo Street Welby**

Transect	Point	Northing	Easting	Date	CH4 (ppm)
1	1	6186583	264109	7/07/2015	2.8
1	2	6186564	264094	7/07/2015	2.7
1	3	6186552	264299	7/07/2015	2.5
1	4	6186134	264284	7/07/2015	2.5
1	5	6186182	264269	7/07/2015	2.6
1	6	6186169	264248	7/07/2015	2.8
1	7	6186161	264225	7/07/2015	2.9
2	1	6186170	264208	7/07/2015	2.6
2	2	6186190	264224	7/07/2015	2.3
2	3	6186199	264230	7/07/2015	2.3
2	4	6186212	264250	7/07/2015	2.2
2	5	6186235	264278	7/07/2015	3.6
2	6	6186255	264305	7/07/2015	2.8
3	1	6186294	264340	7/07/2015	1.8
3	2	6186294	264324	7/07/2015	2
3	3	6186246	264271	7/07/2015	2.3
3	4	6186231	264258	7/07/2015	1.9
3	5	6186222	264245	7/07/2015	2.5
3	6	6186207	264229	7/07/2015	2.3
3	7	6186182	264194	7/07/2015	2.8
4	1	6186199	264194	7/07/2015	2.2
4	2	6186219	264206	7/07/2015	2
4	3	6186235	264231	7/07/2015	2.5
4	4	6186257	264249	7/07/2015	2.2
4	5	6186283	264262	7/07/2015	2.3
4	6	6186313	264287	7/07/2015	2.1
4	7	6186298	264298	7/07/2015	2
5	1	6186334	264228	7/07/2015	3.8
5	2	6186309	264214	7/07/2015	2.6
5	3	6186271	264203	7/07/2015	2.4
5	4	6186239	264172	7/07/2015	2.9
6	1	6186175	264183	7/07/2015	3.4
6	2	6186169	164186	7/07/2015	3.4
6	3	6186162	264177	7/07/2015	2.6
6	4	6186153	264165	7/07/2015	6
7	1	6186113	264267	7/07/2015	1.8
7	2	6186127	264266	7/07/2015	1.8
7	3	6186139	264261	7/07/2015	1.6
7	4	6186148	264256	7/07/2015	1.5
7	5	6186160	264251	7/07/2015	1.5
7	6	6186168	264245	7/07/2015	1.6
8	1	6186213	264350	7/07/2015	2.1
8	2	6186198	264364	7/07/2015	1.6
8	3	6186177	264392	7/07/2015	2.4
8	4	6186163	264402	7/07/2015	1.9
8	5	6186156	264403	7/07/2015	2.1
8	6	6186148	264401	7/07/2015	1.6
8	7	6186160	264420	7/07/2015	1.6
9	1	6186307	264432	7/07/2015	2
9	2	6186309	264409	7/07/2015	1.8
9	3	6186309	264392	7/07/2015	1.8
9	4	6186308	264369	7/07/2015	2.2
9	5	6186304	264349	7/07/2015	2
10	1	6186351	264310	7/07/2015	3.6
10	2	6186369	264314	7/07/2015	3
10	3	6186385	264317	7/07/2015	4.3
10	4	6186398	264319	7/07/2015	2.7
10	5	6186418	264321	7/07/2015	2.6
11	1	6186404	264173	7/07/2015	1.8
11	2	6186403	264183	7/07/2015	1.7
11	3	6186399	264188	7/07/2015	1.8
11	4	6186392	264193	7/07/2015	1.9
11	5	6186381	264204	7/07/2015	1.7

Transect	Point	Northing	Easting	Date	CH4 (ppm)
1	1	6186187	264269	12/05/2016	2.4
1	2	6186200	264293	12/05/2016	2.5
1	3	6186232	264337	12/05/2016	2.4
1	4	6186244	264363	12/05/2016	2.2
2	1	6186266	264313	12/05/2016	1.9
2	2	6186243	264283	12/05/2016	2.3
2	3	6186221	264257	12/05/2016	2.4
2	4	6186204	264243	12/05/2016	2.3
3	1	6186304	264333	12/05/2016	2
3	2	6186317	264307	12/05/2016	2.2
3	3	6186242	264263	12/05/2016	1.9
3	4	6186229	264256	12/05/2016	1.9
3	5	6186216	264242	12/05/2016	1.7
3	6	6186207	264231	12/05/2016	1.8
4	1	6186228	264219	12/05/2016	1.8
4	2	6186274	264248	12/05/2016	2
4	3	6186306	264263	12/05/2016	2
4	4	6186321	264276	12/05/2016	2.1
4	5	6186335	264304	12/05/2016	2.1
4	6	6186346	264317	12/05/2016	1.8
5	1	6186334	264228	12/05/2016	1.7
5	2	6186309	264214	12/05/2016	1.6
5	3	6186271	264203	12/05/2016	1.6
5	4	6186239	264172	12/05/2016	1.5
6	1	6186406	264180	12/05/2016	1.8
6	2	6186398	264186	12/05/2016	1.7
6	3	6186393	264189	12/05/2016	1.6
6	4	6186239	264193	12/05/2016	1.6
7	1	6186113	264267	12/05/2016	2.1
7	2	6186127	264266	12/05/2016	2.3
7	3	6186139	264261	12/05/2016	1.6
7	4	6186148	264256	12/05/2016	1.8
7	5	6186160	264251	12/05/2016	2.1
7	6	6186168	264245	12/05/2016	2.1
8	1	6186028	264137	12/05/2016	1.9
8	2	6186021	264145	12/05/2016	2.1
8	3	6186178	264384	12/05/2016	1.9
8	4	6186172	264386	12/05/2016	2.4
8	5	6186164	264382	12/05/2016	2.2
8	6	6186158	264391	12/05/2016	2.1
8	7	6186154	264395	12/05/2016	1.9
9	1	6186311	264422	12/05/2016	2.4
9	2	6186316	264408	12/05/2016	2.2
9	3	6186311	264393	12/05/2016	2.2
9	4	6186307	264376	12/05/2016	2.2
9	5	6186302	264355	12/05/2016	2.8
10	1	6186433	264367	12/05/2016	2.5
10	2	6186410	264363	12/05/2016	2.1
10	3	6186384	264363	12/05/2016	2.4
10	4	6186365	264361	12/05/2016	2.7
10	5	6186344	264343	12/05/2016	2.2
11	1	6186374	264229	12/05/2016	1.6
11	2	6186383	264234	12/05/2016	1.9
11	3	6186396	264235	12/05/2016	1.7
11	4	6186407	264240	12/05/2016	1.9
11	5	6186439	264233	12/05/2016	1.8

**Table E2: Sub-surface Gas Monitoring Results**  
Former Welby Landfill, Colo Street Welby

EPL Point	Well Name	Approximate Location	Date	SWL	Flow	Methane	Carbon Dioxide	H2S	CO	GSV - CH4	GSV - CO2	Max CS (>CH4/CO2)	Comment
				m	L/hr	%v/v	%v/v	ppm	ppm				
1	WELM-01	Immediate south-west of landfill batter near DAM 1	12/05/2016	-	-	0.0003	0.8	-	-	0.01	0.05	2	
			10/07/2017	3.58	0.2	2.5	6.2	0	3				
			13/02/2018	5.17	0.2	0	5.6	-	-				
			26/11/2018	6.37	0.4	0	3.2	-	-				
			6/05/2019	6.51	0	0	4.9	-	-				
			12/10/2020	5.2	0	0	7.5	-	-				
2	WELM-02	East of landfill batter (southern extent) near DAM-5	12/05/2016	-	-	0.0002	1	-	-	0.00	-0.07	2	
			10/07/2017	2.86	0	0	0.3	0	2				
			13/02/2018	3.68	0.1	0	1.8	-	-				
			26/11/2018	3.68	-2.1	0	0.2	-	-				
			6/05/2019	3.85	-0.1	0	2.6	-	-				
			12/10/2020	2.87	0	0	3.4	-	-				
3	WELM-04	South of landfill batter near DAM-6	12/05/2016	-	-	-	-	-	-	0.00	0.05	2	Well not found
			1/09/2016	-	-	0	-	-	-				
			10/07/2017	5.65	0.1	0	5	0	2				
			13/02/2018	6.9	0.2	0	13.2	-	-				
			26/11/2018	DRY	0.4	0	3.3	-	-				
			12/10/2020	3.69	0	0	6.9	-	-				
4	WELM-05	On eastern landfill batter	12/05/2016	-	-	0.0002	2.2	-	-	0.21	0.08	2	
			1/09/2016	-	-	71.4	27	-	-				
			10/07/2017	DRY	0	0	4.6	0	2				
			13/02/2018	DRY	0.1	0	3.8	-	-				
			26/11/2018	DRY	0.3	0	4.6	-	-				
			6/05/2019	DRY	0.1	0.2	7.5	-	-				
5	WELM-06D	East of landfill batter (northern extent) near DAM-4	12/05/2016	-	-	0.0004	1.8	-	-	-1.76	-0.294	3	Note GSV and CS are based on a single result in 2016 and since then there has been minimal detects of methane (CS1 otherwise)
			1/09/2016	-	-	62.8	10.5	-	-				
			10/07/2017	DRY	0	0	5	0	2				
			13/02/2018	DRY	0	0	1.7	-	-				
			26/11/2018	-	-2.8	0	0.1	-	-				
			6/05/2019	DRY	0.1	0.1	2.4	-	-				
6	WELM-06S	East of landfill batter (northern extent) near DAM-4	12/05/2016	-	-	0.0002	1.1	-	-	-1.93	-0.90	3	Note GSV and CS are based on a single result in 2016 and since then there has been minimal detects of methane (CS2 otherwise due to CO2)
			1/09/2016	-	-	69.1	32.3	-	-				
			10/07/2017	7.24	0	0	27.8	0	3				
			13/02/2018	7.4	0.1	0	21.3	-	-				
			26/11/2018	-	-2.8	0	18	-	-				
			6/05/2019	DRY	0	0	13.7	-	-				
7	WELM-07D	Immediate north of landfill batter	12/05/2016	-	-	0.0002	1	-	-	0.00	0.02	1	
			10/07/2017	DRY	0.2	0	0.7	0	1				
			13/02/2018	DRY	-0.2	0	1.7	-	-				
			26/11/2018	DRY	0.1	0	1.2	-	-				
			6/05/2019	DRY	0.4	0	4.9	-	-				
			12/10/2020	DRY	0	0	0.1	-	-				
8	WELM-07S	Immediate north of landfill batter	12/05/2016	-	-	0.0002	1.3	-	-	0.00	-0.04	1	
			10/07/2017	DRY	0	0	0.2	0	2				
			13/02/2018	DRY	0	0	1.3	-	-				
			26/11/2018	DRY	-1.4	0	0.1	-	-				
			6/05/2019	DRY	0.4	0	2.5	-	-				
			12/10/2020	DRY	0	0	0.1	-	-				
9	WELMLEACH-01	On northern portion of upper cap	10/07/2017	8.6	0	5	5.7	0	1	-0.41	-0.33	2	No cap on bore
			6/05/2019	8.74	-1.7	7.2	8.4	-	-				
			12/10/2020	8.34	0	24.4	19.3	-	-				
			5/04/2021	7.33	0	13.2	9.1	-	-				
18	GAS1	On northern portion of upper cap	10/07/2017	DRY	0.1	69.5	28.7	55	5	0.31	0.11	2	
			13/02/2018	DRY	0	66.3	24.2	-	-				
			26/11/2018	9.2	0.4	48.9	21.9	-	-				
			6/05/2019	7.95	0.3	69.9	24.6	-	-				
			12/10/2020	7.33	0.1	73.5	23.2	-	-				
19	GAS2	On eastern portion of upper cap	10/07/2017	DRY	0.3	39.1	8.3	1	4	0.34	0.07	2	
			13/02/2018	DRY	0	57.3	10	-	-				
			26/11/2018	DRY	0.5	55.5	8.2	-	-				
			6/05/2019	DRY	0.4	60.6	13.1	-	-				
			12/10/2020	DRY	0.2	68.9	12.2	-	-				
20	GAS3	On western portion of upper cap	10/07/2017	DRY	0.5	69.8	32.9	7	5	0.39	0.16	2	
			13/02/2018	DRY	0	65.6	31.5	-	-				
			26/11/2018	DRY	0.4	71.9	31.3	-	-				
			6/05/2019	DRY	0.4	68.5	32.8	-	-				
			12/10/2020	DRY	0.1	65.2	28.3	-	-				
5/04/2021	7.41	0.2	77.9	30	-	-							



# Appendix F

LandGEM Results Reports





## Summary Report

**Landfill Name or Identifier:** Former Welby Landfill Simulation 1

**Date:** Monday, 16 May 2022

### Description/Comments:

#### About LandGEM:

First-Order Decomposition Rate Equation:

$$Q_{CH_4} = \sum_{i=1}^n \sum_{j=0.1}^1 k L_o \left( \frac{M_i}{10} \right) e^{-kt_{ij}}$$

Where,

$Q_{CH_4}$  = annual methane generation in the year of the calculation ( $m^3/year$ )

$i$  = 1-year time increment

$n$  = (year of the calculation) - (initial year of waste acceptance)

$j$  = 0.1-year time increment

$k$  = methane generation rate ( $year^{-1}$ )

$L_o$  = potential methane generation capacity ( $m^3/Mg$ )

$M_i$  = mass of waste accepted in the  $i^{th}$  year ( $Mg$ )

$t_{ij}$  = age of the  $j^{th}$  section of waste mass  $M_i$  accepted in the  $i^{th}$  year (*decimal years*, e.g., 3.2 years)

LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model defaults are based on empirical data from U.S. landfills. Field test data can also be used in place of model defaults when available. Further guidance on EPA test methods, Clean Air Act (CAA) regulations, and other guidance regarding landfill gas emissions and control technology requirements can be found at <http://www.epa.gov/ttnatw01/landfill/landflpg.html>.

LandGEM is considered a screening tool — the better the input data, the better the estimates. Often, there are limitations with the available data regarding waste quantity and composition, variation in design and operating practices over time, and changes occurring over time that impact the emissions potential. Changes to landfill operation, such as operating under wet conditions through leachate recirculation or other liquid additions, will result in generating more gas at a faster rate. Defaults for estimating emissions for this type of operation are being developed to include in LandGEM along with defaults for conventional landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

**Input Review**

## LANDFILL CHARACTERISTICS

Landfill Open Year	<b>1957</b>	
Landfill Closure Year (with 80-year limit)	<b>2002</b>	
Actual Closure Year (without limit)	<b>2002</b>	
Have Model Calculate Closure Year?	<b>No</b>	
Waste Design Capacity		<i>megagrams</i>

## MODEL PARAMETERS

Methane Generation Rate, k	<b>0.057</b>	<i>year<sup>-1</sup></i>
Potential Methane Generation Capacity, L <sub>0</sub>	<b>170</b>	<i>m<sup>3</sup>/Mg</i>
NMOC Concentration	<b>4,000</b>	<i>ppmv as hexane</i>
Methane Content	<b>50</b>	<i>% by volume</i>

## GASES / POLLUTANTS SELECTED

Gas / Pollutant #1:	<b>Total landfill gas</b>
Gas / Pollutant #2:	<b>Methane</b>
Gas / Pollutant #3:	<b>Carbon dioxide</b>
Gas / Pollutant #4:	<b>NMOC</b>

## WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	(short tons/year)	(Mg)	(short tons)
1957	6,194	6,813	0	0
1958	6,194	6,813	6,194	6,813
1959	6,194	6,813	12,388	13,627
1960	6,194	6,813	18,582	20,440
1961	6,194	6,813	24,776	27,254
1962	6,194	6,813	30,970	34,067
1963	6,194	6,813	37,164	40,880
1964	6,194	6,813	43,358	47,694
1965	6,194	6,813	49,552	54,507
1966	6,194	6,813	55,746	61,321
1967	6,194	6,813	61,940	68,134
1968	6,194	6,813	68,134	74,947
1969	6,194	6,813	74,328	81,761
1970	6,194	6,813	80,522	88,574
1971	6,194	6,813	86,716	95,388
1972	6,194	6,813	92,910	102,201
1973	6,194	6,813	99,104	109,014
1974	6,194	6,813	105,298	115,828
1975	6,194	6,813	111,492	122,641
1976	6,194	6,813	117,686	129,455
1977	6,194	6,813	123,880	136,268
1978	6,194	6,813	130,074	143,081
1979	6,194	6,813	136,268	149,895
1980	6,194	6,813	142,462	156,708
1981	6,194	6,813	148,656	163,522
1982	6,194	6,813	154,850	170,335
1983	6,194	6,813	161,044	177,148
1984	6,194	6,813	167,238	183,962
1985	6,194	6,813	173,432	190,775
1986	6,194	6,813	179,626	197,589
1987	6,194	6,813	185,820	204,402
1988	6,194	6,813	192,014	211,215
1989	6,194	6,813	198,208	218,029
1990	6,194	6,813	204,402	224,842
1991	6,194	6,813	210,596	231,656
1992	6,194	6,813	216,790	238,469
1993	6,194	6,813	222,984	245,282
1994	6,194	6,813	229,178	252,096
1995	6,194	6,813	235,372	258,909
1996	6,194	6,813	241,566	265,723

## WASTE ACCEPTANCE RATES (Continued)

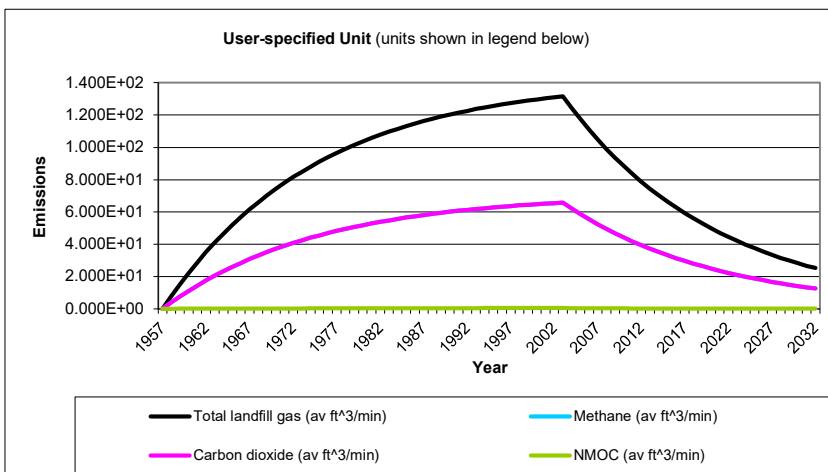
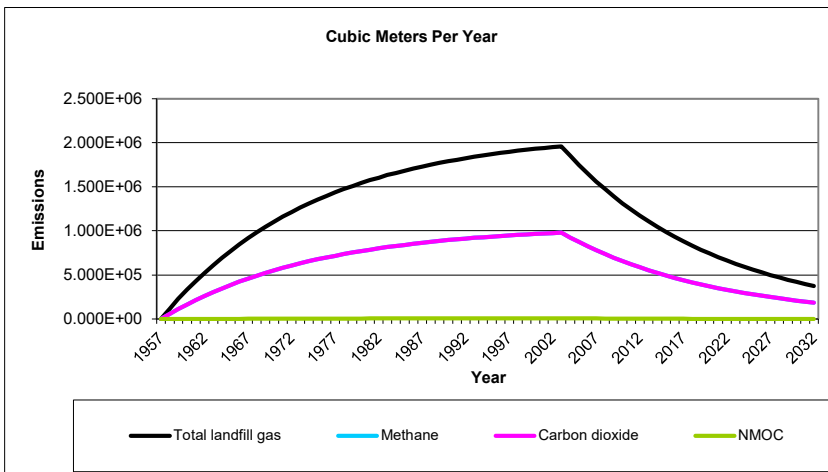
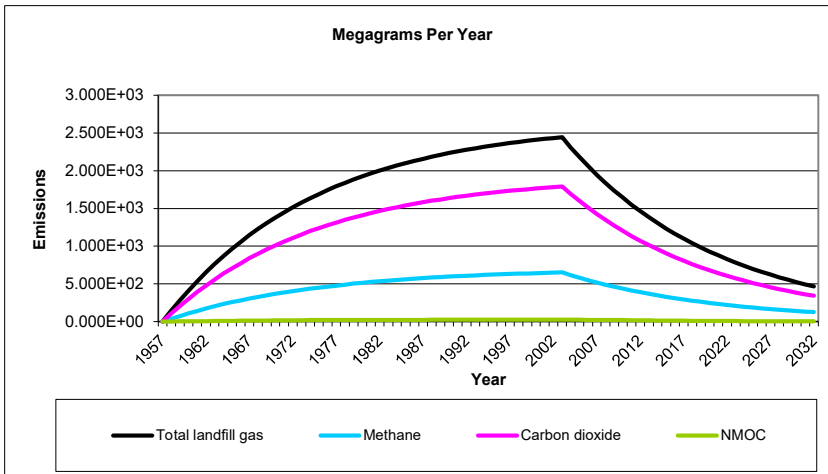
Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	(short tons/year)	(Mg)	(short tons)
1997	6,194	6,813	247,760	272,536
1998	6,194	6,813	253,954	279,349
1999	6,194	6,813	260,148	286,163
2000	6,194	6,813	266,342	292,976
2001	6,194	6,813	272,536	299,790
2002	6,194	6,813	278,730	306,603
2003	0	0	284,924	313,416
2004	0	0	284,924	313,416
2005	0	0	284,924	313,416
2006	0	0	284,924	313,416
2007	0	0	284,924	313,416
2008	0	0	284,924	313,416
2009	0	0	284,924	313,416
2010	0	0	284,924	313,416
2011	0	0	284,924	313,416
2012	0	0	284,924	313,416
2013	0	0	284,924	313,416
2014	0	0	284,924	313,416
2015	0	0	284,924	313,416
2016	0	0	284,924	313,416
2017	0	0	284,924	313,416
2018	0	0	284,924	313,416
2019	0	0	284,924	313,416
2020	0	0	284,924	313,416
2021	0	0	284,924	313,416
2022	0	0	284,924	313,416
2023	0	0	284,924	313,416
2024	0	0	284,924	313,416
2025	0	0	284,924	313,416
2026	0	0	284,924	313,416
2027	0	0	284,924	313,416
2028	0	0	284,924	313,416
2029	0	0	284,924	313,416
2030	0	0	284,924	313,416
2031	0	0	284,924	313,416
2032	0	0	284,924	313,416
2033	0	0	284,924	313,416
2034	0	0	284,924	313,416
2035	0	0	284,924	313,416
2036	0	0	284,924	313,416

**Pollutant Parameters**

<b>Gas / Pollutant Default Parameters:</b>				<b>User-specified Pollutant Parameters:</b>	
	Compound	Concentration (ppmv)	Molecular Weight	Concentration (ppmv)	Molecular Weight
<b>Gases</b>	Total landfill gas		0.00		
	Methane		16.04		
	Carbon dioxide		44.01		
	NMOC	4,000	86.18		
<b>Pollutants</b>	1,1,1-Trichloroethane (methyl chloroform) - HAP	0.48	133.41		
	1,1,1,2,2- Tetrachloroethane - HAP/VOC	1.1	167.85		
	1,1-Dichloroethane (ethylidene dichloride) - HAP/VOC	2.4	98.97		
	1,1-Dichloroethene (vinylidene chloride) - HAP/VOC	0.20	96.94		
	1,2-Dichloroethane (ethylene dichloride) - HAP/VOC	0.41	98.96		
	1,2-Dichloropropane (propylene dichloride) - HAP/VOC	0.18	112.99		
	2-Propanol (isopropyl alcohol) - VOC	50	60.11		
	Acetone	7.0	58.08		
	Acrylonitrile - HAP/VOC	6.3	53.06		
	Benzene - No or Unknown Co-disposal - HAP/VOC	1.9	78.11		
	Benzene - Co-disposal - HAP/VOC	11	78.11		
	Bromodichloromethane - VOC	3.1	163.83		
	Butane - VOC	5.0	58.12		
	Carbon disulfide - HAP/VOC	0.58	76.13		
	Carbon monoxide	140	28.01		
	Carbon tetrachloride - HAP/VOC	4.0E-03	153.84		
	Carbonyl sulfide - HAP/VOC	0.49	60.07		
	Chlorobenzene - HAP/VOC	0.25	112.56		
	Chlorodifluoromethane	1.3	86.47		
	Chloroethane (ethyl chloride) - HAP/VOC	1.3	64.52		
	Chloroform - HAP/VOC	0.03	119.39		
	Chloromethane - VOC	1.2	50.49		
	Dichlorobenzene - (HAP for para isomer/VOC)	0.21	147		
	Dichlorodifluoromethane	16	120.91		
	Dichlorofluoromethane - VOC	2.6	102.92		
	Dichloromethane (methylene chloride) - HAP	14	84.94		
	Dimethyl sulfide (methyl sulfide) - VOC	7.8	62.13		
	Ethane	890	30.07		
	Ethanol - VOC	27	46.08		



**Graphs**



## Results

Year	Total landfill gas			Methane		
	(Mg/year)	(m <sup>3</sup> /year)	(av ft <sup>3</sup> /min)	(Mg/year)	(m <sup>3</sup> /year)	(av ft <sup>3</sup> /min)
1957	0	0	0	0	0	0
1958	1.461E+02	1.170E+05	7.862E+00	3.903E+01	5.851E+04	3.931E+00
1959	2.842E+02	2.275E+05	1.529E+01	7.590E+01	1.138E+05	7.644E+00
1960	4.146E+02	3.320E+05	2.230E+01	1.107E+02	1.660E+05	1.115E+01
1961	5.377E+02	4.306E+05	2.893E+01	1.436E+02	2.153E+05	1.447E+01
1962	6.541E+02	5.237E+05	3.519E+01	1.747E+02	2.619E+05	1.759E+01
1963	7.639E+02	6.117E+05	4.110E+01	2.041E+02	3.059E+05	2.055E+01
1964	8.678E+02	6.949E+05	4.669E+01	2.318E+02	3.474E+05	2.334E+01
1965	9.658E+02	7.734E+05	5.196E+01	2.580E+02	3.867E+05	2.598E+01
1966	1.058E+03	8.475E+05	5.695E+01	2.827E+02	4.238E+05	2.847E+01
1967	1.146E+03	9.176E+05	6.165E+01	3.061E+02	4.588E+05	3.083E+01
1968	1.229E+03	9.838E+05	6.610E+01	3.282E+02	4.919E+05	3.305E+01
1969	1.307E+03	1.046E+06	7.030E+01	3.490E+02	5.231E+05	3.515E+01
1970	1.380E+03	1.105E+06	7.427E+01	3.687E+02	5.527E+05	3.713E+01
1971	1.450E+03	1.161E+06	7.801E+01	3.873E+02	5.805E+05	3.901E+01
1972	1.516E+03	1.214E+06	8.155E+01	4.049E+02	6.069E+05	4.078E+01
1973	1.578E+03	1.264E+06	8.490E+01	4.215E+02	6.318E+05	4.245E+01
1974	1.637E+03	1.311E+06	8.806E+01	4.372E+02	6.553E+05	4.403E+01
1975	1.692E+03	1.355E+06	9.104E+01	4.520E+02	6.775E+05	4.552E+01
1976	1.744E+03	1.397E+06	9.386E+01	4.660E+02	6.985E+05	4.693E+01
1977	1.794E+03	1.437E+06	9.652E+01	4.792E+02	7.183E+05	4.826E+01
1978	1.841E+03	1.474E+06	9.903E+01	4.917E+02	7.370E+05	4.952E+01
1979	1.885E+03	1.509E+06	1.014E+02	5.035E+02	7.546E+05	5.070E+01
1980	1.927E+03	1.543E+06	1.037E+02	5.146E+02	7.713E+05	5.183E+01
1981	1.966E+03	1.574E+06	1.058E+02	5.251E+02	7.871E+05	5.289E+01
1982	2.003E+03	1.604E+06	1.078E+02	5.351E+02	8.020E+05	5.389E+01
1983	2.038E+03	1.632E+06	1.097E+02	5.444E+02	8.161E+05	5.483E+01
1984	2.071E+03	1.659E+06	1.115E+02	5.533E+02	8.294E+05	5.573E+01
1985	2.103E+03	1.684E+06	1.131E+02	5.617E+02	8.419E+05	5.657E+01
1986	2.132E+03	1.708E+06	1.147E+02	5.696E+02	8.538E+05	5.737E+01
1987	2.160E+03	1.730E+06	1.162E+02	5.771E+02	8.650E+05	5.812E+01
1988	2.187E+03	1.751E+06	1.177E+02	5.841E+02	8.756E+05	5.883E+01
1989	2.212E+03	1.771E+06	1.190E+02	5.908E+02	8.856E+05	5.950E+01
1990	2.235E+03	1.790E+06	1.203E+02	5.971E+02	8.950E+05	6.014E+01
1991	2.258E+03	1.808E+06	1.215E+02	6.031E+02	9.039E+05	6.074E+01
1992	2.279E+03	1.825E+06	1.226E+02	6.087E+02	9.124E+05	6.130E+01
1993	2.299E+03	1.841E+06	1.237E+02	6.140E+02	9.203E+05	6.184E+01
1994	2.317E+03	1.856E+06	1.247E+02	6.190E+02	9.278E+05	6.234E+01
1995	2.335E+03	1.870E+06	1.256E+02	6.237E+02	9.349E+05	6.282E+01
1996	2.352E+03	1.883E+06	1.265E+02	6.282E+02	9.416E+05	6.327E+01
1997	2.368E+03	1.896E+06	1.274E+02	6.324E+02	9.480E+05	6.369E+01
1998	2.383E+03	1.908E+06	1.282E+02	6.364E+02	9.540E+05	6.410E+01
1999	2.397E+03	1.919E+06	1.290E+02	6.402E+02	9.596E+05	6.448E+01
2000	2.410E+03	1.930E+06	1.297E+02	6.438E+02	9.650E+05	6.483E+01
2001	2.423E+03	1.940E+06	1.303E+02	6.471E+02	9.700E+05	6.517E+01
2002	2.435E+03	1.950E+06	1.310E+02	6.503E+02	9.748E+05	6.549E+01
2003	2.446E+03	1.959E+06	1.316E+02	6.533E+02	9.793E+05	6.580E+01
2004	2.310E+03	1.850E+06	1.243E+02	6.171E+02	9.250E+05	6.215E+01
2005	2.182E+03	1.748E+06	1.174E+02	5.829E+02	8.738E+05	5.871E+01
2006	2.061E+03	1.651E+06	1.109E+02	5.506E+02	8.253E+05	5.545E+01



**Results (Continued)**

Year	Total landfill gas			Methane		
	(Mg/year)	(m <sup>3</sup> /year)	(av ft <sup>3</sup> /min)	(Mg/year)	(m <sup>3</sup> /year)	(av ft <sup>3</sup> /min)
2007	1.947E+03	1.559E+06	1.048E+02	5.201E+02	7.796E+05	5.238E+01
2008	1.839E+03	1.473E+06	9.896E+01	4.913E+02	7.364E+05	4.948E+01
2009	1.737E+03	1.391E+06	9.348E+01	4.641E+02	6.956E+05	4.674E+01
2010	1.641E+03	1.314E+06	8.830E+01	4.384E+02	6.571E+05	4.415E+01
2011	1.550E+03	1.241E+06	8.341E+01	4.141E+02	6.207E+05	4.170E+01
2012	1.464E+03	1.173E+06	7.878E+01	3.911E+02	5.863E+05	3.939E+01
2013	1.383E+03	1.108E+06	7.442E+01	3.695E+02	5.538E+05	3.721E+01
2014	1.307E+03	1.046E+06	7.030E+01	3.490E+02	5.231E+05	3.515E+01
2015	1.234E+03	9.883E+05	6.640E+01	3.297E+02	4.941E+05	3.320E+01
2016	1.166E+03	9.335E+05	6.272E+01	3.114E+02	4.668E+05	3.136E+01
2017	1.101E+03	8.818E+05	5.925E+01	2.941E+02	4.409E+05	2.962E+01
2018	1.040E+03	8.329E+05	5.596E+01	2.778E+02	4.165E+05	2.798E+01
2019	9.825E+02	7.868E+05	5.286E+01	2.624E+02	3.934E+05	2.643E+01
2020	9.281E+02	7.432E+05	4.993E+01	2.479E+02	3.716E+05	2.497E+01
2021	8.767E+02	7.020E+05	4.717E+01	2.342E+02	3.510E+05	2.358E+01
2022	8.281E+02	6.631E+05	4.455E+01	2.212E+02	3.316E+05	2.228E+01
2023	7.822E+02	6.264E+05	4.209E+01	2.089E+02	3.132E+05	2.104E+01
2024	7.389E+02	5.917E+05	3.975E+01	1.974E+02	2.958E+05	1.988E+01
2025	6.979E+02	5.589E+05	3.755E+01	1.864E+02	2.794E+05	1.878E+01
2026	6.593E+02	5.279E+05	3.547E+01	1.761E+02	2.640E+05	1.774E+01
2027	6.227E+02	4.987E+05	3.351E+01	1.663E+02	2.493E+05	1.675E+01
2028	5.882E+02	4.710E+05	3.165E+01	1.571E+02	2.355E+05	1.582E+01
2029	5.557E+02	4.449E+05	2.990E+01	1.484E+02	2.225E+05	1.495E+01
2030	5.249E+02	4.203E+05	2.824E+01	1.402E+02	2.101E+05	1.412E+01
2031	4.958E+02	3.970E+05	2.667E+01	1.324E+02	1.985E+05	1.334E+01
2032	4.683E+02	3.750E+05	2.520E+01	1.251E+02	1.875E+05	1.260E+01
2033	4.424E+02	3.542E+05	2.380E+01	1.182E+02	1.771E+05	1.190E+01
2034	4.179E+02	3.346E+05	2.248E+01	1.116E+02	1.673E+05	1.124E+01
2035	3.947E+02	3.161E+05	2.124E+01	1.054E+02	1.580E+05	1.062E+01
2036	3.728E+02	2.986E+05	2.006E+01	9.959E+01	1.493E+05	1.003E+01
2037	3.522E+02	2.820E+05	1.895E+01	9.407E+01	1.410E+05	9.474E+00
2038	3.327E+02	2.664E+05	1.790E+01	8.886E+01	1.332E+05	8.949E+00
2039	3.142E+02	2.516E+05	1.691E+01	8.394E+01	1.258E+05	8.453E+00
2040	2.968E+02	2.377E+05	1.597E+01	7.929E+01	1.188E+05	7.985E+00
2041	2.804E+02	2.245E+05	1.509E+01	7.489E+01	1.123E+05	7.543E+00
2042	2.648E+02	2.121E+05	1.425E+01	7.074E+01	1.060E+05	7.125E+00
2043	2.502E+02	2.003E+05	1.346E+01	6.682E+01	1.002E+05	6.730E+00
2044	2.363E+02	1.892E+05	1.271E+01	6.312E+01	9.461E+04	6.357E+00
2045	2.232E+02	1.787E+05	1.201E+01	5.962E+01	8.937E+04	6.005E+00
2046	2.108E+02	1.688E+05	1.134E+01	5.632E+01	8.442E+04	5.672E+00
2047	1.992E+02	1.595E+05	1.072E+01	5.320E+01	7.974E+04	5.358E+00
2048	1.881E+02	1.506E+05	1.012E+01	5.025E+01	7.532E+04	5.061E+00
2049	1.777E+02	1.423E+05	9.561E+00	4.747E+01	7.115E+04	4.781E+00
2050	1.679E+02	1.344E+05	9.031E+00	4.484E+01	6.721E+04	4.516E+00
2051	1.586E+02	1.270E+05	8.531E+00	4.235E+01	6.348E+04	4.266E+00
2052	1.498E+02	1.199E+05	8.058E+00	4.001E+01	5.997E+04	4.029E+00
2053	1.415E+02	1.133E+05	7.612E+00	3.779E+01	5.664E+04	3.806E+00
2054	1.336E+02	1.070E+05	7.190E+00	3.570E+01	5.351E+04	3.595E+00
2055	1.262E+02	1.011E+05	6.792E+00	3.372E+01	5.054E+04	3.396E+00
2056	1.192E+02	9.548E+04	6.415E+00	3.185E+01	4.774E+04	3.208E+00
2057	1.126E+02	9.019E+04	6.060E+00	3.009E+01	4.510E+04	3.030E+00

**Results (Continued)**

Year	Total landfill gas			Methane		
	(Mg/year)	(m <sup>3</sup> /year)	(av ft <sup>3</sup> /min)	(Mg/year)	(m <sup>3</sup> /year)	(av ft <sup>3</sup> /min)
2058	1.064E+02	8.520E+04	5.724E+00	2.842E+01	4.260E+04	2.862E+00
2059	1.005E+02	8.047E+04	5.407E+00	2.684E+01	4.024E+04	2.704E+00
2060	9.493E+01	7.602E+04	5.108E+00	2.536E+01	3.801E+04	2.554E+00
2061	8.967E+01	7.180E+04	4.825E+00	2.395E+01	3.590E+04	2.412E+00
2062	8.470E+01	6.783E+04	4.557E+00	2.262E+01	3.391E+04	2.279E+00
2063	8.001E+01	6.407E+04	4.305E+00	2.137E+01	3.203E+04	2.152E+00
2064	7.558E+01	6.052E+04	4.066E+00	2.019E+01	3.026E+04	2.033E+00
2065	7.139E+01	5.717E+04	3.841E+00	1.907E+01	2.858E+04	1.920E+00
2066	6.743E+01	5.400E+04	3.628E+00	1.801E+01	2.700E+04	1.814E+00
2067	6.370E+01	5.101E+04	3.427E+00	1.701E+01	2.550E+04	1.714E+00
2068	6.017E+01	4.818E+04	3.237E+00	1.607E+01	2.409E+04	1.619E+00
2069	5.683E+01	4.551E+04	3.058E+00	1.518E+01	2.276E+04	1.529E+00
2070	5.369E+01	4.299E+04	2.888E+00	1.434E+01	2.149E+04	1.444E+00
2071	5.071E+01	4.061E+04	2.728E+00	1.355E+01	2.030E+04	1.364E+00
2072	4.790E+01	3.836E+04	2.577E+00	1.279E+01	1.918E+04	1.289E+00
2073	4.525E+01	3.623E+04	2.434E+00	1.209E+01	1.812E+04	1.217E+00
2074	4.274E+01	3.422E+04	2.300E+00	1.142E+01	1.711E+04	1.150E+00
2075	4.037E+01	3.233E+04	2.172E+00	1.078E+01	1.616E+04	1.086E+00
2076	3.814E+01	3.054E+04	2.052E+00	1.019E+01	1.527E+04	1.026E+00
2077	3.602E+01	2.885E+04	1.938E+00	9.622E+00	1.442E+04	9.691E-01
2078	3.403E+01	2.725E+04	1.831E+00	9.089E+00	1.362E+04	9.154E-01
2079	3.214E+01	2.574E+04	1.729E+00	8.585E+00	1.287E+04	8.646E-01
2080	3.036E+01	2.431E+04	1.633E+00	8.110E+00	1.216E+04	8.167E-01
2081	2.868E+01	2.296E+04	1.543E+00	7.660E+00	1.148E+04	7.715E-01
2082	2.709E+01	2.169E+04	1.457E+00	7.236E+00	1.085E+04	7.287E-01
2083	2.559E+01	2.049E+04	1.377E+00	6.835E+00	1.025E+04	6.884E-01
2084	2.417E+01	1.935E+04	1.300E+00	6.456E+00	9.677E+03	6.502E-01
2085	2.283E+01	1.828E+04	1.228E+00	6.099E+00	9.141E+03	6.142E-01
2086	2.157E+01	1.727E+04	1.160E+00	5.761E+00	8.635E+03	5.802E-01
2087	2.037E+01	1.631E+04	1.096E+00	5.441E+00	8.156E+03	5.480E-01
2088	1.924E+01	1.541E+04	1.035E+00	5.140E+00	7.704E+03	5.177E-01
2089	1.818E+01	1.456E+04	9.780E-01	4.855E+00	7.278E+03	4.890E-01
2090	1.717E+01	1.375E+04	9.238E-01	4.586E+00	6.874E+03	4.619E-01
2091	1.622E+01	1.299E+04	8.726E-01	4.332E+00	6.493E+03	4.363E-01
2092	1.532E+01	1.227E+04	8.242E-01	4.092E+00	6.134E+03	4.121E-01
2093	1.447E+01	1.159E+04	7.786E-01	3.865E+00	5.794E+03	3.893E-01
2094	1.367E+01	1.095E+04	7.354E-01	3.651E+00	5.473E+03	3.677E-01
2095	1.291E+01	1.034E+04	6.947E-01	3.449E+00	5.170E+03	3.473E-01
2096	1.220E+01	9.766E+03	6.562E-01	3.258E+00	4.883E+03	3.281E-01
2097	1.152E+01	9.225E+03	6.198E-01	3.077E+00	4.613E+03	3.099E-01

**Results (Continued)**

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m <sup>3</sup> /year)	(av ft <sup>3</sup> /min)	(Mg/year)	(m <sup>3</sup> /year)	(av ft <sup>3</sup> /min)
1957	0	0	0	0	0	0
1958	1.071E+02	5.851E+04	3.931E+00	1.678E+00	4.681E+02	3.145E-02
1959	2.083E+02	1.138E+05	7.644E+00	3.263E+00	9.102E+02	6.116E-02
1960	3.038E+02	1.660E+05	1.115E+01	4.760E+00	1.328E+03	8.922E-02
1961	3.941E+02	2.153E+05	1.447E+01	6.174E+00	1.722E+03	1.157E-01
1962	4.794E+02	2.619E+05	1.759E+01	7.509E+00	2.095E+03	1.408E-01
1963	5.599E+02	3.059E+05	2.055E+01	8.771E+00	2.447E+03	1.644E-01
1964	6.360E+02	3.474E+05	2.334E+01	9.963E+00	2.779E+03	1.867E-01
1965	7.078E+02	3.867E+05	2.598E+01	1.109E+01	3.093E+03	2.079E-01
1966	7.757E+02	4.238E+05	2.847E+01	1.215E+01	3.390E+03	2.278E-01
1967	8.398E+02	4.588E+05	3.083E+01	1.316E+01	3.670E+03	2.466E-01
1968	9.004E+02	4.919E+05	3.305E+01	1.411E+01	3.935E+03	2.644E-01
1969	9.576E+02	5.231E+05	3.515E+01	1.500E+01	4.185E+03	2.812E-01
1970	1.012E+03	5.527E+05	3.713E+01	1.585E+01	4.421E+03	2.971E-01
1971	1.063E+03	5.805E+05	3.901E+01	1.665E+01	4.644E+03	3.121E-01
1972	1.111E+03	6.069E+05	4.078E+01	1.740E+01	4.855E+03	3.262E-01
1973	1.156E+03	6.318E+05	4.245E+01	1.812E+01	5.054E+03	3.396E-01
1974	1.199E+03	6.553E+05	4.403E+01	1.879E+01	5.242E+03	3.522E-01
1975	1.240E+03	6.775E+05	4.552E+01	1.943E+01	5.420E+03	3.642E-01
1976	1.279E+03	6.985E+05	4.693E+01	2.003E+01	5.588E+03	3.754E-01
1977	1.315E+03	7.183E+05	4.826E+01	2.060E+01	5.746E+03	3.861E-01
1978	1.349E+03	7.370E+05	4.952E+01	2.113E+01	5.896E+03	3.961E-01
1979	1.381E+03	7.546E+05	5.070E+01	2.164E+01	6.037E+03	4.056E-01
1980	1.412E+03	7.713E+05	5.183E+01	2.212E+01	6.171E+03	4.146E-01
1981	1.441E+03	7.871E+05	5.289E+01	2.257E+01	6.297E+03	4.231E-01
1982	1.468E+03	8.020E+05	5.389E+01	2.300E+01	6.416E+03	4.311E-01
1983	1.494E+03	8.161E+05	5.483E+01	2.340E+01	6.529E+03	4.387E-01
1984	1.518E+03	8.294E+05	5.573E+01	2.378E+01	6.635E+03	4.458E-01
1985	1.541E+03	8.419E+05	5.657E+01	2.414E+01	6.735E+03	4.526E-01
1986	1.563E+03	8.538E+05	5.737E+01	2.448E+01	6.830E+03	4.589E-01
1987	1.583E+03	8.650E+05	5.812E+01	2.480E+01	6.920E+03	4.649E-01
1988	1.603E+03	8.756E+05	5.883E+01	2.511E+01	7.005E+03	4.706E-01
1989	1.621E+03	8.856E+05	5.950E+01	2.539E+01	7.085E+03	4.760E-01
1990	1.638E+03	8.950E+05	6.014E+01	2.567E+01	7.160E+03	4.811E-01
1991	1.655E+03	9.039E+05	6.074E+01	2.592E+01	7.231E+03	4.859E-01
1992	1.670E+03	9.124E+05	6.130E+01	2.616E+01	7.299E+03	4.904E-01
1993	1.685E+03	9.203E+05	6.184E+01	2.639E+01	7.363E+03	4.947E-01
1994	1.698E+03	9.278E+05	6.234E+01	2.661E+01	7.423E+03	4.987E-01
1995	1.711E+03	9.349E+05	6.282E+01	2.681E+01	7.479E+03	5.025E-01
1996	1.724E+03	9.416E+05	6.327E+01	2.700E+01	7.533E+03	5.061E-01
1997	1.735E+03	9.480E+05	6.369E+01	2.718E+01	7.584E+03	5.096E-01
1998	1.746E+03	9.540E+05	6.410E+01	2.736E+01	7.632E+03	5.128E-01
1999	1.757E+03	9.596E+05	6.448E+01	2.752E+01	7.677E+03	5.158E-01
2000	1.766E+03	9.650E+05	6.483E+01	2.767E+01	7.720E+03	5.187E-01
2001	1.776E+03	9.700E+05	6.517E+01	2.782E+01	7.760E+03	5.214E-01
2002	1.784E+03	9.748E+05	6.549E+01	2.795E+01	7.798E+03	5.240E-01
2003	1.793E+03	9.793E+05	6.580E+01	2.808E+01	7.834E+03	5.264E-01
2004	1.693E+03	9.250E+05	6.215E+01	2.653E+01	7.400E+03	4.972E-01
2005	1.599E+03	8.738E+05	5.871E+01	2.506E+01	6.990E+03	4.697E-01
2006	1.511E+03	8.253E+05	5.545E+01	2.367E+01	6.603E+03	4.436E-01

**Results (Continued)**

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m <sup>3</sup> /year)	(av ft <sup>3</sup> /min)	(Mg/year)	(m <sup>3</sup> /year)	(av ft <sup>3</sup> /min)
2007	1.427E+03	7.796E+05	5.238E+01	2.236E+01	6.237E+03	4.191E-01
2008	1.348E+03	7.364E+05	4.948E+01	2.112E+01	5.891E+03	3.958E-01
2009	1.273E+03	6.956E+05	4.674E+01	1.995E+01	5.565E+03	3.739E-01
2010	1.203E+03	6.571E+05	4.415E+01	1.884E+01	5.257E+03	3.532E-01
2011	1.136E+03	6.207E+05	4.170E+01	1.780E+01	4.965E+03	3.336E-01
2012	1.073E+03	5.863E+05	3.939E+01	1.681E+01	4.690E+03	3.151E-01
2013	1.014E+03	5.538E+05	3.721E+01	1.588E+01	4.430E+03	2.977E-01
2014	9.576E+02	5.231E+05	3.515E+01	1.500E+01	4.185E+03	2.812E-01
2015	9.045E+02	4.941E+05	3.320E+01	1.417E+01	3.953E+03	2.656E-01
2016	8.544E+02	4.668E+05	3.136E+01	1.338E+01	3.734E+03	2.509E-01
2017	8.070E+02	4.409E+05	2.962E+01	1.264E+01	3.527E+03	2.370E-01
2018	7.623E+02	4.165E+05	2.798E+01	1.194E+01	3.332E+03	2.239E-01
2019	7.201E+02	3.934E+05	2.643E+01	1.128E+01	3.147E+03	2.115E-01
2020	6.802E+02	3.716E+05	2.497E+01	1.066E+01	2.973E+03	1.997E-01
2021	6.425E+02	3.510E+05	2.358E+01	1.007E+01	2.808E+03	1.887E-01
2022	6.069E+02	3.316E+05	2.228E+01	9.508E+00	2.652E+03	1.782E-01
2023	5.733E+02	3.132E+05	2.104E+01	8.981E+00	2.505E+03	1.683E-01
2024	5.415E+02	2.958E+05	1.988E+01	8.483E+00	2.367E+03	1.590E-01
2025	5.115E+02	2.794E+05	1.878E+01	8.013E+00	2.236E+03	1.502E-01
2026	4.832E+02	2.640E+05	1.774E+01	7.569E+00	2.112E+03	1.419E-01
2027	4.564E+02	2.493E+05	1.675E+01	7.150E+00	1.995E+03	1.340E-01
2028	4.311E+02	2.355E+05	1.582E+01	6.754E+00	1.884E+03	1.266E-01
2029	4.072E+02	2.225E+05	1.495E+01	6.380E+00	1.780E+03	1.196E-01
2030	3.847E+02	2.101E+05	1.412E+01	6.026E+00	1.681E+03	1.130E-01
2031	3.634E+02	1.985E+05	1.334E+01	5.692E+00	1.588E+03	1.067E-01
2032	3.432E+02	1.875E+05	1.260E+01	5.377E+00	1.500E+03	1.008E-01
2033	3.242E+02	1.771E+05	1.190E+01	5.079E+00	1.417E+03	9.520E-02
2034	3.062E+02	1.673E+05	1.124E+01	4.797E+00	1.338E+03	8.993E-02
2035	2.893E+02	1.580E+05	1.062E+01	4.532E+00	1.264E+03	8.495E-02
2036	2.732E+02	1.493E+05	1.003E+01	4.281E+00	1.194E+03	8.024E-02
2037	2.581E+02	1.410E+05	9.474E+00	4.043E+00	1.128E+03	7.579E-02
2038	2.438E+02	1.332E+05	8.949E+00	3.819E+00	1.066E+03	7.159E-02
2039	2.303E+02	1.258E+05	8.453E+00	3.608E+00	1.007E+03	6.763E-02
2040	2.175E+02	1.188E+05	7.985E+00	3.408E+00	9.507E+02	6.388E-02
2041	2.055E+02	1.123E+05	7.543E+00	3.219E+00	8.981E+02	6.034E-02
2042	1.941E+02	1.060E+05	7.125E+00	3.041E+00	8.483E+02	5.700E-02
2043	1.833E+02	1.002E+05	6.730E+00	2.872E+00	8.013E+02	5.384E-02
2044	1.732E+02	9.461E+04	6.357E+00	2.713E+00	7.569E+02	5.086E-02
2045	1.636E+02	8.937E+04	6.005E+00	2.563E+00	7.150E+02	4.804E-02
2046	1.545E+02	8.442E+04	5.672E+00	2.421E+00	6.754E+02	4.538E-02
2047	1.460E+02	7.974E+04	5.358E+00	2.287E+00	6.379E+02	4.286E-02
2048	1.379E+02	7.532E+04	5.061E+00	2.160E+00	6.026E+02	4.049E-02
2049	1.302E+02	7.115E+04	4.781E+00	2.040E+00	5.692E+02	3.824E-02
2050	1.230E+02	6.721E+04	4.516E+00	1.927E+00	5.377E+02	3.613E-02
2051	1.162E+02	6.348E+04	4.266E+00	1.820E+00	5.079E+02	3.412E-02
2052	1.098E+02	5.997E+04	4.029E+00	1.720E+00	4.797E+02	3.223E-02
2053	1.037E+02	5.664E+04	3.806E+00	1.624E+00	4.532E+02	3.045E-02
2054	9.794E+01	5.351E+04	3.595E+00	1.534E+00	4.280E+02	2.876E-02
2055	9.252E+01	5.054E+04	3.396E+00	1.449E+00	4.043E+02	2.717E-02
2056	8.739E+01	4.774E+04	3.208E+00	1.369E+00	3.819E+02	2.566E-02
2057	8.255E+01	4.510E+04	3.030E+00	1.293E+00	3.608E+02	2.424E-02

**Results (Continued)**

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m <sup>3</sup> /year)	(av ft <sup>3</sup> /min)	(Mg/year)	(m <sup>3</sup> /year)	(av ft <sup>3</sup> /min)
2058	7.797E+01	4.260E+04	2.862E+00	1.222E+00	3.408E+02	2.290E-02
2059	7.365E+01	4.024E+04	2.704E+00	1.154E+00	3.219E+02	2.163E-02
2060	6.957E+01	3.801E+04	2.554E+00	1.090E+00	3.041E+02	2.043E-02
2061	6.572E+01	3.590E+04	2.412E+00	1.030E+00	2.872E+02	1.930E-02
2062	6.208E+01	3.391E+04	2.279E+00	9.725E-01	2.713E+02	1.823E-02
2063	5.864E+01	3.203E+04	2.152E+00	9.186E-01	2.563E+02	1.722E-02
2064	5.539E+01	3.026E+04	2.033E+00	8.677E-01	2.421E+02	1.626E-02
2065	5.232E+01	2.858E+04	1.920E+00	8.196E-01	2.287E+02	1.536E-02
2066	4.942E+01	2.700E+04	1.814E+00	7.742E-01	2.160E+02	1.451E-02
2067	4.668E+01	2.550E+04	1.714E+00	7.313E-01	2.040E+02	1.371E-02
2068	4.410E+01	2.409E+04	1.619E+00	6.908E-01	1.927E+02	1.295E-02
2069	4.165E+01	2.276E+04	1.529E+00	6.525E-01	1.820E+02	1.223E-02
2070	3.935E+01	2.149E+04	1.444E+00	6.164E-01	1.720E+02	1.155E-02
2071	3.717E+01	2.030E+04	1.364E+00	5.822E-01	1.624E+02	1.091E-02
2072	3.511E+01	1.918E+04	1.289E+00	5.500E-01	1.534E+02	1.031E-02
2073	3.316E+01	1.812E+04	1.217E+00	5.195E-01	1.449E+02	9.738E-03
2074	3.132E+01	1.711E+04	1.150E+00	4.907E-01	1.369E+02	9.198E-03
2075	2.959E+01	1.616E+04	1.086E+00	4.635E-01	1.293E+02	8.689E-03
2076	2.795E+01	1.527E+04	1.026E+00	4.378E-01	1.221E+02	8.207E-03
2077	2.640E+01	1.442E+04	9.691E-01	4.136E-01	1.154E+02	7.752E-03
2078	2.494E+01	1.362E+04	9.154E-01	3.907E-01	1.090E+02	7.323E-03
2079	2.356E+01	1.287E+04	8.646E-01	3.690E-01	1.029E+02	6.917E-03
2080	2.225E+01	1.216E+04	8.167E-01	3.486E-01	9.725E+01	6.534E-03
2081	2.102E+01	1.148E+04	7.715E-01	3.293E-01	9.186E+01	6.172E-03
2082	1.985E+01	1.085E+04	7.287E-01	3.110E-01	8.677E+01	5.830E-03
2083	1.875E+01	1.025E+04	6.884E-01	2.938E-01	8.196E+01	5.507E-03
2084	1.771E+01	9.677E+03	6.502E-01	2.775E-01	7.742E+01	5.202E-03
2085	1.673E+01	9.141E+03	6.142E-01	2.621E-01	7.313E+01	4.914E-03
2086	1.581E+01	8.635E+03	5.802E-01	2.476E-01	6.908E+01	4.641E-03
2087	1.493E+01	8.156E+03	5.480E-01	2.339E-01	6.525E+01	4.384E-03
2088	1.410E+01	7.704E+03	5.177E-01	2.209E-01	6.164E+01	4.141E-03
2089	1.332E+01	7.278E+03	4.890E-01	2.087E-01	5.822E+01	3.912E-03
2090	1.258E+01	6.874E+03	4.619E-01	1.971E-01	5.499E+01	3.695E-03
2091	1.189E+01	6.493E+03	4.363E-01	1.862E-01	5.195E+01	3.490E-03
2092	1.123E+01	6.134E+03	4.121E-01	1.759E-01	4.907E+01	3.297E-03
2093	1.061E+01	5.794E+03	3.893E-01	1.661E-01	4.635E+01	3.114E-03
2094	1.002E+01	5.473E+03	3.677E-01	1.569E-01	4.378E+01	2.942E-03
2095	9.463E+00	5.170E+03	3.473E-01	1.482E-01	4.136E+01	2.779E-03
2096	8.939E+00	4.883E+03	3.281E-01	1.400E-01	3.907E+01	2.625E-03
2097	8.443E+00	4.613E+03	3.099E-01	1.323E-01	3.690E+01	2.479E-03



## Summary Report

**Landfill Name or Identifier:** Former Welby Landfill Simulation 2

**Date:** Monday, 16 May 2022

### Description/Comments:

### About LandGEM:

First-Order Decomposition Rate Equation:

$$Q_{CH_4} = \sum_{i=1}^n \sum_{j=0.1}^1 kL_o \left( \frac{M_i}{10} \right) e^{-kt_{ij}}$$

Where,

$Q_{CH_4}$  = annual methane generation in the year of the calculation ( $m^3/year$ )

$i$  = 1-year time increment

$n$  = (year of the calculation) - (initial year of waste acceptance)

$j$  = 0.1-year time increment

$k$  = methane generation rate ( $year^{-1}$ )

$L_o$  = potential methane generation capacity ( $m^3/Mg$ )

$M_i$  = mass of waste accepted in the  $i^{th}$  year ( $Mg$ )

$t_{ij}$  = age of the  $j^{th}$  section of waste mass  $M_i$  accepted in the  $i^{th}$  year (*decimal years*, e.g., 3.2 years)

LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model defaults are based on empirical data from U.S. landfills. Field test data can also be used in place of model defaults when available. Further guidance on EPA test methods, Clean Air Act (CAA) regulations, and other guidance regarding landfill gas emissions and control technology requirements can be found at <http://www.epa.gov/ttnatw01/landfill/landflpg.html>.

LandGEM is considered a screening tool — the better the input data, the better the estimates. Often, there are limitations with the available data regarding waste quantity and composition, variation in design and operating practices over time, and changes occurring over time that impact the emissions potential. Changes to landfill operation, such as operating under wet conditions through leachate recirculation or other liquid additions, will result in generating more gas at a faster rate. Defaults for estimating emissions for this type of operation are being developed to include in LandGEM along with defaults for conventional landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

**Input Review**

## LANDFILL CHARACTERISTICS

Landfill Open Year	<b>1957</b>	
Landfill Closure Year (with 80-year limit)	<b>2002</b>	
Actual Closure Year (without limit)	<b>2002</b>	
Have Model Calculate Closure Year?	<b>No</b>	
Waste Design Capacity		<i>megagrams</i>

## MODEL PARAMETERS

Methane Generation Rate, k	<b>0.020</b>	<i>year<sup>-1</sup></i>
Potential Methane Generation Capacity, L <sub>0</sub>	<b>170</b>	<i>m<sup>3</sup>/Mg</i>
NMOC Concentration	<b>4,000</b>	<i>ppmv as hexane</i>
Methane Content	<b>50</b>	<i>% by volume</i>

## GASES / POLLUTANTS SELECTED

Gas / Pollutant #1:	<b>Total landfill gas</b>
Gas / Pollutant #2:	<b>Methane</b>
Gas / Pollutant #3:	<b>Carbon dioxide</b>
Gas / Pollutant #4:	<b>NMOC</b>

## WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	(short tons/year)	(Mg)	(short tons)
1957	8,553	9,408	0	0
1958	8,553	9,408	8,553	9,408
1959	8,553	9,408	17,106	18,817
1960	8,553	9,408	25,659	28,225
1961	8,553	9,408	34,212	37,633
1962	8,553	9,408	42,765	47,042
1963	8,553	9,408	51,318	56,450
1964	8,553	9,408	59,871	65,858
1965	8,553	9,408	68,424	75,266
1966	8,553	9,408	76,977	84,675
1967	8,553	9,408	85,530	94,083
1968	8,553	9,408	94,083	103,491
1969	8,553	9,408	102,636	112,900
1970	8,553	9,408	111,189	122,308
1971	8,553	9,408	119,742	131,716
1972	8,553	9,408	128,295	141,125
1973	8,553	9,408	136,848	150,533
1974	8,553	9,408	145,401	159,941
1975	8,553	9,408	153,954	169,349
1976	8,553	9,408	162,507	178,758
1977	8,553	9,408	171,060	188,166
1978	8,553	9,408	179,613	197,574
1979	8,553	9,408	188,166	206,983
1980	8,553	9,408	196,719	216,391
1981	8,553	9,408	205,272	225,799
1982	8,553	9,408	213,825	235,208
1983	8,553	9,408	222,378	244,616
1984	8,553	9,408	230,931	254,024
1985	8,553	9,408	239,484	263,432
1986	8,553	9,408	248,037	272,841
1987	8,553	9,408	256,590	282,249
1988	8,553	9,408	265,143	291,657
1989	8,553	9,408	273,696	301,066
1990	8,553	9,408	282,249	310,474
1991	8,553	9,408	290,802	319,882
1992	8,553	9,408	299,355	329,291
1993	8,553	9,408	307,908	338,699
1994	8,553	9,408	316,461	348,107
1995	8,553	9,408	325,014	357,515
1996	8,553	9,408	333,567	366,924

## WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	(short tons/year)	(Mg)	(short tons)
1997	8,553	9,408	342,120	376,332
1998	8,553	9,408	350,673	385,740
1999	8,553	9,408	359,226	395,149
2000	8,553	9,408	367,779	404,557
2001	8,553	9,408	376,332	413,965
2002	8,553	9,408	384,885	423,374
2003	0	0	393,438	432,782
2004	0	0	393,438	432,782
2005	0	0	393,438	432,782
2006	0	0	393,438	432,782
2007	0	0	393,438	432,782
2008	0	0	393,438	432,782
2009	0	0	393,438	432,782
2010	0	0	393,438	432,782
2011	0	0	393,438	432,782
2012	0	0	393,438	432,782
2013	0	0	393,438	432,782
2014	0	0	393,438	432,782
2015	0	0	393,438	432,782
2016	0	0	393,438	432,782
2017	0	0	393,438	432,782
2018	0	0	393,438	432,782
2019	0	0	393,438	432,782
2020	0	0	393,438	432,782
2021	0	0	393,438	432,782
2022	0	0	393,438	432,782
2023	0	0	393,438	432,782
2024	0	0	393,438	432,782
2025	0	0	393,438	432,782
2026	0	0	393,438	432,782
2027	0	0	393,438	432,782
2028	0	0	393,438	432,782
2029	0	0	393,438	432,782
2030	0	0	393,438	432,782
2031	0	0	393,438	432,782
2032	0	0	393,438	432,782
2033	0	0	393,438	432,782
2034	0	0	393,438	432,782
2035	0	0	393,438	432,782
2036	0	0	393,438	432,782

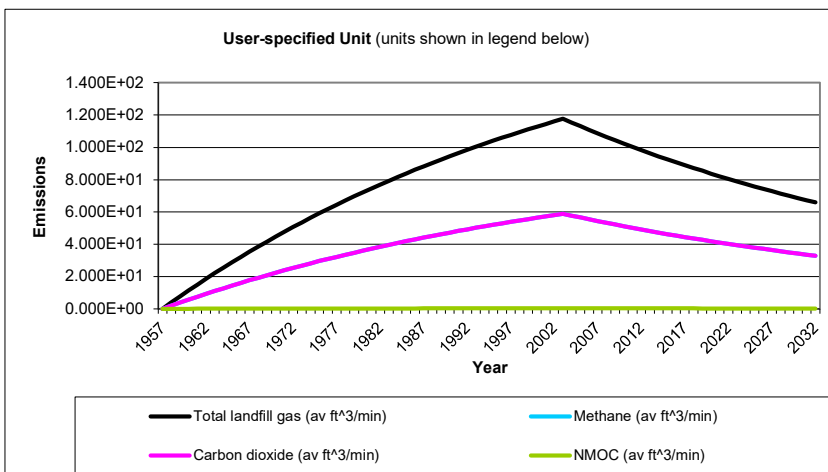
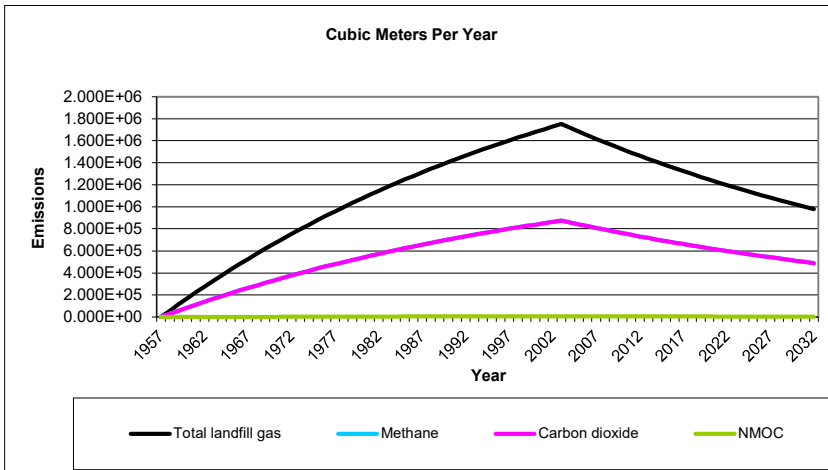
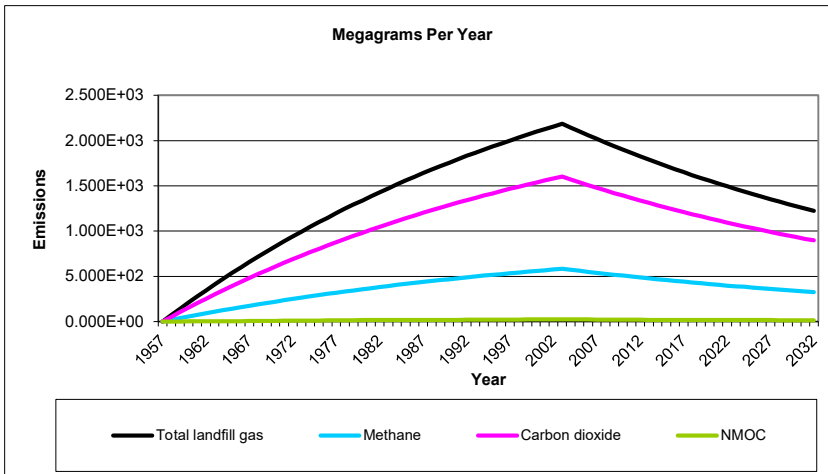


**Pollutant Parameters**

<b>Gas / Pollutant Default Parameters:</b>				<b>User-specified Pollutant Parameters:</b>	
	Compound	Concentration (ppmv)	Molecular Weight	Concentration (ppmv)	Molecular Weight
<b>Gases</b>	Total landfill gas		0.00		
	Methane		16.04		
	Carbon dioxide		44.01		
	NMOC	4,000	86.18		
<b>Pollutants</b>	1,1,1-Trichloroethane (methyl chloroform) - HAP	0.48	133.41		
	1,1,1,2,2- Tetrachloroethane - HAP/VOC	1.1	167.85		
	1,1-Dichloroethane (ethylidene dichloride) - HAP/VOC	2.4	98.97		
	1,1-Dichloroethene (vinylidene chloride) - HAP/VOC	0.20	96.94		
	1,2-Dichloroethane (ethylene dichloride) - HAP/VOC	0.41	98.96		
	1,2-Dichloropropane (propylene dichloride) - HAP/VOC	0.18	112.99		
	2-Propanol (isopropyl alcohol) - VOC	50	60.11		
	Acetone	7.0	58.08		
	Acrylonitrile - HAP/VOC	6.3	53.06		
	Benzene - No or Unknown Co-disposal - HAP/VOC	1.9	78.11		
	Benzene - Co-disposal - HAP/VOC	11	78.11		
	Bromodichloromethane - VOC	3.1	163.83		
	Butane - VOC	5.0	58.12		
	Carbon disulfide - HAP/VOC	0.58	76.13		
	Carbon monoxide	140	28.01		
	Carbon tetrachloride - HAP/VOC	4.0E-03	153.84		
	Carbonyl sulfide - HAP/VOC	0.49	60.07		
	Chlorobenzene - HAP/VOC	0.25	112.56		
	Chlorodifluoromethane	1.3	86.47		
	Chloroethane (ethyl chloride) - HAP/VOC	1.3	64.52		
	Chloroform - HAP/VOC	0.03	119.39		
	Chloromethane - VOC	1.2	50.49		
	Dichlorobenzene - (HAP for para isomer/VOC)	0.21	147		
	Dichlorodifluoromethane	16	120.91		
	Dichlorofluoromethane - VOC	2.6	102.92		
	Dichloromethane (methylene chloride) - HAP	14	84.94		
	Dimethyl sulfide (methyl sulfide) - VOC	7.8	62.13		
	Ethane	890	30.07		
	Ethanol - VOC	27	46.08		



**Graphs**



## Results

Year	Total landfill gas			Methane		
	(Mg/year)	(m <sup>3</sup> /year)	(av ft <sup>3</sup> /min)	(Mg/year)	(m <sup>3</sup> /year)	(av ft <sup>3</sup> /min)
1957	0	0	0	0	0	0
1958	7.198E+01	5.764E+04	3.873E+00	1.923E+01	2.882E+04	1.936E+00
1959	1.425E+02	1.141E+05	7.669E+00	3.807E+01	5.707E+04	3.834E+00
1960	2.117E+02	1.695E+05	1.139E+01	5.655E+01	8.476E+04	5.695E+00
1961	2.795E+02	2.238E+05	1.504E+01	7.465E+01	1.119E+05	7.519E+00
1962	3.459E+02	2.770E+05	1.861E+01	9.240E+01	1.385E+05	9.306E+00
1963	4.111E+02	3.292E+05	2.212E+01	1.098E+02	1.646E+05	1.106E+01
1964	4.749E+02	3.803E+05	2.555E+01	1.269E+02	1.901E+05	1.278E+01
1965	5.375E+02	4.304E+05	2.892E+01	1.436E+02	2.152E+05	1.446E+01
1966	5.988E+02	4.795E+05	3.222E+01	1.600E+02	2.398E+05	1.611E+01
1967	6.590E+02	5.277E+05	3.545E+01	1.760E+02	2.638E+05	1.773E+01
1968	7.179E+02	5.749E+05	3.862E+01	1.918E+02	2.874E+05	1.931E+01
1969	7.757E+02	6.211E+05	4.173E+01	2.072E+02	3.106E+05	2.087E+01
1970	8.323E+02	6.665E+05	4.478E+01	2.223E+02	3.332E+05	2.239E+01
1971	8.878E+02	7.109E+05	4.777E+01	2.371E+02	3.554E+05	2.388E+01
1972	9.422E+02	7.545E+05	5.069E+01	2.517E+02	3.772E+05	2.535E+01
1973	9.955E+02	7.972E+05	5.356E+01	2.659E+02	3.986E+05	2.678E+01
1974	1.048E+03	8.390E+05	5.637E+01	2.799E+02	4.195E+05	2.819E+01
1975	1.099E+03	8.800E+05	5.913E+01	2.936E+02	4.400E+05	2.956E+01
1976	1.149E+03	9.203E+05	6.183E+01	3.070E+02	4.601E+05	3.092E+01
1977	1.198E+03	9.597E+05	6.448E+01	3.201E+02	4.798E+05	3.224E+01
1978	1.247E+03	9.983E+05	6.708E+01	3.330E+02	4.992E+05	3.354E+01
1979	1.294E+03	1.036E+06	6.962E+01	3.456E+02	5.181E+05	3.481E+01
1980	1.340E+03	1.073E+06	7.212E+01	3.580E+02	5.367E+05	3.606E+01
1981	1.386E+03	1.110E+06	7.456E+01	3.702E+02	5.548E+05	3.728E+01
1982	1.430E+03	1.145E+06	7.696E+01	3.821E+02	5.727E+05	3.848E+01
1983	1.474E+03	1.180E+06	7.931E+01	3.937E+02	5.902E+05	3.965E+01
1984	1.517E+03	1.215E+06	8.161E+01	4.052E+02	6.073E+05	4.080E+01
1985	1.559E+03	1.248E+06	8.387E+01	4.164E+02	6.241E+05	4.193E+01
1986	1.600E+03	1.281E+06	8.608E+01	4.273E+02	6.406E+05	4.304E+01
1987	1.640E+03	1.313E+06	8.825E+01	4.381E+02	6.567E+05	4.412E+01
1988	1.680E+03	1.345E+06	9.037E+01	4.487E+02	6.725E+05	4.519E+01
1989	1.718E+03	1.376E+06	9.245E+01	4.590E+02	6.880E+05	4.623E+01
1990	1.756E+03	1.406E+06	9.450E+01	4.691E+02	7.032E+05	4.725E+01
1991	1.794E+03	1.436E+06	9.650E+01	4.791E+02	7.181E+05	4.825E+01
1992	1.830E+03	1.465E+06	9.846E+01	4.888E+02	7.327E+05	4.923E+01
1993	1.866E+03	1.494E+06	1.004E+02	4.984E+02	7.470E+05	5.019E+01
1994	1.901E+03	1.522E+06	1.023E+02	5.077E+02	7.610E+05	5.113E+01
1995	1.935E+03	1.550E+06	1.041E+02	5.169E+02	7.748E+05	5.206E+01
1996	1.969E+03	1.577E+06	1.059E+02	5.259E+02	7.883E+05	5.296E+01
1997	2.002E+03	1.603E+06	1.077E+02	5.347E+02	8.015E+05	5.385E+01
1998	2.034E+03	1.629E+06	1.094E+02	5.433E+02	8.144E+05	5.472E+01
1999	2.066E+03	1.654E+06	1.111E+02	5.518E+02	8.271E+05	5.557E+01
2000	2.097E+03	1.679E+06	1.128E+02	5.601E+02	8.396E+05	5.641E+01
2001	2.127E+03	1.704E+06	1.145E+02	5.683E+02	8.518E+05	5.723E+01
2002	2.157E+03	1.727E+06	1.161E+02	5.762E+02	8.637E+05	5.803E+01
2003	2.187E+03	1.751E+06	1.176E+02	5.840E+02	8.754E+05	5.882E+01
2004	2.143E+03	1.716E+06	1.153E+02	5.725E+02	8.581E+05	5.766E+01
2005	2.101E+03	1.682E+06	1.130E+02	5.611E+02	8.411E+05	5.651E+01
2006	2.059E+03	1.649E+06	1.108E+02	5.500E+02	8.245E+05	5.539E+01

**Results (Continued)**

Year	Total landfill gas			Methane		
	(Mg/year)	(m <sup>3</sup> /year)	(av ft <sup>3</sup> /min)	(Mg/year)	(m <sup>3</sup> /year)	(av ft <sup>3</sup> /min)
2007	2.018E+03	1.616E+06	1.086E+02	5.391E+02	8.081E+05	5.430E+01
2008	1.978E+03	1.584E+06	1.064E+02	5.285E+02	7.921E+05	5.322E+01
2009	1.939E+03	1.553E+06	1.043E+02	5.180E+02	7.764E+05	5.217E+01
2010	1.901E+03	1.522E+06	1.023E+02	5.077E+02	7.611E+05	5.114E+01
2011	1.863E+03	1.492E+06	1.002E+02	4.977E+02	7.460E+05	5.012E+01
2012	1.826E+03	1.462E+06	9.826E+01	4.878E+02	7.312E+05	4.913E+01
2013	1.790E+03	1.433E+06	9.632E+01	4.782E+02	7.167E+05	4.816E+01
2014	1.755E+03	1.405E+06	9.441E+01	4.687E+02	7.026E+05	4.720E+01
2015	1.720E+03	1.377E+06	9.254E+01	4.594E+02	6.886E+05	4.627E+01
2016	1.686E+03	1.350E+06	9.071E+01	4.503E+02	6.750E+05	4.535E+01
2017	1.653E+03	1.323E+06	8.891E+01	4.414E+02	6.616E+05	4.446E+01
2018	1.620E+03	1.297E+06	8.715E+01	4.327E+02	6.485E+05	4.358E+01
2019	1.588E+03	1.271E+06	8.542E+01	4.241E+02	6.357E+05	4.271E+01
2020	1.556E+03	1.246E+06	8.373E+01	4.157E+02	6.231E+05	4.187E+01
2021	1.525E+03	1.222E+06	8.208E+01	4.075E+02	6.108E+05	4.104E+01
2022	1.495E+03	1.197E+06	8.045E+01	3.994E+02	5.987E+05	4.022E+01
2023	1.466E+03	1.174E+06	7.886E+01	3.915E+02	5.868E+05	3.943E+01
2024	1.437E+03	1.150E+06	7.730E+01	3.837E+02	5.752E+05	3.865E+01
2025	1.408E+03	1.128E+06	7.576E+01	3.761E+02	5.638E+05	3.788E+01
2026	1.380E+03	1.105E+06	7.426E+01	3.687E+02	5.526E+05	3.713E+01
2027	1.353E+03	1.083E+06	7.279E+01	3.614E+02	5.417E+05	3.640E+01
2028	1.326E+03	1.062E+06	7.135E+01	3.542E+02	5.310E+05	3.568E+01
2029	1.300E+03	1.041E+06	6.994E+01	3.472E+02	5.205E+05	3.497E+01
2030	1.274E+03	1.020E+06	6.855E+01	3.404E+02	5.102E+05	3.428E+01
2031	1.249E+03	1.000E+06	6.720E+01	3.336E+02	5.001E+05	3.360E+01
2032	1.224E+03	9.803E+05	6.587E+01	3.270E+02	4.902E+05	3.293E+01
2033	1.200E+03	9.609E+05	6.456E+01	3.205E+02	4.804E+05	3.228E+01
2034	1.176E+03	9.419E+05	6.328E+01	3.142E+02	4.709E+05	3.164E+01
2035	1.153E+03	9.232E+05	6.203E+01	3.080E+02	4.616E+05	3.102E+01
2036	1.130E+03	9.049E+05	6.080E+01	3.019E+02	4.525E+05	3.040E+01
2037	1.108E+03	8.870E+05	5.960E+01	2.959E+02	4.435E+05	2.980E+01
2038	1.086E+03	8.695E+05	5.842E+01	2.900E+02	4.347E+05	2.921E+01
2039	1.064E+03	8.522E+05	5.726E+01	2.843E+02	4.261E+05	2.863E+01
2040	1.043E+03	8.354E+05	5.613E+01	2.787E+02	4.177E+05	2.806E+01
2041	1.023E+03	8.188E+05	5.502E+01	2.731E+02	4.094E+05	2.751E+01
2042	1.002E+03	8.026E+05	5.393E+01	2.677E+02	4.013E+05	2.696E+01
2043	9.825E+02	7.867E+05	5.286E+01	2.624E+02	3.934E+05	2.643E+01
2044	9.630E+02	7.711E+05	5.181E+01	2.572E+02	3.856E+05	2.591E+01
2045	9.439E+02	7.559E+05	5.079E+01	2.521E+02	3.779E+05	2.539E+01
2046	9.253E+02	7.409E+05	4.978E+01	2.471E+02	3.705E+05	2.489E+01
2047	9.069E+02	7.262E+05	4.880E+01	2.423E+02	3.631E+05	2.440E+01
2048	8.890E+02	7.118E+05	4.783E+01	2.375E+02	3.559E+05	2.391E+01
2049	8.714E+02	6.978E+05	4.688E+01	2.328E+02	3.489E+05	2.344E+01
2050	8.541E+02	6.839E+05	4.595E+01	2.281E+02	3.420E+05	2.298E+01
2051	8.372E+02	6.704E+05	4.504E+01	2.236E+02	3.352E+05	2.252E+01
2052	8.206E+02	6.571E+05	4.415E+01	2.192E+02	3.286E+05	2.208E+01
2053	8.044E+02	6.441E+05	4.328E+01	2.149E+02	3.221E+05	2.164E+01
2054	7.885E+02	6.314E+05	4.242E+01	2.106E+02	3.157E+05	2.121E+01
2055	7.728E+02	6.189E+05	4.158E+01	2.064E+02	3.094E+05	2.079E+01
2056	7.575E+02	6.066E+05	4.076E+01	2.023E+02	3.033E+05	2.038E+01
2057	7.425E+02	5.946E+05	3.995E+01	1.983E+02	2.973E+05	1.998E+01

**Results (Continued)**

Year	Total landfill gas			Methane		
	(Mg/year)	(m <sup>3</sup> /year)	(av ft <sup>3</sup> /min)	(Mg/year)	(m <sup>3</sup> /year)	(av ft <sup>3</sup> /min)
2058	7.278E+02	5.828E+05	3.916E+01	1.944E+02	2.914E+05	1.958E+01
2059	7.134E+02	5.713E+05	3.838E+01	1.906E+02	2.856E+05	1.919E+01
2060	6.993E+02	5.600E+05	3.762E+01	1.868E+02	2.800E+05	1.881E+01
2061	6.854E+02	5.489E+05	3.688E+01	1.831E+02	2.744E+05	1.844E+01
2062	6.719E+02	5.380E+05	3.615E+01	1.795E+02	2.690E+05	1.807E+01
2063	6.586E+02	5.274E+05	3.543E+01	1.759E+02	2.637E+05	1.772E+01
2064	6.455E+02	5.169E+05	3.473E+01	1.724E+02	2.585E+05	1.737E+01
2065	6.327E+02	5.067E+05	3.404E+01	1.690E+02	2.533E+05	1.702E+01
2066	6.202E+02	4.966E+05	3.337E+01	1.657E+02	2.483E+05	1.668E+01
2067	6.079E+02	4.868E+05	3.271E+01	1.624E+02	2.434E+05	1.635E+01
2068	5.959E+02	4.772E+05	3.206E+01	1.592E+02	2.386E+05	1.603E+01
2069	5.841E+02	4.677E+05	3.143E+01	1.560E+02	2.339E+05	1.571E+01
2070	5.725E+02	4.585E+05	3.080E+01	1.529E+02	2.292E+05	1.540E+01
2071	5.612E+02	4.494E+05	3.019E+01	1.499E+02	2.247E+05	1.510E+01
2072	5.501E+02	4.405E+05	2.960E+01	1.469E+02	2.202E+05	1.480E+01
2073	5.392E+02	4.318E+05	2.901E+01	1.440E+02	2.159E+05	1.450E+01
2074	5.285E+02	4.232E+05	2.844E+01	1.412E+02	2.116E+05	1.422E+01
2075	5.180E+02	4.148E+05	2.787E+01	1.384E+02	2.074E+05	1.394E+01
2076	5.078E+02	4.066E+05	2.732E+01	1.356E+02	2.033E+05	1.366E+01
2077	4.977E+02	3.986E+05	2.678E+01	1.330E+02	1.993E+05	1.339E+01
2078	4.879E+02	3.907E+05	2.625E+01	1.303E+02	1.953E+05	1.312E+01
2079	4.782E+02	3.829E+05	2.573E+01	1.277E+02	1.915E+05	1.286E+01
2080	4.687E+02	3.754E+05	2.522E+01	1.252E+02	1.877E+05	1.261E+01
2081	4.595E+02	3.679E+05	2.472E+01	1.227E+02	1.840E+05	1.236E+01
2082	4.504E+02	3.606E+05	2.423E+01	1.203E+02	1.803E+05	1.212E+01
2083	4.415E+02	3.535E+05	2.375E+01	1.179E+02	1.767E+05	1.188E+01
2084	4.327E+02	3.465E+05	2.328E+01	1.156E+02	1.732E+05	1.164E+01
2085	4.241E+02	3.396E+05	2.282E+01	1.133E+02	1.698E+05	1.141E+01
2086	4.157E+02	3.329E+05	2.237E+01	1.110E+02	1.665E+05	1.118E+01
2087	4.075E+02	3.263E+05	2.193E+01	1.089E+02	1.632E+05	1.096E+01
2088	3.994E+02	3.199E+05	2.149E+01	1.067E+02	1.599E+05	1.075E+01
2089	3.915E+02	3.135E+05	2.107E+01	1.046E+02	1.568E+05	1.053E+01
2090	3.838E+02	3.073E+05	2.065E+01	1.025E+02	1.537E+05	1.032E+01
2091	3.762E+02	3.012E+05	2.024E+01	1.005E+02	1.506E+05	1.012E+01
2092	3.687E+02	2.953E+05	1.984E+01	9.849E+01	1.476E+05	9.919E+00
2093	3.614E+02	2.894E+05	1.945E+01	9.654E+01	1.447E+05	9.723E+00
2094	3.543E+02	2.837E+05	1.906E+01	9.463E+01	1.418E+05	9.530E+00
2095	3.473E+02	2.781E+05	1.868E+01	9.276E+01	1.390E+05	9.342E+00
2096	3.404E+02	2.726E+05	1.831E+01	9.092E+01	1.363E+05	9.157E+00
2097	3.336E+02	2.672E+05	1.795E+01	8.912E+01	1.336E+05	8.975E+00

**Results (Continued)**

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m <sup>3</sup> /year)	(av ft <sup>3</sup> /min)	(Mg/year)	(m <sup>3</sup> /year)	(av ft <sup>3</sup> /min)
1957	0	0	0	0	0	0
1958	5.276E+01	2.882E+04	1.936E+00	8.264E-01	2.306E+02	1.549E-02
1959	1.045E+02	5.707E+04	3.834E+00	1.637E+00	4.566E+02	3.068E-02
1960	1.552E+02	8.476E+04	5.695E+00	2.431E+00	6.781E+02	4.556E-02
1961	2.048E+02	1.119E+05	7.519E+00	3.209E+00	8.952E+02	6.015E-02
1962	2.535E+02	1.385E+05	9.306E+00	3.972E+00	1.108E+03	7.445E-02
1963	3.013E+02	1.646E+05	1.106E+01	4.720E+00	1.317E+03	8.847E-02
1964	3.481E+02	1.901E+05	1.278E+01	5.453E+00	1.521E+03	1.022E-01
1965	3.939E+02	2.152E+05	1.446E+01	6.171E+00	1.722E+03	1.157E-01
1966	4.389E+02	2.398E+05	1.611E+01	6.875E+00	1.918E+03	1.289E-01
1967	4.829E+02	2.638E+05	1.773E+01	7.566E+00	2.111E+03	1.418E-01
1968	5.261E+02	2.874E+05	1.931E+01	8.242E+00	2.299E+03	1.545E-01
1969	5.685E+02	3.106E+05	2.087E+01	8.905E+00	2.484E+03	1.669E-01
1970	6.100E+02	3.332E+05	2.239E+01	9.556E+00	2.666E+03	1.791E-01
1971	6.506E+02	3.554E+05	2.388E+01	1.019E+01	2.844E+03	1.911E-01
1972	6.905E+02	3.772E+05	2.535E+01	1.082E+01	3.018E+03	2.028E-01
1973	7.296E+02	3.986E+05	2.678E+01	1.143E+01	3.189E+03	2.142E-01
1974	7.679E+02	4.195E+05	2.819E+01	1.203E+01	3.356E+03	2.255E-01
1975	8.055E+02	4.400E+05	2.956E+01	1.262E+01	3.520E+03	2.365E-01
1976	8.423E+02	4.601E+05	3.092E+01	1.319E+01	3.681E+03	2.473E-01
1977	8.783E+02	4.798E+05	3.224E+01	1.376E+01	3.839E+03	2.579E-01
1978	9.137E+02	4.992E+05	3.354E+01	1.431E+01	3.993E+03	2.683E-01
1979	9.484E+02	5.181E+05	3.481E+01	1.486E+01	4.145E+03	2.785E-01
1980	9.823E+02	5.367E+05	3.606E+01	1.539E+01	4.293E+03	2.885E-01
1981	1.016E+03	5.548E+05	3.728E+01	1.591E+01	4.439E+03	2.982E-01
1982	1.048E+03	5.727E+05	3.848E+01	1.642E+01	4.581E+03	3.078E-01
1983	1.080E+03	5.902E+05	3.965E+01	1.692E+01	4.721E+03	3.172E-01
1984	1.112E+03	6.073E+05	4.080E+01	1.741E+01	4.858E+03	3.264E-01
1985	1.142E+03	6.241E+05	4.193E+01	1.790E+01	4.993E+03	3.355E-01
1986	1.173E+03	6.406E+05	4.304E+01	1.837E+01	5.124E+03	3.443E-01
1987	1.202E+03	6.567E+05	4.412E+01	1.883E+01	5.254E+03	3.530E-01
1988	1.231E+03	6.725E+05	4.519E+01	1.928E+01	5.380E+03	3.615E-01
1989	1.259E+03	6.880E+05	4.623E+01	1.973E+01	5.504E+03	3.698E-01
1990	1.287E+03	7.032E+05	4.725E+01	2.016E+01	5.626E+03	3.780E-01
1991	1.314E+03	7.181E+05	4.825E+01	2.059E+01	5.745E+03	3.860E-01
1992	1.341E+03	7.327E+05	4.923E+01	2.101E+01	5.862E+03	3.938E-01
1993	1.367E+03	7.470E+05	5.019E+01	2.142E+01	5.976E+03	4.015E-01
1994	1.393E+03	7.610E+05	5.113E+01	2.182E+01	6.088E+03	4.091E-01
1995	1.418E+03	7.748E+05	5.206E+01	2.222E+01	6.198E+03	4.165E-01
1996	1.443E+03	7.883E+05	5.296E+01	2.260E+01	6.306E+03	4.237E-01
1997	1.467E+03	8.015E+05	5.385E+01	2.298E+01	6.412E+03	4.308E-01
1998	1.491E+03	8.144E+05	5.472E+01	2.335E+01	6.515E+03	4.378E-01
1999	1.514E+03	8.271E+05	5.557E+01	2.372E+01	6.617E+03	4.446E-01
2000	1.537E+03	8.396E+05	5.641E+01	2.408E+01	6.717E+03	4.513E-01
2001	1.559E+03	8.518E+05	5.723E+01	2.442E+01	6.814E+03	4.578E-01
2002	1.581E+03	8.637E+05	5.803E+01	2.477E+01	6.910E+03	4.643E-01
2003	1.602E+03	8.754E+05	5.882E+01	2.510E+01	7.003E+03	4.706E-01
2004	1.571E+03	8.581E+05	5.766E+01	2.461E+01	6.865E+03	4.612E-01
2005	1.540E+03	8.411E+05	5.651E+01	2.412E+01	6.729E+03	4.521E-01
2006	1.509E+03	8.245E+05	5.539E+01	2.364E+01	6.596E+03	4.432E-01

**Results (Continued)**

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m <sup>3</sup> /year)	(av ft <sup>3</sup> /min)	(Mg/year)	(m <sup>3</sup> /year)	(av ft <sup>3</sup> /min)
2007	1.479E+03	8.081E+05	5.430E+01	2.317E+01	6.465E+03	4.344E-01
2008	1.450E+03	7.921E+05	5.322E+01	2.271E+01	6.337E+03	4.258E-01
2009	1.421E+03	7.764E+05	5.217E+01	2.227E+01	6.212E+03	4.174E-01
2010	1.393E+03	7.611E+05	5.114E+01	2.182E+01	6.089E+03	4.091E-01
2011	1.366E+03	7.460E+05	5.012E+01	2.139E+01	5.968E+03	4.010E-01
2012	1.339E+03	7.312E+05	4.913E+01	2.097E+01	5.850E+03	3.930E-01
2013	1.312E+03	7.167E+05	4.816E+01	2.055E+01	5.734E+03	3.853E-01
2014	1.286E+03	7.026E+05	4.720E+01	2.015E+01	5.620E+03	3.776E-01
2015	1.261E+03	6.886E+05	4.627E+01	1.975E+01	5.509E+03	3.702E-01
2016	1.236E+03	6.750E+05	4.535E+01	1.936E+01	5.400E+03	3.628E-01
2017	1.211E+03	6.616E+05	4.446E+01	1.897E+01	5.293E+03	3.556E-01
2018	1.187E+03	6.485E+05	4.358E+01	1.860E+01	5.188E+03	3.486E-01
2019	1.164E+03	6.357E+05	4.271E+01	1.823E+01	5.086E+03	3.417E-01
2020	1.141E+03	6.231E+05	4.187E+01	1.787E+01	4.985E+03	3.349E-01
2021	1.118E+03	6.108E+05	4.104E+01	1.751E+01	4.886E+03	3.283E-01
2022	1.096E+03	5.987E+05	4.022E+01	1.717E+01	4.789E+03	3.218E-01
2023	1.074E+03	5.868E+05	3.943E+01	1.683E+01	4.695E+03	3.154E-01
2024	1.053E+03	5.752E+05	3.865E+01	1.649E+01	4.602E+03	3.092E-01
2025	1.032E+03	5.638E+05	3.788E+01	1.617E+01	4.510E+03	3.031E-01
2026	1.012E+03	5.526E+05	3.713E+01	1.585E+01	4.421E+03	2.971E-01
2027	9.916E+02	5.417E+05	3.640E+01	1.553E+01	4.334E+03	2.912E-01
2028	9.720E+02	5.310E+05	3.568E+01	1.523E+01	4.248E+03	2.854E-01
2029	9.527E+02	5.205E+05	3.497E+01	1.492E+01	4.164E+03	2.798E-01
2030	9.338E+02	5.102E+05	3.428E+01	1.463E+01	4.081E+03	2.742E-01
2031	9.154E+02	5.001E+05	3.360E+01	1.434E+01	4.000E+03	2.688E-01
2032	8.972E+02	4.902E+05	3.293E+01	1.406E+01	3.921E+03	2.635E-01
2033	8.795E+02	4.804E+05	3.228E+01	1.378E+01	3.844E+03	2.583E-01
2034	8.620E+02	4.709E+05	3.164E+01	1.350E+01	3.767E+03	2.531E-01
2035	8.450E+02	4.616E+05	3.102E+01	1.324E+01	3.693E+03	2.481E-01
2036	8.282E+02	4.525E+05	3.040E+01	1.297E+01	3.620E+03	2.432E-01
2037	8.118E+02	4.435E+05	2.980E+01	1.272E+01	3.548E+03	2.384E-01
2038	7.958E+02	4.347E+05	2.921E+01	1.247E+01	3.478E+03	2.337E-01
2039	7.800E+02	4.261E+05	2.863E+01	1.222E+01	3.409E+03	2.290E-01
2040	7.646E+02	4.177E+05	2.806E+01	1.198E+01	3.341E+03	2.245E-01
2041	7.494E+02	4.094E+05	2.751E+01	1.174E+01	3.275E+03	2.201E-01
2042	7.346E+02	4.013E+05	2.696E+01	1.151E+01	3.210E+03	2.157E-01
2043	7.200E+02	3.934E+05	2.643E+01	1.128E+01	3.147E+03	2.114E-01
2044	7.058E+02	3.856E+05	2.591E+01	1.106E+01	3.085E+03	2.073E-01
2045	6.918E+02	3.779E+05	2.539E+01	1.084E+01	3.023E+03	2.031E-01
2046	6.781E+02	3.705E+05	2.489E+01	1.062E+01	2.964E+03	1.991E-01
2047	6.647E+02	3.631E+05	2.440E+01	1.041E+01	2.905E+03	1.952E-01
2048	6.515E+02	3.559E+05	2.391E+01	1.021E+01	2.847E+03	1.913E-01
2049	6.386E+02	3.489E+05	2.344E+01	1.000E+01	2.791E+03	1.875E-01
2050	6.260E+02	3.420E+05	2.298E+01	9.806E+00	2.736E+03	1.838E-01
2051	6.136E+02	3.352E+05	2.252E+01	9.612E+00	2.682E+03	1.802E-01
2052	6.014E+02	3.286E+05	2.208E+01	9.422E+00	2.628E+03	1.766E-01
2053	5.895E+02	3.221E+05	2.164E+01	9.235E+00	2.576E+03	1.731E-01
2054	5.778E+02	3.157E+05	2.121E+01	9.052E+00	2.525E+03	1.697E-01
2055	5.664E+02	3.094E+05	2.079E+01	8.873E+00	2.475E+03	1.663E-01
2056	5.552E+02	3.033E+05	2.038E+01	8.697E+00	2.426E+03	1.630E-01
2057	5.442E+02	2.973E+05	1.998E+01	8.525E+00	2.378E+03	1.598E-01



**Results (Continued)**

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m <sup>3</sup> /year)	(av ft <sup>3</sup> /min)	(Mg/year)	(m <sup>3</sup> /year)	(av ft <sup>3</sup> /min)
2058	5.334E+02	2.914E+05	1.958E+01	8.356E+00	2.331E+03	1.566E-01
2059	5.229E+02	2.856E+05	1.919E+01	8.191E+00	2.285E+03	1.535E-01
2060	5.125E+02	2.800E+05	1.881E+01	8.029E+00	2.240E+03	1.505E-01
2061	5.024E+02	2.744E+05	1.844E+01	7.870E+00	2.195E+03	1.475E-01
2062	4.924E+02	2.690E+05	1.807E+01	7.714E+00	2.152E+03	1.446E-01
2063	4.827E+02	2.637E+05	1.772E+01	7.561E+00	2.109E+03	1.417E-01
2064	4.731E+02	2.585E+05	1.737E+01	7.411E+00	2.068E+03	1.389E-01
2065	4.637E+02	2.533E+05	1.702E+01	7.265E+00	2.027E+03	1.362E-01
2066	4.546E+02	2.483E+05	1.668E+01	7.121E+00	1.987E+03	1.335E-01
2067	4.455E+02	2.434E+05	1.635E+01	6.980E+00	1.947E+03	1.308E-01
2068	4.367E+02	2.386E+05	1.603E+01	6.842E+00	1.909E+03	1.282E-01
2069	4.281E+02	2.339E+05	1.571E+01	6.706E+00	1.871E+03	1.257E-01
2070	4.196E+02	2.292E+05	1.540E+01	6.573E+00	1.834E+03	1.232E-01
2071	4.113E+02	2.247E+05	1.510E+01	6.443E+00	1.798E+03	1.208E-01
2072	4.031E+02	2.202E+05	1.480E+01	6.316E+00	1.762E+03	1.184E-01
2073	3.952E+02	2.159E+05	1.450E+01	6.191E+00	1.727E+03	1.160E-01
2074	3.873E+02	2.116E+05	1.422E+01	6.068E+00	1.693E+03	1.137E-01
2075	3.797E+02	2.074E+05	1.394E+01	5.948E+00	1.659E+03	1.115E-01
2076	3.722E+02	2.033E+05	1.366E+01	5.830E+00	1.626E+03	1.093E-01
2077	3.648E+02	1.993E+05	1.339E+01	5.715E+00	1.594E+03	1.071E-01
2078	3.576E+02	1.953E+05	1.312E+01	5.601E+00	1.563E+03	1.050E-01
2079	3.505E+02	1.915E+05	1.286E+01	5.490E+00	1.532E+03	1.029E-01
2080	3.435E+02	1.877E+05	1.261E+01	5.382E+00	1.501E+03	1.009E-01
2081	3.367E+02	1.840E+05	1.236E+01	5.275E+00	1.472E+03	9.888E-02
2082	3.301E+02	1.803E+05	1.212E+01	5.171E+00	1.443E+03	9.692E-02
2083	3.235E+02	1.767E+05	1.188E+01	5.068E+00	1.414E+03	9.500E-02
2084	3.171E+02	1.732E+05	1.164E+01	4.968E+00	1.386E+03	9.312E-02
2085	3.108E+02	1.698E+05	1.141E+01	4.870E+00	1.359E+03	9.128E-02
2086	3.047E+02	1.665E+05	1.118E+01	4.773E+00	1.332E+03	8.947E-02
2087	2.987E+02	1.632E+05	1.096E+01	4.679E+00	1.305E+03	8.770E-02
2088	2.927E+02	1.599E+05	1.075E+01	4.586E+00	1.279E+03	8.596E-02
2089	2.870E+02	1.568E+05	1.053E+01	4.495E+00	1.254E+03	8.426E-02
2090	2.813E+02	1.537E+05	1.032E+01	4.406E+00	1.229E+03	8.259E-02
2091	2.757E+02	1.506E+05	1.012E+01	4.319E+00	1.205E+03	8.096E-02
2092	2.702E+02	1.476E+05	9.919E+00	4.233E+00	1.181E+03	7.935E-02
2093	2.649E+02	1.447E+05	9.723E+00	4.150E+00	1.158E+03	7.778E-02
2094	2.596E+02	1.418E+05	9.530E+00	4.067E+00	1.135E+03	7.624E-02
2095	2.545E+02	1.390E+05	9.342E+00	3.987E+00	1.112E+03	7.473E-02
2096	2.495E+02	1.363E+05	9.157E+00	3.908E+00	1.090E+03	7.325E-02
2097	2.445E+02	1.336E+05	8.975E+00	3.831E+00	1.069E+03	7.180E-02

# Appendix G

Future Landuse Documentation





**9.8 Application to be Appointed as Reserve Trust Manager - part Lot 156 DP 751275 (part Crown Reserve 91032) adjoining Welby Landfill Site, 40 Colo Street, Welby**

**Report Author:** Coordinator Property Services  
**Authoriser:** General Manager

The Director, Corporate Strategy and Resourcing introduced the item.

**OFFICER'S RECOMMENDATION**

THAT

1. Council formally lodge an application with NSW Department of Planning, Industry and Environment – Crown Lands to be appointed as Reserve Trust Manager for part Lot 156 in Deposited Plan 751275 and part Lot 7307 in Deposited Plan 1146411 being part Crown Reserve 91032, adjoining the Welby Landfill Site at 40 Colo Street, Welby.
2. Council seek Ministerial consent to classify all of the land contained within the Welby Landfill Site being Lot 156 DP 751275, Lot 197 DP 723134, Lot 147 DP 751275, Lot 160 DP 751275, Lot 102 DP 751275 and Lot 161 DP 751275 as Operational land and that formal application be lodged with NSW Department of Planning Industry and Environment – Crown Lands.

**MN 356/21**

**MOTION** moved by Interim Administrator

THAT

1. ***Council formally lodge an application with NSW Department of Planning, Industry and Environment – Crown Lands to be appointed as Reserve Trust Manager for part Lot 156 in Deposited Plan 751275 and part Lot 7307 in Deposited Plan 1146411 being part Crown Reserve 91032, adjoining the Welby Landfill Site at 40 Colo Street, Welby.***
2. ***Council seek Ministerial consent to classify all of the land contained within the Welby Landfill Site being Lot 156 DP 751275, Lot 197 DP 723134, Lot 147 DP 751275, Lot 160 DP 751275, Lot 102 DP 751275 and Lot 161 DP 751275 as Operational land and that formal application be lodged with NSW Department of Planning Industry and Environment – Crown Lands.***
3. ***It be noted that it is Council's intention to reclassify the land, the subject of this application as community land upon completion of the remediation works.***

**CARRIED**

# Appendix H

Stockpile Information and NSW EPA  
Correspondence





EPA ref: DOC22/274211-5

Lisa Miscamble  
General Manager  
Wingecarribee Shire Council  
PO Box 141  
MOSS VALE NSW 2577  
Email: [mail@wsc.nsw.gov.au](mailto:mail@wsc.nsw.gov.au)

19 May 2022

Attention: Mulavana Lakshmy

Dear Ms Miscamble

### **EPA response to Organic Waste Stockpiles Remedial Options Appraisal Welby Landfill – EPL 20194**

The Environment Protection Authority (EPA) has responsibility for the administration and enforcement of the *Protection of the Environment Operations Act 1997* (POEO Act). Wingecarribee Shire Council (Council) operated a landfill at Colo Street WELBY NSW 2575 (Welby Landfill) (premises). The premises is licenced by the EPA under Environment Protection Licence 20194 (EPL) (licence).

The Welby Landfill was opened in 1957 and was established as a 'trench and burn' operation. Operations ceased in 2002, and regular sampling and analysis of ground water, surface water, leachate and gas, in line with the licence. Council has not prepared a final capping plan or completed weighbridge installation for the premises.

There are two stockpiles of waste located on the landfill cap that Council will need to remediate before final capping can take place.

### **Welby Landfill Organic Waste Stockpiles remediation options**

On 5 April 2022 Council submitted to the EPA a document prepared by WSP titled *Organic Waste Stockpiles Remedial Options Appraisal - Former Welby Landfill, Welby NSW* (Council reference 129987\_CLM\_REP\_Org Waste Options\_Rev1). The EPA has reviewed this document in conjunction with Council's response (dated 21 September 2021) to an EPA Advisory Letter requesting information about the closed landfill. The EPA's detailed comments are provided in Attachment 1 to this letter.

### **EPA preferred option for organic waste stockpiles and next steps**

The EPA does not prescribe disposal options in all instances. It is the responsibility of the licensee to determine the most appropriate remedial option for the waste located at the premises. However, the EPA recommends the offsite disposal of the waste to a facility that can lawfully accept the waste because this addresses the risks immediately and does not require the excavation and creation of a new specialised landfill cell or create licencing and compliance issues with the waste.

Phone 131 555

TTY 133 677

Locked Bag 5022

4 Parramatta Square

[info@epa.nsw.gov.au](mailto:info@epa.nsw.gov.au)

Phone +61 2 9995 5555

ABN 43 692 285 758

Parramatta

12 Darcy St, Parramatta

[www.epa.nsw.gov.au](http://www.epa.nsw.gov.au)

(from outside NSW)

NSW 2124 Australia

NSW 2150 Australia

Council should review this letter and determine the most appropriate course of action to remediate the two stockpiles of waste located at the premises, considering the EPA's comments below. Council should notify the EPA of the proposed remediation action by **30 June 2022**.

The EPA reminds Council of the requirement to prepare and submit a final capping plan to the EPA once a remedial action is decided upon.

If you have questions regarding the above, please phone James Crawford on (02) 4224 4123.

Yours sincerely

A handwritten signature in black ink, appearing to read 'LARA BARRINGTON', with a stylized flourish at the end.

**LARA BARRINGTON**  
**Unit Head Regulatory Operations**

Attachment: EPA Assessment of Council documents

## Attachment 1

### EPA assessment of Council documents

#### Key findings:

- Based on information provided by Council, the waste materials on-site comprise a single stockpile of foundry sand with an approximate volume of 3,031m<sup>3</sup> and multiple stockpiles of nutripost totalling an approximate volume of 8,911m<sup>3</sup> (includes three large stockpiles and multiple smaller stockpiles).
- The areas of the nutripost stockpiles have been individually calculated and reported as 2,154m<sup>3</sup>, 3,837m<sup>3</sup>, 1,811m<sup>3</sup>, 144m<sup>3</sup>, 177m<sup>3</sup> and 788m<sup>3</sup>.
- The foundry sand could be managed under the resource recovery order and exemption requirements. The material can be beneficially reused onsite based on the assessment provided. Noting the requirement for a cover layer over the deposited foundry sand.
- Nutripost - samples were collected and analysed for waste classification purposes. Several samples exceeded the CT1 threshold (BaP, chromium, lead, nickel) though when assessed in combination with TCLP, all samples were classified as general solid waste using chemical assessment. However, one sample was found to contain asbestos and a number of samples (not defined) were found to contain medical waste such as syringes. This pre-classifies the waste as special waste (clinical and related waste) and special waste (asbestos waste) as outlined by WSP in their assessment.
- WSP have advised that due to the heterogeneity of the waste and the contaminants being dispersed throughout the stockpiles that it is not possible to separate the asbestos and medical waste contaminants. Therefore, all the nutripost is classified as Special Waste.

#### Options:

WSP have provided Council with two options for remediating the nutripost waste. The first is onsite disposal in a purpose-built encapsulation cell. The second option is to transport the waste to a facility that can lawfully accept special waste for disposal.

### Issues to consider for each option

#### Option 1.

The waste is classified as special waste and the premises is not permitted to accept/dispose of this waste. A license variation would be required to allow the waste to remain onsite if the EPA were to consider allowing this option.

An encapsulation cell would need to be created and the waste managed in perpetuity. The encapsulation cell will need to be lined and have leachate control and capping as BaP, chromium, lead and nickel exceed CT1 criteria.

The cover requirements for asbestos should also be noted. Specific requirements for landfilling asbestos waste and clinical waste are contained in the *Protection of the Environment Operations (Waste) Regulation 2014*. Under the regulation, asbestos waste must be covered with virgin excavated natural material or other material as approved in the environment protection licence.

The depths of the required covering are:

- immediate covering with 150 millimetres of cover;
- 500 millimetres of cover at the end of each day; and
- final cover of at least 1000 millimetres (in the case of bonded asbestos waste or asbestos-contaminated soils) or 3000 millimetres (in the case of friable asbestos material).

The encapsulation cell would need to be designed and constructed in accordance with the environmental guidelines for solid waste landfills and may trigger the requirement for planning consent and a licence variation.

The disposal of waste at the premises has already encroached over its boundaries into Crown Land and there is a proposal for recreation use of the area (mountain biking, motocross etc) post capping. If this final land use is to occur it will require a higher level of capping and rehabilitation to ensure erosion does not expose the deposited waste.

### **Option 2.**

The removal and transport of the waste to a facility that can lawfully accept the waste has the potential for exposure of workers to asbestos during the loading of the waste material for transport. This risk would also exist if an encapsulation cell was to be made as all the stockpiles would require consolidation onsite.

The cost of transport, disposal and waste levy implications need to be considered.

### **Conclusion**

The nutripast waste is classified as Special Waste (clinical and related waste as well as asbestos waste). The waste should be managed as asbestos containing material and disposed of in accordance with the requirements outlined in the *Protection of the Environment Operations (Waste) Regulation 2014* for asbestos.

Both disposal options outlined by Council and WSP could be used. However, there are significant issues that will need to be addressed for onsite disposal as outlined above.

Whilst the options will need to be decided by Council, the preference is for the disposal of the waste to a facility that can lawfully accept the waste as this addresses the risks immediately. Designing, gaining approval and building an encapsulation cell is a lengthy process and will require ongoing management, monitoring and maintenance.





Our ref: PS114036-CLM-LTR-WASTE Rev001

1 July 2019

Neil Townsend  
Manager Business Services  
Wingecarribee Shire Council  
177 Berrima Road  
Moss Vale NSW 2577

Dear Neil

## **Waste and Reuse Assessment - Stockpiled Materials, Former Welby Landfill**

### **1. BACKGROUND**

WSP Australia Pty Ltd (WSP) has been engaged by Wingecarribee Shire Council (Council) to undertake stockpile waste characterisation works at the former Welby Landfill situated off Colo Street, Welby NSW. Refer to Figure 1 of Attachment A for site locality.

Based on information provided by Council, the target materials on-site comprise a single stockpile of foundry sand with an approximate volume of 3,031m<sup>3</sup> and multiple stockpiles of nutripost totalling an approximate volume of 8,911m<sup>3</sup> (includes three large stockpiles and multiple smaller stockpiles). The location of each of the stockpiles are presented in the survey drawings shown in Attachment B. The areas of the nutripost stockpiles are individually calculated as 2,154m<sup>3</sup>, 3,837m<sup>3</sup>, 1,811m<sup>3</sup>, 144m<sup>3</sup>, 177m<sup>3</sup> and 788m<sup>3</sup>.

A number of stockpiles constituting two specific material types have been deposited across the former landfill surface and the outcome of a recent meeting with NSW Environment Protection Authority (EPA) is that these materials (foundry sands and nutripost) require further characterisation for their suitability to remain on-site. The purpose of this investigation is to undertake this characterisation and provide advice on potential management options (e.g. beneficial reuse on-site, on-site encapsulation or off-site disposal).

### **2. INVESTIGATION SCOPE**

WSP undertook the following scope of work:

- Mobilised to site to undertake sampling of each of the identified stockpiles. WSP collected samples from a range of depths within the stockpiles using a manual hand auger to the maximum depth achievable in higher stockpiles (i.e. greater than 1.5m in height). In shallower stockpiles (i.e. lower than 1.5m in height) WSP achieved target depth by excavating into the individual stockpiles with mattock and shovel.
- The hand auger and shovel/mattock were decontaminated between individual stockpiles by washing the sample equipment in a bucket filled with DECON 90 and water and then rinsing with deionised water.

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- Sample material descriptions were recorded and screened in the field for pH with a soil pH kit. The location of each sample was marked on a site plan based on location in relation to known site features and also with a hand held GPS.
- A total of 44 primary samples were collected from the nutripost stockpiles and 20 primary samples from the foundry sand stockpile. Each of these samples along with relevant intra-laboratory field duplicates, trip blank and trip spike were analysed at a National Association of Testing Authorities (NATA) accredited testing laboratory for the analytes presented in Table 2.1 below.
- Preparation of this material characterisation report detailing the results of the sampling and presenting conclusions with regards to material suitability to remain on-site as well as off-site disposal classifications.

## 2.1 FIELD OBSERVATIONS

WSP undertook field sampling of the nutripost stockpiles on 13th May 2019 and the foundry sand stockpile on 14th May 2019. The individual sample locations were positioned using GPS. The location of individual samples are presented in Figures 2 and 3 of Attachment A. Descriptions of individual samples along with sample depth, field description, coordinates and material photographs are presented in Attachment C.

Key observations from the nutripost stockpile sampling included the following:

- Material comprised predominantly fibrous, dried organic matter with occasional faint organic odour. Surface and near surface materials within stockpiles were generally slightly moist to dry during sampling but moisture content increased with depth.
- Deeper materials were found to be considerably warmer than shallow materials indicating biological decomposition of the material.
- Field pH screening undertaken across all 44 samples demonstrated a range of between 5.5 and 7.5 pH units with an average of 6 pH units.
- A number of inclusions were identified in the nutripost materials including plastics, paper, gravel, rubber/plastic tubing, glass and other debris.
- A fragment of fibre cement sheeting was identified in WNP20 0.0-0.2.
- Potential medical waste including possible syringes were identified at a number of locations and depths within the nutripost stockpiles. The photographs below show potential materials.



Key observations from the foundry sand stockpile sampling are as follows:

- Material comprised predominantly orange to brown sands with foundry sand gravels, cobbles and boulders and occasional slag.
- With the exception of variance in grain size (i.e. sand to boulder sizing), material composition was generally consistent across and within the stockpile.
- Field pH screening undertaken across all 20 samples demonstrated a range of between 5 and 9.5 pH units with an average of 7.5 pH units.
- No discernible odour, discoloration or other visible evidence of contamination was identified in the stockpile during sampling.

## 2.2 ANALYTICAL PROGRAM

The analytical program for both material types as well as the intra-laboratory duplicate samples collected is presented in the table below. In addition to these samples a trip blank and trip spike was also analysed for quality assurance and quality control purposes. The blank and spike were both analysed for light end total recoverable hydrocarbons (TRH) and benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN).

Table 2.1 Analytical Program

	TRH/BTEXN	TOTAL PHENOLICS	PAH	BENZO(A)PYRENE TCLP	8 HEAVY METALS	8 HEAVY METALS TCLP	MOLYBDENUM, SELENIUM, SILVER, TIN	TOTAL CYANIDE	OCP/OPP/PCB	ASBESTOS
Nutripost (primary)	44	12	44	1	44	3	0	0	12	44
Nutripost (duplicates)	4	0	4	0	4	0	0	0	0	0
Foundry Sand (primary)	20	3	20	0	20	2	5	15	3	20
Foundry Sand (duplicates)	2	0	2	0	2	0	0	0	0	0
TOTAL (primary)	64	15	64	1	64	5	5	15	15	64
TOTAL (duplicates)	6	0	6	0	6	0	0	0	0	0

**Notes:**

TRH: Total Recoverable Hydrocarbons

BTEXN: Benzene, Toluene, Ethylbenzene, Xylenes and Naphthalene

PAH: Polycyclic Aromatic Hydrocarbons

TCLP: Toxicity Characteristic Leaching Procedure

PCB: Polychlorinated Biphenyls

OCP: Organochlorine Pesticides

OPP: Organophosphorus Pesticides

### 3. ASSESSMENT CRITERIA

The full sample result dataset was compared to both on-site reuse and off-site disposal criteria. The following sections present the adopted criteria which have been employed as part of this assessment.

#### 3.1 ON-SITE REUSE CRITERIA

On-site reuse criteria were developed based on a two-stage review of results.

The first stage involved a comparison of analytical and field data against the NSW EPA (2014) *Waste Classification Guidelines: Part 1 Classifying Waste*, Step 1: Is the waste special waste? Special waste has unique regulatory requirements and the potential environmental impacts of special waste need to be managed to minimise the risk of harm to the environment and human health. Special waste means any of the following: -

- Clinical and related waste
- Asbestos waste
- Waste tyres

- Anything classified as special waste under an EPA gazetted notice.

The second stage involved assessment of suitability to be beneficially reused on-site by applying the following criteria from the *National Environmental Protection (Assessment of Site Contamination) Measure 1999* (2013 amendment):

- Health-based Investigation Levels (HILs) for Recreational C.
- Ecological Investigation Levels (EILs) for Urban Residential and Public Open Space.
- Ecological Screening Levels (ESLs) for Urban Residential and Public Open Space.

The basis for the specific land use criteria was the understanding that the eventual intent of Council would be to redevelop the site for recreational open space purposes.

EILs were based on average pH of stockpiled material and grain size. Where cation exchange capacity was required to derive the result, the most conservative added contaminant limit for the land use type was adopted.

### 3.2 OFF-SITE DISPOSAL CRITERIA

Materials to be disposed off-site have been classified in accordance with the NSW EPA (2014) *Waste Classification Guidelines: Part 1 Classifying Waste*, with analytical results compared against the criteria presented in Tables 1 and 2. Where analytical results exceeded the CT1 criteria, targeted samples were analysed for leachability (TCLP) to facilitate comparison against the SCC and TCLP criteria. Statistical analysis using 95% upper confidence limit was also employed on target datasets.

## 4. ANALYTICAL RESULTS

The analytical results for the works are summarised in the tables presented in Attachment D. The laboratory certificates are presented in Attachment E.

### 4.1 NUTRIPOST STOCKPILES

Based on observations recorded during sampling the material is classified as Special Waste (asbestos and clinical and related waste).

The nutripost material was compared to the CT1 criteria presented in the *Waste Classification Guidelines*. All results met the CT1 criteria for General Solid Waste with the exception of the following:

- WNP 16 0.0-0.3 for benzo(a)pyrene.
- WNP2 1.0-1.2, WNP4 0.8-1.0, WNP6 0.0-0.3, WNP7 0.0-0.3, WNP10 0.0-0.3, WNP13 0.0-0.3, WNP19 0.0-0.2, WNP21 0.4-0.6, WNP23 0.0-0.3 and WNP25 0.0-0.3 for chromium.
- WNP13 0.0-0.3, WNP19 0.0-0.2, WNP24 0.0-0.3, WNP25 0.0-0.3 and WNP32 0.0-0.3 for lead.
- WNP5 0.0-0.2, WNP10 0.0-0.3, WNP15 0.0-0.3, WNP19 0.0-0.2, WNP24 0.0-0.3 and WNP25 0.0-0.3 for nickel.
- WNP20 0.0-0.2 for asbestos.

Further leachability (TCLP) testing was performed on selected samples. When combined, the Specific Contaminant Concentrations (SCC1) and Leachable Concentration (TCLP1) for all analytes in the samples were below the contaminant threshold values for 'General Solid' waste.

Based on laboratory results the material is classified as Special Waste (asbestos and clinical and related waste) in a matrix of 'General Solid' Waste.



## 4.2 FOUNDRY SAND STOCKPILE

The foundry sand stockpile was compared to adopted on-site reuse criteria. A summary of the results is as follows:

- All results for metals, cyanide, pesticides, polychlorinated biphenyls and hydrocarbons were below the adopted health investigation levels.
- Multiple samples exceeded the adopted ecological investigation limit for nickel.
- WFS9 0.0-0.2 reported a concentration of zinc which exceeded the ecological investigation limit.
- No asbestos was identified in any samples.
- Following further targeted TCLP testing for chromium and nickel, when combined all analytical results were found to be below the SCC1 and TCLP1 criteria for General Solid Waste.

## 4.3 QUALITY ASSURANCE / QUALITY CONTROL

The results of field duplicate, trip blank and trip spike analyses are summarised in the tables in Attachment D. Laboratory quality assurance/quality control (QA/QC) is presented in the laboratory certificates in Attachment E.

Overall the results indicate acceptable data quality for the intent of the investigation.

### 4.3.1 FIELD DUPLICATE RESULTS

The field duplicates indicated good comparison between duplicate-primary pairs for TRH and TPH with all but two relative percentage difference (RPD) calculations returning results below 50%.

WNPDUP300 was found to have very elevated PAH results compared to its primary sample. Considering the minimal presence of PAHs throughout the nutripost dataset (i.e. only three of 44 samples holding detectable concentrations) it is considered that this duplicate may have been contaminated with asphalt to return this result and is not considered statistically significant.

Several elevated RPDs of arsenic, cadmium, chromium, nickel and zinc were identified across the metals dataset. The majority of these elevated RPDs (i.e. seven of the eight failures) were derived from nutripost sample pairs. It is considered that these failures are a demonstration of the heterogeneous nature of this material type compared to the foundry sand.

### 4.3.2 TRIP BLANK AND TRIP SPIKE

The trip blank accompanying the primary samples on 13<sup>th</sup> May 2019 was analysed for TRH and BTEXN. All results were below the limits of reporting and therefore demonstrate minimal risk of cross contamination of samples.

The trip spike was analysed for TRH and BTEXN and returned results of between 99% and 110% which indicates good recovery.

### 4.3.3 LABORATORY QA/QC

Laboratory QA/QC results generally complied with relevant criteria and demonstrate acceptable data quality.

## 5. MATERIAL SUITABILITY AND RECOMMENDATIONS

### 5.1 NUTRIPOST

Due to the confirmed presence of asbestos and inferred presence of medical waste within the nutripost stockpiles, it is considered that the nutripost stockpiles are unsuitable to be beneficially reused on-site as capping material during final closure works.

Based upon the comparison of the analytical results against NSW EPA (2014), *Waste Classification Guidelines*, for off-site disposal purposes the nutripost material is classified as Special Waste (asbestos and clinical waste) in a matrix of General Solid Waste (putrescible).

The putrescible sub-classification is based upon the material comprising “manure and night soil” and/or “grit or screenings from sewage treatment systems that have been dewatered so that grit or screenings do not contain free liquids”.

An alternative solution to off-site disposal is placing the impacted material beneath an engineered separation layer or cap on-site and then implementing a long-term management plan targeting the encapsulation area.

### 5.2 FOUNDRY SAND

The chemical concentrations of the foundry sand materials were all below the adopted human health criteria for on-site reuse. Isolated samples failed the adopted ecological criteria for nickel and zinc with sample WSF10 0.9-1.1 and WSF9 0.0-0.2 exceeding the adopted ecological criteria by 250% for nickel and zinc respectively. Based upon the results it is considered that the material is suitable to be beneficially reused on-site if the material is used in such a way that it is not directly in connectivity with ecological receptors (e.g. emplaced at depth and overlain by topsoil and plants whose root zones can't reach the foundry sand materials).

Based on the field observations and the analytical data collected, if the materials are to be disposed off-site it is suitable to be disposed of as General Solid Waste (non-putrescible).

WSP note that if Council intend on disposing the material off-site there is potential that the material may be beneficially reused off-site under the *Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 – The Processed Foundry Sand Order 2014*. However, this will require further testing in accordance with the Order and there is possibility that it won't meet the suitability criteria based upon chromium results collected during this investigation.

## 6. CLOSING

This report should be read in conjunction with the stated limitations presented below.

Yours sincerely



Jonathon Hilliard  
Principal Environmental Scientist



Julie Porter  
Principal Environmental Engineer



## REFERENCES

- NEPC (2013), *National Environment Protection (Assessment of Site Contamination) Measure 1999* (2013 amendment)
- NSW EPA (2014), *Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 - The Processed Foundry Sand Order 2014*
- NSW EPA (2014), *Waste Classification Guidelines: Part 1 Classifying Waste*.
- *Protection of the Environment Operations Act 1997*





## LIMITATIONS

### *Scope of services*

This environmental site assessment report (the report) has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the client and WSP (scope of services). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

### *Reliance on data*

In preparing the report, WSP has relied upon data, surveys, analyses, designs, plans and other information provided by the client and other individuals and organisations, most of which are referred to in the report (the data). Except as otherwise stated in the report, WSP has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report (conclusions) are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. WSP will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to WSP.

### *Environmental conclusions*

In accordance with the scope of services, WSP has relied upon the data and has not conducted any environmental field monitoring or testing in the preparation of the report. The conclusions are based upon the data and visual observations and are therefore merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of contaminants or emissions.

Within the limitations imposed by the scope of services, the assessment of the site and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

### *Report for benefit of client*

The report has been prepared for the benefit of the client and no other party. WSP assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of WSP or for any loss or damage suffered by any other party in relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

### *Other limitations*

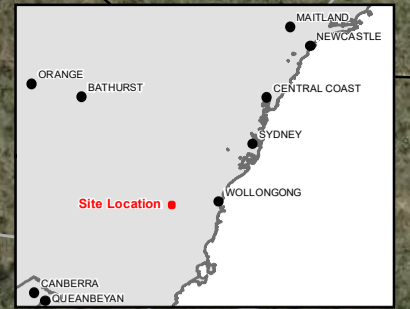
WSP will not be liable to update or revise the report to take into account any events, emergent circumstances or facts occurring or becoming apparent after the date of the report.

The scope of services did not include any assessment of the title to nor ownership of the properties, buildings and structures referred to in the report, nor the application or interpretation of laws in the jurisdiction in which those properties, buildings and structures are located.

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# ATTACHMENT A FIGURES





**Legend**

- Road
- ▭ Cadastre
- ▭ Site Boundary

Map: PS114036_GIS_001_A	Author: Angela.Sun		 1:8,000 Coordinate system: GDA 1994 MGA Zone 56 Scale ratio correct when printed at A3
Date: 27/06/2019	Approved by: JH		
Data source: NSW LPI 2019			



**Stockpiled Material Characterisation  
Former Welby Landfill, Welby NSW**

**Figure 1**  
Site Locality and General Layout





**Legend**

- Sample Locations
- Cadastre
- Site Boundary

Map: PS114036\_GIS\_002\_A Author: Angela.Sun  
 Date: 27/06/2019 Approved by: JH



0 8 16 m  
 1:800  
 Coordinate system: GDA 1994 MGA Zone 56  
 Scale ratio correct when printed at A3



**Stockpiled Material Characterisation  
 Former Welby Landfill, Welby NSW**

**Figure 2**  
 Sample Locations - Nutripost Stockpiles (WNP series)

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**Legend**

- Sample Locations
- Cadastre
- Site Boundary

Map: PS114036\_GIS\_003\_A Author: Angela.Sun

Date: 27/06/2019 Approved by: JH



0 5 10  
m

1:500

Coordinate system: GDA 1994 MGA Zone 56  
Scale ratio correct when printed at A3



**Stockpiled Material Characterisation  
Former Welby Landfill, Welby NSW**

**Figure 3**  
Sample Locations - Foundry Sand Stockpile (WFS series)

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**ATTACHMENT B**  
**STOCKPILE SURVEY**  
**DRAWINGS**




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**ATTACHMENT C**  
**FIELD SAMPLE LOGS**




POINT ID AND DEPTH	SAMPLE DATE	COORDINATES	DESCRIPTION	FIELD PH (PH UNITS)	MATERIAL PHOTOGRAPHS
WFS1 0.0-0.2	2019-05-14	{"longitude":"150.4357598628861", "latitude":"-34.43681339267401"}	Fine to medium pale brown sand with small to large foundry sand gravel and cobble	7.5	
WFS1 0.8-1.1	2019-05-14	{"longitude":"150.4357919377746", "latitude":"-34.43681272681289"}	Fine to medium sand with small to medium foundry sand gravels and black slag. Brown	6	
WFS1 1.0-1.2	2019-05-14	{"longitude":"150.4357919377746", "latitude":"-34.43681272681289"}	Fine to medium sand browns dry to moist with small to medium foundry sand gravel WFS DUP100	6.5	






POINT ID AND DEPTH	SAMPLE DATE	COORDINATES	DESCRIPTION	FIELD PH (PH UNITS)	MATERIAL PHOTOGRAPHS
WFS2 0.0-0.2	2019-05-14	{"longitude":"150.4357425683647", "latitude":"-34.43688108123324"}	Fine to medium sand with foundry sand gravels and white and black slag. Brown. Dry with rootlets	7.5	
WFS3 0.0-0.2	2019-05-14	{"longitude":"150.4359278247757", "latitude":"-34.43690749833614"}	Fine to medium sand with small foundry sand gravels and trace slag. Brown. Dry.	6.5	
WFS3 1.0-1.2	2019-05-14	{"longitude":"150.4358694703788", "latitude":"-34.43695723082359"}	Fine to medium and with fine to large foundry sand gravels and cobbles and trace slag. Brown. Dry to moist.	7	




POINT ID AND DEPTH	SAMPLE DATE	COORDINATES	DESCRIPTION	FIELD PH (PH UNITS)	MATERIAL PHOTOGRAPHS
WFS4 0.0-0.1	2019-05-14	{"longitude":"150.4358207715213", "latitude":"-34.43691351919849"}	Fine to medium sand with small to large foundry sand gravels and cobbles and trace of slag. Dry. Brown	8	
WFS4 1.4-1.6	2019-05-14	{"longitude":"150.4358207715213", "latitude":"-34.43691351919849"}	Fine to medium sand with small to large foundry sand gravels and cobbles and trace slag. Brown. Dry to moist. WFS4DUP200	9	
WFS5 0.0-0.2	2019-05-14	{"longitude":"150.435806943198", "latitude":"-34.43689649150095"}	Fine to medium sand with small to large foundry sand gravels. Brown. Dry to moist.	5	






POINT ID AND DEPTH	SAMPLE DATE	COORDINATES	DESCRIPTION	FIELD PH (PH UNITS)	MATERIAL PHOTOGRAPHS
WFS5 1.2-1.4	2019-05-14	{"longitude":"150.4358207715213", "latitude":-34.43691351919849"}	Fine to medium sand with small to large foundry sand gravels and white fibrous material. Brown. Moist.	6.5	
WFS6 0.0-0.2	2019-05-14	{"longitude":"150.4357412272602", "latitude":-34.43689776122054"}	Fine to medium sand with small to large foundry sand gravels and cobbles. Brown. Moist. Trace of slag	6.5	
WFS6 1.4-1.6	2019-05-14	{"longitude":"150.4358207715213", "latitude":-34.43691351919849"}	Fine to medium sand with small to large foundry sand gravels and cobbles. Brown. Moist. Trace of slag	9	




POINT ID AND DEPTH	SAMPLE DATE	COORDINATES	DESCRIPTION	FIELD PH (PH UNITS)	MATERIAL PHOTOGRAPHS
WFS7 0.0-0.2	2019-05-14	{"longitude":"150.4359539417894", "latitude": "-34.43701417903035"}	Fine to medium sand with small to large foundry sand gravels and trace of slag. Brown. Dry to moist with rootlets.	8.5	
WFS7 0.8-1.0	2019-05-14	{"longitude":"150.4358207715213", "latitude": "-34.43691351919849"}	Fine to medium sand with small to large foundry sand gravels. Trace of slag. Brown. Moist.	6.5	
WFS8 0.0-0.2	2019-05-14	{"longitude":"150.4359622096376", "latitude": "-34.43706382316241"}	Fine to medium sand with small to large foundry sand gravels. Brown. Dry. Rootlets noted	6.5	






POINT ID AND DEPTH	SAMPLE DATE	COORDINATES	DESCRIPTION	FIELD PH (PH UNITS)	MATERIAL PHOTOGRAPHS
WFS8 0.7-0.8	2019-05-14	{"longitude":"150.4358207715213", "latitude":"-34.43691351919849"}	Fine to medium sand with small to large gravels and trace slag. Brown. Dry.	6.5	
WFS9 0.0-0.2	2019-05-14	{"longitude":"150.4359572388782", "latitude":"-34.43704696377738"}	Small to medium sand with small to large foundry sand gravel. Trace of slag. Rootlets noted. Brown. Dry.	6.5	
WFS9 1.2-1.4	2019-05-14	{"longitude":"150.4358207715213", "latitude":"-34.43691351919849"}	Small to medium grained sand with small to large foundry sand gravels. Brown. Dry to moist.	9	




POINT ID AND DEPTH	SAMPLE DATE	COORDINATES	DESCRIPTION	FIELD PH (PH UNITS)	MATERIAL PHOTOGRAPHS
WFS10 0.0-0.4	2019-05-14	{"longitude":"150.4359671348952", "latitude":"-34.43695282983862"}	Fine to medium sand with small to large foundry sand gravels. Trace of slag. Rootlets noted. Brown. Dry	9.5	
WFS10 0.9-1.1	2019-05-14	{"longitude":"150.4358207715213", "latitude":"-34.43691351919849"}	Fine to medium sand with small to large foundry sand gravels and trace of slag. Brown. Dry.	9	
WNP1-0.0-0.2	2019-05-13	{"longitude":"150.4362679561256", "latitude":"-34.43600869987617"}	Processed sewage waste. Silty material with fibrous inclusions. Brown. Some plastic and paper. WNPDUP100.	6	






POINT ID AND DEPTH	SAMPLE DATE	COORDINATES	DESCRIPTION	FIELD PH (PH UNITS)	MATERIAL PHOTOGRAPHS
WNP1_0.8-1.0	2019-05-13	{"longitude":"150.4362229466316", "latitude": "-34.43599858338779"}	Brown silty soil, fibrous organic material, minor paper and plastic inclusions. pH of 6.	6	
WNP2_0.0-0.2	2019-05-13	{"longitude":"150.4364236503972", "latitude": "-34.43601074800183"}	Silty, brown, dry, paper and plastic inclusions, fibrous inclusions	6	
WNP2_1.0-1.2	2019-05-13	{"longitude":"150.4364530184744", "latitude": "-34.43599796996437"}	Brown, silty, increasing moisture, higher temperature indicating bacterial presence, fibrous and paper inclusions	6	




POINT ID AND DEPTH	SAMPLE DATE	COORDINATES	DESCRIPTION	FIELD PH (PH UNITS)	MATERIAL PHOTOGRAPHS
WNP3_0.0-0.2	2019-05-13	{"longitude":"150.4364442372475", "latitude":"-34.43608924889946"}	Light brown, silty, dry, paper and plastic inclusions, fibrous inclusions	5.5	
WNP3_1.1-1.3	2019-05-13	{"longitude":"150.4364376783754", "latitude":"-34.43610242761597"}	Brown, silty, fibrous inclusions, higher temperature, WNPDUP300	6	
WNP4_0.0-0.2	2019-05-13	{"longitude":"150.43638107138", "latitude":"-34.43605696582903"}	Light brown, silty, paper and fibrous inclusions, plastic inclusions, dry	6.5	






POINT ID AND DEPTH	SAMPLE DATE	COORDINATES	DESCRIPTION	FIELD PH (PH UNITS)	MATERIAL PHOTOGRAPHS
WNP4_0.8-1.0	2019-05-13	{"longitude":"150.4363677403987", "latitude":"-34.43604539878944"}	Brown, silty, moist, paper and fibrous inclusions, warm	7.5	
WNP5_0.0-0.2	2019-05-13	{"longitude":"150.4362710974807", "latitude":"-34.43607329446758"}	Light brown, silty, plastic and fibrous inclusions, dry	6.5	
WNP5_1.0-1.2	2019-05-13	{"longitude":"150.4362726244523", "latitude":"-34.43607799986918"}	Brown, moist, plastic and fibrous inclusions, warm	6	




POINT ID AND DEPTH	SAMPLE DATE	COORDINATES	DESCRIPTION	FIELD PH (PH UNITS)	MATERIAL PHOTOGRAPHS
WNP6_0.0-0.3	2019-05-13	{"longitude":"150.4362379605989", "latitude":"-34.43618852026492"}	Brown, silty, moist, fibrous inclusions	6	
WNP7_0.0-0.3	2019-05-13	{"longitude":"150.4364043185545", "latitude":"-34.43625795328169"}	Brown, silty, paper and fibrous inclusions, moist, plastic inclusions	6	
WNP8_0.0-0.3	2019-05-13	{"longitude":"150.4362311725399", "latitude":"-34.4362764280273"}	Brown, silty, dry, paper and plastic inclusions	6	






POINT ID AND DEPTH	SAMPLE DATE	COORDINATES	DESCRIPTION	FIELD PH (PH UNITS)	MATERIAL PHOTOGRAPHS
WNP9_0-0.3	2019-05-13	{"longitude":"150.436460395067", "latitude":"-34.4362945875668"}	Brown, silty, dry, plastic and fibrous inclusions	6	
WNP10_0.0-0.3	2019-05-13	{"longitude":"150.4363860000159", "latitude":"-34.43639547441997"}	Brown, silty, dry, fibrous and plastic inclusions. WNPDUP400	6	
WNP11_0.0-0.3	2019-05-13	{"longitude":"150.4364871561521", "latitude":"-34.43637602961782"}	Dark brown, silty, dry, wood chips, plastic and fibrous inclusions	6	




POINT ID AND DEPTH	SAMPLE DATE	COORDINATES	DESCRIPTION	FIELD PH (PH UNITS)	MATERIAL PHOTOGRAPHS
WNP12_0.0-0.3	2019-05-13	{"longitude":"150.4362859790723", "latitude":"-34.43644102992317"}	Brown, silty, dry, paper and fibrous inclusions, small pebbles/ rocks	6	
WNP13_0.0-0.3	2019-05-13	{"longitude":"150.4364683239958", "latitude":"-34.43647730091855"}	Brown, silty, dry, paper, fibrous and plastic inclusions	6	
WNP14_0.0-0.3	2019-05-13	{"longitude":"150.4362807841043", "latitude":"-34.43650350078045"}	Brown, silty, dry, fibrous inclusions, minor presence of rocks/pebbles, plastic inclusions	6.5	






POINT ID AND DEPTH	SAMPLE DATE	COORDINATES	DESCRIPTION	FIELD PH (PH UNITS)	MATERIAL PHOTOGRAPHS
WNP15_0.0-0.3	2019-05-13	{"longitude":"150.4364411566677", "latitude":"-34.4365113881931"}	Brown, silty, dry, wood chips, plastic and fibrous inclusions	6	
WNP16_0.0-0.3	2019-05-13	{"longitude":"150.4363800993805", "latitude":"-34.43664183731246"}	Light brown, silty, dry, fibrous inclusions, wood chips	6	
WNP17_0.0-0.2	2019-05-13	{"longitude":"150.4358683951758", "latitude":"-34.43637231075366"}	Brown, silty, dry, plastic and fibrous inclusions	6	




POINT ID AND DEPTH	SAMPLE DATE	COORDINATES	DESCRIPTION	FIELD PH (PH UNITS)	MATERIAL PHOTOGRAPHS
WNP17_1.0-1.2	2019-05-13	{"longitude":"150.4358922806439", "latitude":"-34.43635565045428"}	Dark brown, silty and clayey, very moist, minor gravel inclusions, minor fragments of fabric. WNPDUP500	6.5	
WNP18_0.0-0.2	2019-05-13	{"longitude":"150.4358440505128", "latitude":"-34.43618778098566"}	Brown, silty, dry, fibrous inclusions, wood chips	6	
WNP18_1.0-1.2	2019-05-13	{"longitude":"150.4358371526547", "latitude":"-34.43626010090828"}	Brown, silty, moist, fibrous and plastic inclusions, presence of pebbles and rocks	6.5	






POINT ID AND DEPTH	SAMPLE DATE	COORDINATES	DESCRIPTION	FIELD PH (PH UNITS)	MATERIAL PHOTOGRAPHS
WNP19_0.0-0.2	2019-05-13	{"longitude":"150.4357947897335", "latitude":"-34.43642432665889"}	Brown, silty, dry, paper and fibrous inclusions	6	
WNP19_0.6-0.8	2019-05-13	{"longitude":"150.435820400262", "latitude":"-34.43643403920629"}	Dark brown, silty, moist, fibrous inclusions, wood chips, presence of pebbles/rocks	6.5	
WNP20_0.0-0.2	2019-05-13	{"longitude":"150.4357226114528", "latitude":"-34.43636355379158"}	Brown, silty, dry, fibrous inclusions, fragment of cement sheeting found, plastic inclusions, minor gravel inclusions	7	




POINT ID AND DEPTH	SAMPLE DATE	COORDINATES	DESCRIPTION	FIELD PH (PH UNITS)	MATERIAL PHOTOGRAPHS
WNP20_1.0-1.2	2019-05-13	{"longitude":"150.4357360040466", "latitude":"-34.43636008874242"}	Dark brown, silty, moist, plastic and fibrous inclusions	7	
WNP21_0.0-0.2	2019-05-13	{"longitude":"150.4357654418374", "latitude":"-34.43649161107419"}	Brown, silty, dry, plastic and fibrous inclusions	6.5	
WNP21_0.4-0.6	2019-05-13	{"longitude":"150.4357435789811", "latitude":"-34.43649269679"}	Dark brown, silty, moist, plastic and fabric inclusions, fibrous inclusions (hair-like fabric found)	7	







POINT ID AND DEPTH	SAMPLE DATE	COORDINATES	DESCRIPTION	FIELD PH (PH UNITS)	MATERIAL PHOTOGRAPHS
WNP22_0.0-0.2	2019-05-13	{"longitude":"150.4356341023748", "latitude":"-34.43646532158233"}	Brown, silty, dry, plastic and fibrous inclusions, minor gravel inclusions	6	
WNP22_0.7-0.9	2019-05-13	{"longitude":"150.4356603171387", "latitude":"-34.43647999070129"}	Brown, silty, dry, plastic and fibrous inclusions, gravel inclusions	5.5	
WNP23_0.0-0.3	2019-05-13	{"longitude":"150.4350296667387", "latitude":"-34.43691646174963"}	Brown, silty, dry, paper and plastic inclusions	6	

POINT ID AND DEPTH	SAMPLE DATE	COORDINATES	DESCRIPTION	FIELD PH (PH UNITS)	MATERIAL PHOTOGRAPHS
WNP24_0.0-0.3	2019-05-13	{"longitude":"150.435098594566", "latitude":"-34.43692281362677"}	Brown, silty, dry, plastic and fibrous inclusions, wood chips	6	
WNP25_0.0-0.3	2019-05-13	{"longitude":"150.4351216335592", "latitude":"-34.43701344032907"}	Brown, silty, dry, plastic and fibrous inclusions	6	
WNP26_0.0-0.3	2019-05-13	{"longitude":"150.4350631168106", "latitude":"-34.4369053913075"}	Brown, silty, dry, paper and fibrous inclusions	6	



POINT ID AND DEPTH	SAMPLE DATE	COORDINATES	DESCRIPTION	FIELD PH (PH UNITS)	MATERIAL PHOTOGRAPHS
WNP27_0.0-0.3	2019-05-13	{"longitude":"150.4349475299485", "latitude":"-34.43707901484417"}	Brown, silty, dry, fibrous and plastic inclusions, wood chips	6	
WNP28_0.0-0.3	2019-05-13	{"longitude":"150.435053799768", "latitude":"-34.43703014829231"}	Brown, silty, dry, plastic, paper and fibrous inclusions	6	
WNP29_0.0-0.3	2019-05-13	{"longitude":"150.4353187593986", "latitude":"-34.43711460490202"}	Brown, silty, dry, wood chips, minor gravel inclusions, plastic and fibrous inclusions	6	

POINT ID AND DEPTH	SAMPLE DATE	COORDINATES	DESCRIPTION	FIELD PH (PH UNITS)	MATERIAL PHOTOGRAPHS
WNP30_0.0-0.3	2019-05-13	{"longitude":"150.4353808020526", "latitude":-34.43710126579042"}	Brown, silty, dry, plastic and fibrous inclusions, minor gravel inclusions, wood chips	6	
WNP31_0.0-0.3	2019-05-13	{"longitude":"150.4352780401533", "latitude":-34.43720111142341"}	Dark brown, silty, moist, plastic, paper and fibrous inclusions	6	
WNP32_0.0-0.3	2019-05-13	{"longitude":"150.4353208470744", "latitude":-34.43725916864231"}	Dark brown, silty, moist, plastic and fibrous inclusions	6	

POINT ID AND DEPTH	SAMPLE DATE	COORDINATES	DESCRIPTION	FIELD PH (PH UNITS)	MATERIAL PHOTOGRAPHS
WNP33_0.0-0.3	2019-05-13	{"longitude":"150.4351539382056", "latitude":"-34.43719065951993"}	Dark brown, silty, moist, plastic inclusions, minor gravel inclusions	6.5	

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**ATTACHMENT D**  
**SUMMARY RESULTS TABLES**









A	B	C	D	E	F	G	H	I	J	K	L
1	<b>Normal UCL Statistics for Uncensored Full Data Sets</b>										
2											
3	User Selected Options	Chromium Welby Foundry Sands									
4	Date/Time of Computation	ProUCL 5.128/06/2019 6:27:31 AM									
5	From File	WorkSheet_a.xls									
6	Full Precision	OFF									
7	Confidence Coefficient	95%									
8											
9											
10	<b>C0</b>										
11											
12	<b>General Statistics</b>										
13	Total Number of Observations	16						Number of Distinct Observations	13		
14								Number of Missing Observations	0		
15		Minimum	42					Mean	87.19		
16		Maximum	210					Median	77		
17		SD	46.23					SD of logged Data	0.486		
18		Coefficient of Variation	0.53					Skewness	1.386		
19											
20	<b>Normal GOF Test</b>										
21	Shapiro Wilk Test Statistic	0.866						<b>Shapiro Wilk GOF Test</b>			
22	5% Shapiro Wilk Critical Value	0.887						Data Not Normal at 5% Significance Level			
23	Lilliefors Test Statistic	0.187						<b>Lilliefors GOF Test</b>			
24	5% Lilliefors Critical Value	0.213						Data appear Normal at 5% Significance Level			
25	<b>Data appear Approximate Normal at 5% Significance Level</b>										
26											
27	<b>Assuming Normal Distribution</b>										
28	<b>95% Normal UCL</b>							<b>95% UCLs (Adjusted for Skewness)</b>			
29		95% Student's-t UCL	107.4					95% Adjusted-CLT UCL (Chen-1995)	110.5		
30								95% Modified-t UCL (Johnson-1978)	108.1		
31											
32	<b>Suggested UCL to Use</b>										
33		95% Student's-t UCL	107.4								
34											
35	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test										
36	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL										
37											
38	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
39	Recommendations are based upon data size, data distribution, and skewness.										
40	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
41	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										

A	B	C	D	E	F	G	H	I	J	K	L	
1	<b>Normal UCL Statistics for Uncensored Full Data Sets</b>											
2												
3	User Selected Options	Nickel Welby Foundry Sands										
4	Date/Time of Computation	ProUCL 5.128/06/2019 6:23:17 AM										
5	From File	WorkSheet.xls										
6	Full Precision	OFF										
7	Confidence Coefficient	95%										
8												
9												
10	<b>C0</b>											
11												
12	<b>General Statistics</b>											
13	Total Number of Observations	16						Number of Distinct Observations	13			
14								Number of Missing Observations	0			
15		Minimum	15						Mean	39.25		
16		Maximum	130						Median	32.5		
17		SD	26.25						SD of logged Data	0.489		
18		Coefficient of Variation	0.669						Skewness	3.013		
19												
20	<b>Normal GOF Test</b>											
21	Shapiro Wilk Test Statistic	0.65						<b>Shapiro Wilk GOF Test</b>				
22	5% Shapiro Wilk Critical Value	0.887						Data Not Normal at 5% Significance Level				
23	Lilliefors Test Statistic	0.293						<b>Lilliefors GOF Test</b>				
24	5% Lilliefors Critical Value	0.213						Data Not Normal at 5% Significance Level				
25	<b>Data Not Normal at 5% Significance Level</b>											
26												
27	<b>Assuming Normal Distribution</b>											
28	<b>95% Normal UCL</b>					<b>95% UCLs (Adjusted for Skewness)</b>						
29		95% Student's-t UCL	50.75				95% Adjusted-CLT UCL (Chen-1995)	55.33				
30							95% Modified-t UCL (Johnson-1978)	51.58				
31												
32	<b>Suggested UCL to Use</b>											
33	<b>Data appear Approximate Gamma, May want to try Gamma Distribution</b>											
34												
35	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
36	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
37												
38	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
39	Recommendations are based upon data size, data distribution, and skewness.											
40	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
41	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											



Field ID	Matrix Type	Date	TPH				TRH				BTEX					PAH										Metals															
			C6 - C9	C10 - C14	C15 - C28	C29 - C36	C6 - C10	C10 - C16	C16 - C34	C34 - C40	Benzene	Toluene	Ethylbenzene	Xylenes (m & p)	Xylenes (o)	Xylenes (Sum)	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene	Arabic	Calcium	Chromium	Copper	Lead	Mercury	Nickel	Zinc		
EQL			20	20	50	50	20	50	100	100	0.1	0.1	0.1	0.2	0.1	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	2	0.4	5	5	5	0.1	5	5			
WNP1 0.0-0.2	soil	13/05/2019	<40	22	290	410	<40	<50	610	190	<0.2	<0.2	<0.2	<0.4	<0.2	<0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
WNPDU100	soil	13/05/2019	<40	<20	<50	<50	<40	<50	<100	<100	<0.2	<0.2	<0.2	<0.4	<0.2	<0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
RPD			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
WNP10 0.0-0.3	soil	13/05/2019	<40	<20	460	450	<40	<50	810	370	<0.2	<0.2	<0.2	<0.4	<0.2	<0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
WNPDU400	soil	13/05/2019	<40	<20	330	410	<40	<50	670	340	<0.2	<0.2	<0.2	<0.4	<0.2	<0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
RPD			-	0	33	9	-	-	19	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
WNP17 1.0-1.2	soil	13/05/2019	<40	32	310	320	<40	<50	540	170	<0.2	<0.2	<0.2	<0.4	<0.2	<0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
WNPDU500	soil	13/05/2019	<40	<20	580	460	<40	<50	930	360	<0.2	<0.2	<0.2	<0.4	<0.2	<0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
RPD			-	-	61	36	-	-	53	72	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
WNP3 1.1-1.3	soil	13/05/2019	<40	24	400	500	<40	<50	760	300	<0.2	<0.2	<0.2	<0.4	<0.2	<0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
WNPDU300	soil	13/05/2019	<40	<20	660	450	<40	<50	1,000	300	<0.2	<0.2	<0.2	<0.4	<0.2	<0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
RPD			-	-	49	11	-	-	27	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
WFS1 1.0-1.2	soil	14/05/2019	<40	<20	<50	<50	<40	<50	<100	<100	<0.2	<0.2	<0.2	<0.4	<0.2	<0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
WFS1 1.0-1.2	soil	14/05/2019	<40	<20	<50	<50	<40	<50	<100	<100	<0.2	<0.2	<0.2	<0.4	<0.2	<0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
RPD			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
WFS4 1.4-1.6	soil	14/05/2019	<40	<20	<50	<50	<40	<50	<100	<100	<0.2	<0.2	<0.2	<0.4	<0.2	<0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
WFS4 1.4-1.6	soil	14/05/2019	<40	<20	<50	<50	<40	<50	<100	<100	<0.2	<0.2	<0.2	<0.4	<0.2	<0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
RPD			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

\*RPDs have only been considered where a concentration is greater than 1 times the EQL.  
 \*\*Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: (1 - 10 x EQL); 30 (10 - 30 x EQL); 30 (> 30 x EQL) )  
 \*\*\*Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory



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TPH	TRH		BTEX						PAH
C6 - C9	C6 - C10	C6 - C10 less BTEX (F1)	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene (Sum)	Naphthalene
mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg

Field ID	Matrix Type	Date										
TRIP BLANK	soil	13/05/2019	<20	<20	<20	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.5

TPH	TRH	BTEX						PAH
C6 - C9	C6 - C10	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene (Sum)	Naphthalene
%	%	%	%	%	%	%	%	%

Field ID	Matrix Type	Date									
TRIP SPIKE	soil	13/05/2019	100	100	100	100	100	110	110	110	99

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**ATTACHMENT E**  
**LABORATORY CERTIFICATES**

# Appendix I

Basis of Estimate





Project: Former Welby Landfill Date: Mon 16/01/23	Task		Summary		Inactive Milestone		Duration-only		Start-only		External Milestone		Manual Progress	
	Split		Project Summary		Inactive Summary		Manual Summary Rollup		Finish-only		Deadline			
	Milestone		Inactive Task		Manual Task		Manual Summary		External Tasks		Progress			