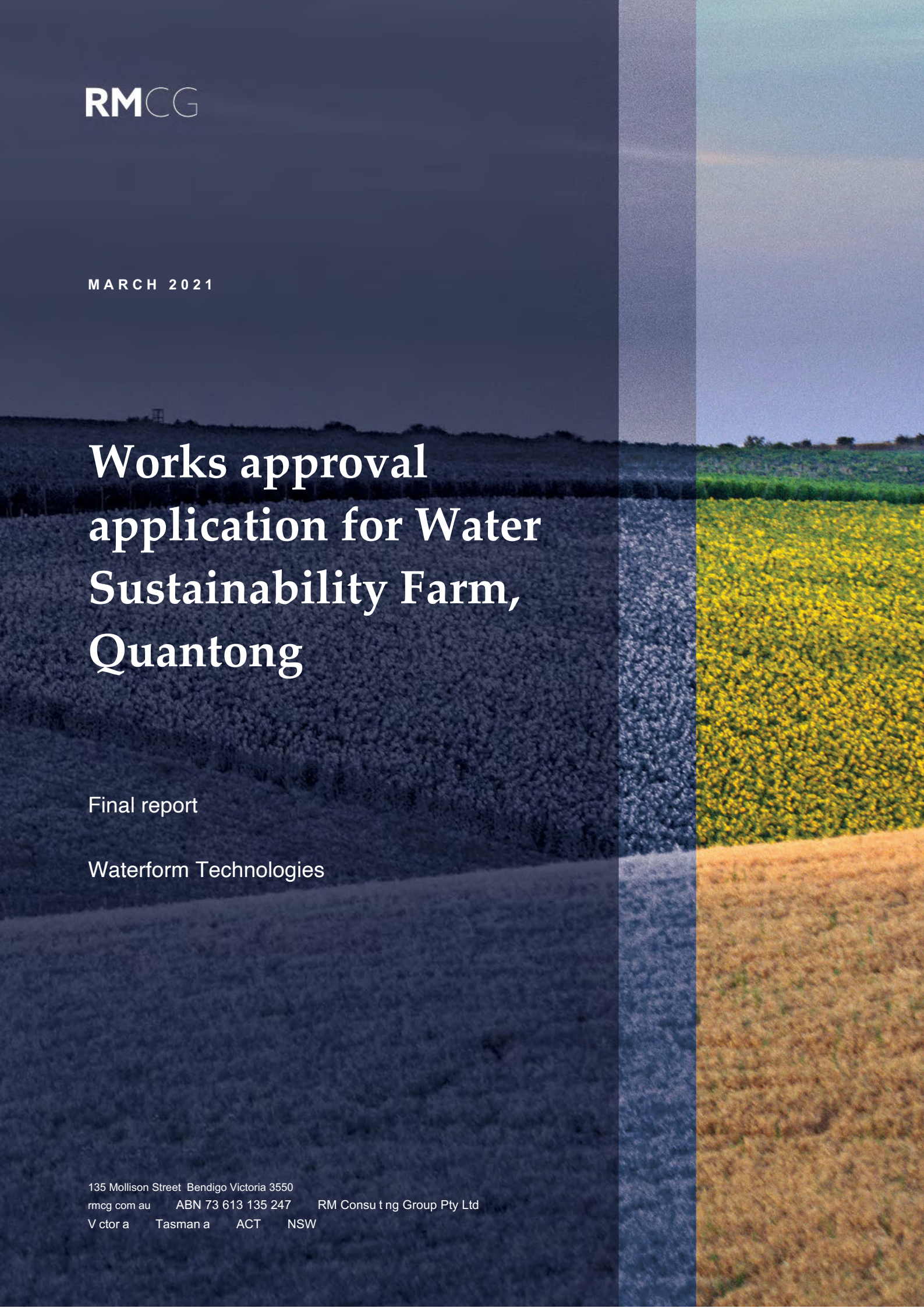
RMCG

MARCH 2021

Works approval application for Water Sustainability Farm, Quantong

Final report

Waterform Technologies



135 Mollison Street Bendigo Victoria 3550
rmcg com au ABN 73 613 135 247 RM Consu t ng Group Pty Ltd
V ctor a Tasman a ACT NSW

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SECTION 1 – General information

1 Primary information

1.1 COMPANY LEGAL ENTITY

Company name:	Water Susta nab ty Farm Pty Ltd
ABN:	648 463 003
Reg stered off ce address:	1324 B ue R bbon Road, Ka kee VIC 3401
B ng address:	As above
[redacted]:	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
Prem ses address:	Lanes Avenue, Quantong VIC 3401

A copy of the property title is provided in Attachment 1.

1.2 APPLICATION FEE

The application fee is the greater of:

- 1 per cent of the estimated cost; or
- 81.83 fee units @ $14.81 = $1,211.90.

The construction cost of the facility is estimated to be $160,000, therefore the application fee is $1,600.

2 Land use

2.1 PLANNING AND OTHER APPROVALS

The project is located near the intersection of Lanes Avenue and Lindners Road, Quantong, in the Rural City of Horsham. Attachment 2 is a Property Report from Land.Vic showing the location of the property and the current zones and street names. The site is located on land that is zoned for Farming (FZ) and is not subject to any planning overlays, as shown on Figure 2-1 and Figure 2-2.

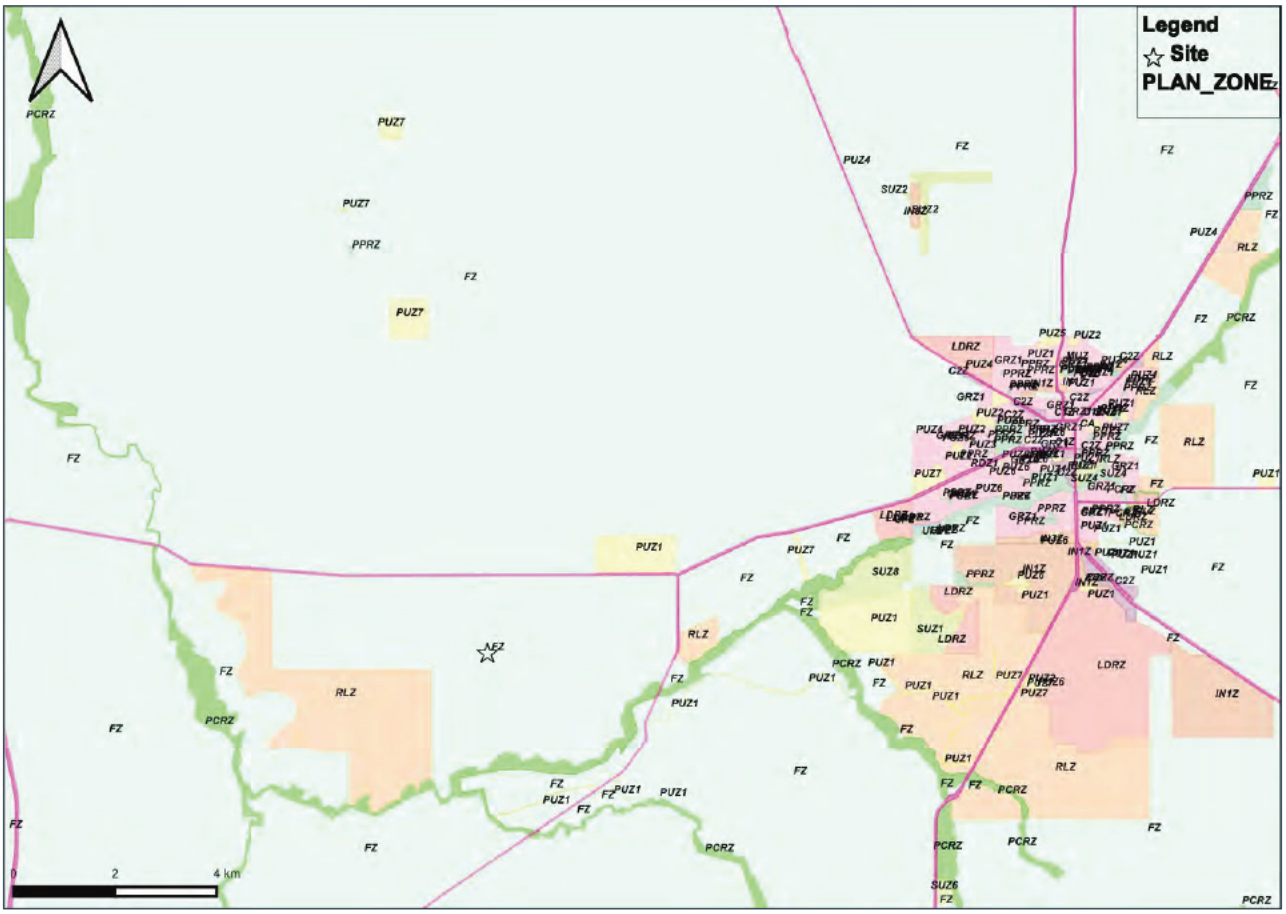


Figure 2-1: Planning scheme zones in the site locality

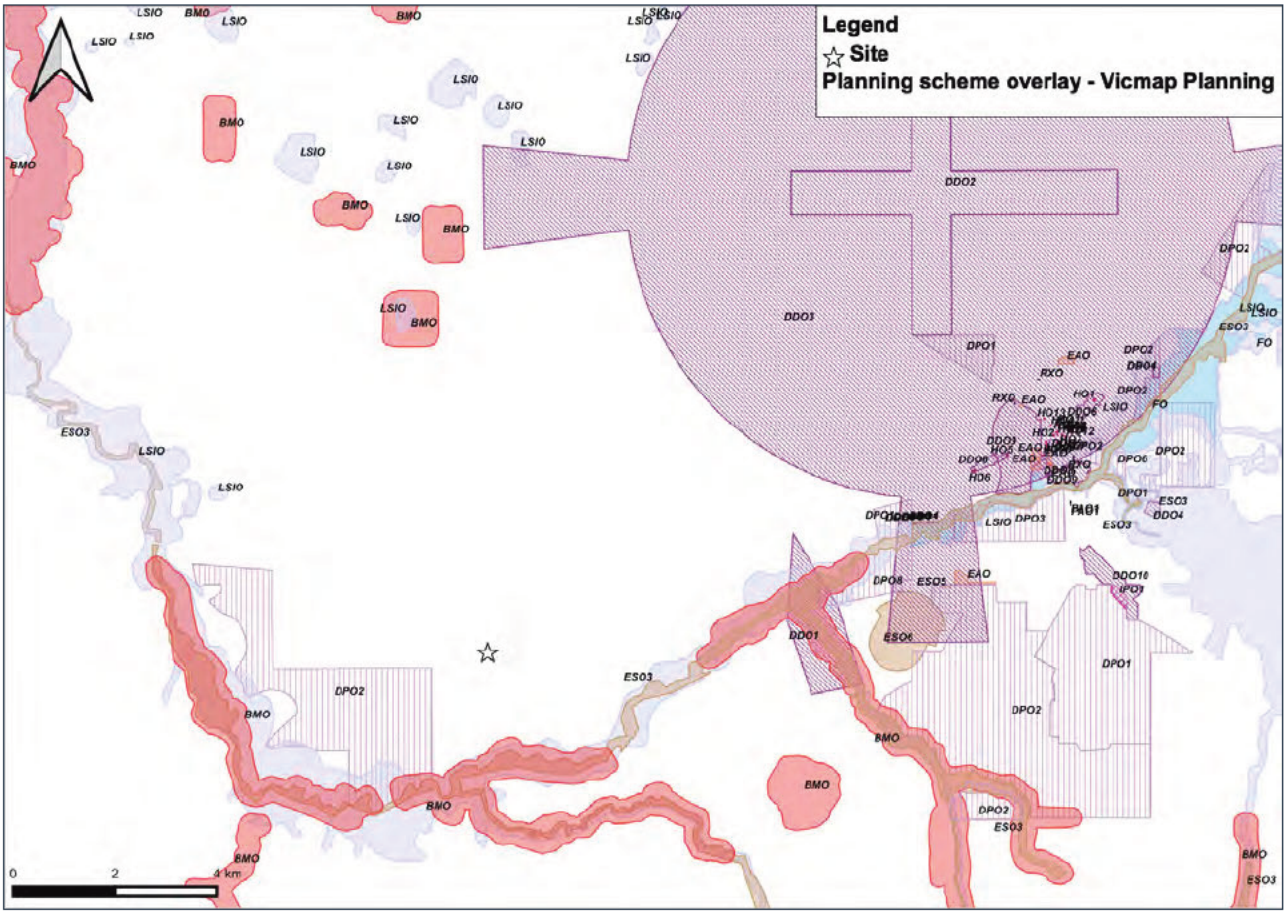


Figure 2-2: Planning scheme overlays in the site locality

A separate planning permit application will be lodged with the Rural City of Horsham in parallel with this works approval application. The contact details of the planning authority with which this planning permit application will be lodged is:

Horsham Rural City Council Planning Services

03 5382 9798

planning@hrrc.vic.gov.au

2.2 CHOICE OF LOCATION FOR NEW PREMISES

The location of the new premises has been chosen to be relatively close to Horsham, where the Australian Plant Protein processing facility is located, which will be the source of the brine and sludge needing to be dried. Figure 2-3 shows the site in relation to the town of Horsham and Victoria.

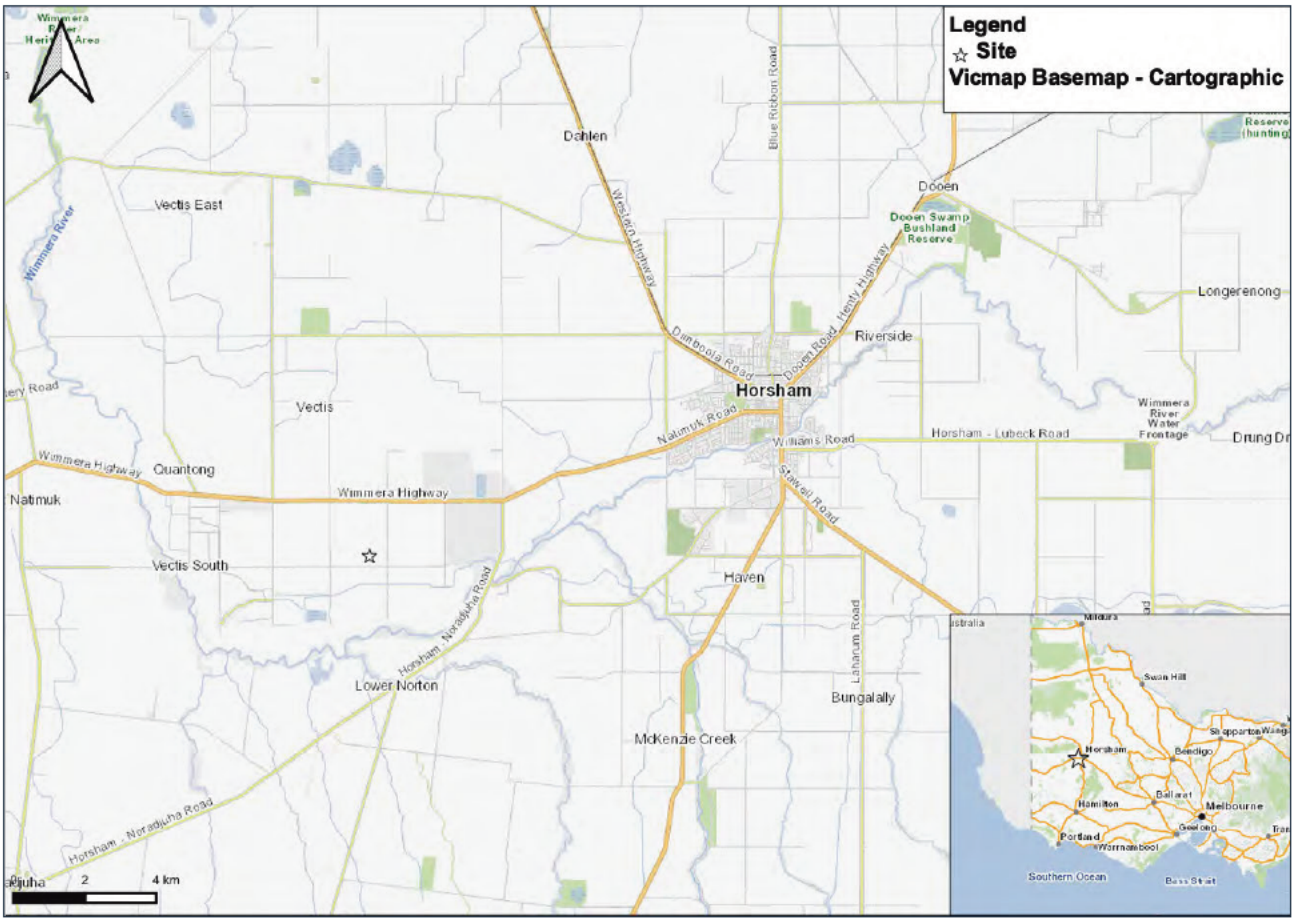


Figure 2-3: Cartographic map showing the site locality

Figure 2-4 shows an aerial view of the general locality and Figure 2-5 shows a closer aerial view of the site.

Features of the site that make it suited to the proposed use are:

1. Close proximity to the source of the waste, to minimise transport energy use and cost
2. Remote from urban areas and sensitive rural uses
3. A large enough block of land to accommodate the works
4. The site is owned by a farmer and businessman who has skills in land management and a financial interest in the plant protein company.

According to Environment Protection (Scheduled Premises) Regulation 2017, Schedule 1, the Water Sustainability Farm will be classed as A04 (Industrial wastewater treatment).

This Works Approval application is based on the brine and sludge being classified as industrial wastes, according to Schedule 1 of the Environment Protection (Industrial Waste Resource) Regulation 2009.

Figure 2-4: Aerial view of the locality

Figure 2-5: Close up aerial view of the site (Google Satellite)

3 Track record

This is a new development and therefore there is no track record to report for this site.

An offence declaration and statement of track record from the applicant is provided in Attachment 3.

Details about APP are available on their website. https://approteins.com.au

4 Community engagement

The proponent has engaged with the surrounding property owners regarding the proposed works. The Engagement Plan is currently being completed and will be provided shortly, in Attachment 4.

5 Process and integrated environmental assessment

5.1 EXISTING OPERATION

This is a new site and therefore there is no existing licensed operation. The site is currently used for broadacre dryland farming, including cereal cropping and sheep grazing.

5.2 DESCRIPTION OF THE PROPOSAL

OVERVIEW

Waterform Technologies is working with Australian Plant Proteins (APP) to complete a major upgrade of the APP food processing facility in Horsham. This upgrade includes a wastewater treatment plant for the treatment of the wastewater produced by the manufacturing process. By-products of the wastewater treatment system are brine and biological sludge. APP proposes to transport these by-products to the proposed Water Sustainability Farm for solar drying.

This Works Approval application relates to the proposed Water Sustainability Farm at Quantong, 15 km south west of Horsham. The proposal for the site comprises the following elements, discussed in more detail below and illustrated in the following process schematic:

- The waste streams
- The site
- The brine evaporation basins
- The sludge drying pad
- Site works and operations
- Layout plan.

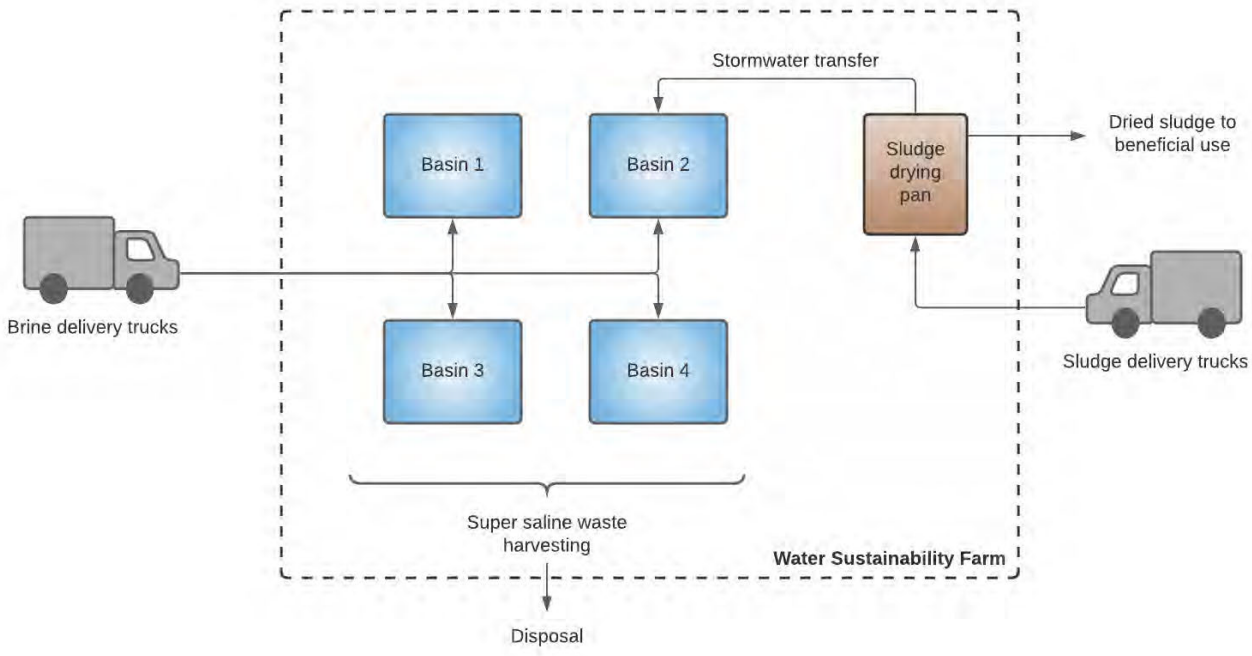


Figure 5-1: Process schematic

THE WASTE STREAMS

Two waste streams will be managed at the Water Sustainability Farm. The two waste streams are:

- **Brine** (saline waste) will be produced from the APP facility and will be transported from Horsham to the site where it will be managed with evaporation pans to store and further concentrate this brine. It is expected that the facility will receive:
  - An average of 57,600 L/day of brine produced 7 days/week (approximately 21 ML/year), with no seasonal variation
  - Initial salt concentration of approximately 14,000 ppm, increasing to 30,000 ppm after the first year, once the second stage production and treatment units have been commissioned.
- **Dewatered sludge** from the biological wastewater treatment process at the APP facility in Horsham will also be transported to this site to be air dried prior to beneficial use. It is expected that the facility will receive:
  - Less than 5 m^3/day of dewatered sludge with no seasonal variation
  - Solids concentration of 15–20% dry solids.

CLIMATE

The region generally has a dry, hot climate in summer, with mild days and cool nights in winter. Rainfall and evaporation statistics are provided in Table 5-1.

Table 5-1: Annual climate statistics

	RAINFALL (MM)	EVAPORATION (MM)
Mean	417	1,510
Med an	419	1,521
90th Percent e	549	1,605
Max	634	1,747
M n	193	1,285

Data in Table 5-1 were downloaded from the SILO database[1] which constructs climate datasets from Bureau of Meteorology observational data. The period assessed is 1975 to date. This accounts for advice provided by DELWP[2] that advises use of a 'current climate' baseline period from July 1975 to date. Evaporation data is Class A Pan Evaporation.

EVAPORATION BASINS

Four evaporation basins shall be constructed, with the first two providing sufficient capacity for 10 years of saline waste from the APP facility. The second two basins will be constructed after this time, to provide the necessary evaporation area required for the 30 year life of the facility.

The critical factor in the size of the basins is the evaporation rate that can be achieved and therefore the surface area required.

1 www longpaddock qld gov au/silo/point-data/

2 *Guidelines for Assessing the Impact of Climate Change on Water Supplies in Victoria* DELWP December 2016

The evaporation rate is largely driven by the local climate. On average, net evaporation is 1,093 mm or 11 ML/ha. However, this evaporation rate is reduced by two factors:

- Oasis effect – as the size of a water body increases, the evaporation rate decreases. This is due to wind creating more humid conditions above the water. The oasis effect will be minimal at this site as the basin/s will be relatively small. A factor of 0.9 is assumed.
- Salinity effect – as evaporation occurs, the salinity in the basin increases. This is referred to as evapoconcentration. As the salinity increases, the evaporation rate decreases. This is because the vapour pressure of the saline water is lower than that of freshwater and because dissolved salts lower the free energy of the water molecules. The salinity effect will initially be minimal, but will increase exponentially as evapoconcentration occurs. A factor of 0.7 is considered a reasonable allowance for long-term evaporation reduction[3].

RMCG has modelled the basin system surface area required using climate data from the 45 year period back to 1975, based on an evaporation factor of 0.63 (combining 0.9 for oasis effect and 0.7 for salinity effect). The modelling determined that **4.4 ha total surface area** is required, based on brine flows of 57,600 L/day.

To allow for wet periods, the modelled surface area needs to be combined with a sufficient storage capacity or volume. Modelling has been undertaken on a monthly time step over the climate period 1975 to present. Net inflows or outflows to the evaporation basin were calculated for each month and the cumulative storage from month to month was determined. The evaporation basins will combine 4.4 ha surface area with 35 ML storage capacity to allow for wet years. This will result in an average active basin depth of 0.8 m.

In addition, there will be an allowance of 0.22 m depth for salt storage and a freeboard of 0.5 m to allow for wind and wave action.

The evaporation basins will be constructed using compacted clay found onsite, graded to 1:1000 and compacted to ≤1 x 10^{-9} m/s permeability. The clay pad will prevent seepage/leakage to subsoils and groundwater. Testing has shown the site clay is able to achieve co-efficient of permeability of 6 x 10^{-11} m/s. Therefore, given correct construction, essentially impermeable evaporation basins will be possible. This is further detailed in Section 11.

The site layout is provided in Attachment 5.

SLUDGE DRYING PAD

Based on an annual maximum dewatered sludge production of 1,825 m^3 (5 m^3/day for 365 days), a sludge drying pad with a total area of 0.5 ha will be installed. This is based on the following calculations:

- Unloading/delivery area of 0.05 ha. Assuming windrowing cannot occur for a maximum period of 90 days due to wet weather making site inaccessible to machinery. This will allow 450 m^3 (5 m^3/day for 90 days) to be stored at a depth of 1 m.
- Windrowing area of 0.4 ha assuming the annual solids load is windrowed at 0.5 m high. This is based on experience at other sites – the speed at which drying occurs dramatically reduces the volume of solids to be handled. That is, within weeks of commencing the drying process the windrows have reduced in size allowing more vehicle access room for turning the windrows to encourage further drying, should this be needed.
- Stockpile area of 0.02 ha. Based on the volumetric reduction relationship: i.e. volume is inversely proportional to the percent dry solids. For sludge with a final dry solids content of 70%, the expected volume of solids is approximately 400 m^3/year, and stockpiles are assumed to be up to 3 m in height.

[3] *Membrane Concentrate Disposal: Practices and Regulation (Second Edition)* Mickley & Associates 2006 Desalination and Water Purification Research and Development Program Report No 123 U S Department of the nterior Bureau of Reclamation

Similar to the evaporation basins, the sludge drying pad will be constructed from onsite clay, graded to 1:1000 and compacted to ≤1 x 10^{-9} m/s permeability. Civil drawings of the evaporation basins and sludge drying pad are provided in Attachment 6.

SITE WORKS AND OPERATIONS

Site works include an access road, fences and vegetative screening:

- Access road for bringing in brine and sludge from the APP facility, and for transporting dried solids to nearby farms
- Shelter belts in strategic locations inside the perimeter of the property and along the edge of the drying facility itself will be installed to visually screen the site, suppress dust and generally soften the development from nearby sensitive uses.

During construction, a Construction Impact Management Plan will be prepared, to minimise the impact of construction on the surrounding environment and neighbouring properties. This is further detailed in Section 13. Once operational, the site will be unattended most of the time and trucks will access the site during daylight hours only.

5.3 PROCESS AND TECHNOLOGY

The processes and technology proposed are simple, reliable and robust:

- Evaporation is reliable and the dimensions of the evaporation basins and drying pan have been based on over 20 years of monthly climate data.
- Clay lining systems are reliable provided that sufficient correct soil can be found, is compacted in layers at the right moisture content and retains its imperviousness over time without the clay breaking down, cracking or being mechanically disturbed. Groundwater monitoring will confirm performance of the basins.
- Dust from the site is a potential hazard, as it can be from any agricultural area, but simple and reliable controls such as vegetative screens and separation distances will be used to manage the risk.
- Super saline waste will be disposed of at a landfill licenced to accept this waste.
- Dried biological solids will be beneficially applied to farmland with appropriate testing and controls.
- Fire hazard is not expected to be increased by this proposal.

5.4 ENVIRONMENTAL BEST PRACTICE

The Water Sustainability Farm design employs environmental best practice, as defined in EPA Publication 1517.1 *Demonstrating Best Practice*. A summary of the design responses to State Environment Protection Policy (SEPP) clauses is provided in Table 5-2.

Table 5-2: Environmental best practice according to relevant SEPP clauses

SEPP	CLAUSE	DESIGN RESPONSE
SEPP (Waters)	C ause 35 (management of sa ne d scharges)	Sa ne d scharges from the process of p ant prote ns are not d scharged to waterways. Instead, they are managed respons b y at the Water Susta nab ty Farm, Quantong and u t mate y d sposed of at a censed and f .
	C ause 53 (d rect waste d scharge to groundwater)	The evaporat on bas ns w be c ay ned to prevent eakage to aqu fers. Groundwater mon tor ng w occur to ensure the effect veness of the ners.
SEPP (Prevent on and Management of Contam nat on of Land)	C ause 16 (app cat on of waste to and)	Due to the nutr ents and organ c matter n the dr ed s udge, benef c a use n agr cu ture has been dent f ed as the preferred management opt on.
	C ause 17 (prevent on of contam nat on of and)	Benef c a and app cat on of the dr ed s udge w be undertaken accord ng to an env ronment mprovement p an (EIP). The EIP sha nc ude a r sk assessment and r sk m t gat on measures.
	C ause 18 (potent a env ronment mpact)	The Quantong s te s current y n use for agr cu ture. At the end of ts use as a Water Susta nab ty Farm t can be rehab tated and returned to agr cu tura use. The evaporat on bas ns and s udge dry ng area w be c ay ned to prevent eakage of sa ne waste and contam nated stormwater to subso s and surround ng and.
SEPP (Contro of No se from Commerce, Industry and Trade) No. N-1	C ause 16 (new prem ses)	Th s proposed new prem ses cons dered no se em ss ons and has based the techno ogy cho ce on a ow-no se, pass ve techno ogy (so ar dry ng/evaporat on).
SEPP (A r Qua ty Management)	C ause 19 (management of new source em ss ons)	An aerob c treatment process has been se ected, at the prote n p ant n Horsham, to m n m se nu sance odours of the resu t ng b o og ca s udge. Odours generated from the Water Susta nab ty Farm are expected to be m nor and cons stent w th other agr cu tura act v t es.
	C ause 33 (management of greenhouse gases)	Pass ve so ar evaporat on and a r dry ng processes have been se ected n favour of energy- ntens ve mechan ca equ pment.

5.5 CHOICE OF PROCESS AND TECHNOLOGY

The environmental impact of a proposal can vary with the type of raw materials, processes and technology used. The following environmental factors were considered when choosing the process and technology for the APP saline and sludge waste streams at the proposed Water Sustainability Farm at Quantong:

SALINE WASTE

- Saline waste cannot be beneficially used. Dried salt can have a commercial value (e.g. for human consumption), but the market is small compared to the volume of waste brine produced regionally and it is difficult to achieve the quality required for these commercial uses.
- Ocean discharge of saline waste was considered, however the financial, environmental and energy costs of transporting the saline waste 200 km to the nearest ocean outfall at Warrnambool are prohibitive.
- Discharge to GWMWater's Horsham sewerage system was considered and was discussed with GWMWater. However, the sewerage scheme makes beneficial use of the treated wastewater for agricultural irrigation and extra salt would not be beneficial for that scheme. Therefore, GWMWater will not accept the saline waste.
- Brine evaporation in the Horsham climate is a low risk process and relies on basic technology.
- Suitable land is available near Horsham for the evaporation process.
- The advantages of the saline waste management set out in this application is that it is has low environmental risk, is simple and proven technology, and therefore easy to operate.

SLUDGE

- The nutrients and organic matter in biological sludge can be beneficially used in agriculture.
- GWMWater has agreed to accept the wet sludge at the Horsham wastewater treatment plant for a short-term period. However, this is not sustainable for GWMWater in the long-term and therefore sludge drying at the proposed Water Sustainability Farm is needed for ongoing sludge management.
- Drying sludge in the Horsham climate is a low risk process and relies of basic technology.
- Suitable farm land is available near Horsham to beneficially use the dried solids as part of normal farming operations.

5.6 INTEGRATED ENVIRONMENTAL ASSESSMENT

The solution described in this application represents a balanced and integrated approach of waste management from an important plant-based protein processing venture. Passive treatment processes have been selected for saline and sludge waste management which minimise environmental impacts, including GHG emissions from transport of wastes.

SECTION 2 – Environmental information

6 Energy use and greenhouse gas emissions

6.1 GENERAL INFORMATION

The Water Sustainability Farm will not be connected to an electricity supply. The site will rely on solar evaporation to concentrate the brine and dry the sludge. When stormwater collects on the sludge drying pad, a portable petrol or diesel or solar pump will be used to transfer the stormwater into an evaporation basin. Due to low rainfall in the Horsham area, it is only expected that this pump will run for a few hours each year. Therefore, onsite electricity and fossil fuel use is considered negligible.

Direct (Scope 1) emissions will be generated by the transport of brine and dewatered sludge to the Water Sustainability Farm. Based on the expected number of annual truck movements and the travel distance between the APP processing facility and the Water Sustainability Farm, it is estimated that annual emissions from transport will be 57 tonnes CO_2-e.

No energy will be sourced from the Victorian electricity grid, therefore the indirect GHG (Scope 2) emissions from the Water Sustainability Farm will be zero CO_2-e.

6.2 CLIMATE CHANGE ACT

Section 17(1) of EPA 1970 requires the EPA to consider climate change in licensing decisions (to issue or refuse a licence), as identified in Schedule 1 of the Climate Change Act. This chapter of the application addresses this requirement. Section 17 (2) requires the EPA to have regard to five specific issues, each of which is addressed in Table 6-1 below.

Table 6-1: Response to the Climate Change Act

EPA MUST HAVE REGARD TO	RESPONSE FOR THE WATER SUSTAINABILITY FARM
The potent a mpacts of c mate change re evant to the dec s on or act on.	C mate change w not mpact d rect y on the v ab ty of the proposed fac ty.
The potent a contr but on to the State's greenhouse gas em ss ons of the dec s on or act on.	M n ma GHG em ss ons as noted n Sect on 6.1
Any gu de nes ssued by the M n ster under Sect on 18. To date, no such gu de nes have been ssued.	
Sect on 17 (3) sets out the re evant cons derat ons for EPA n hav ng regard to the potent a mpacts of c mate change. These are the potent a b ophys ca mpacts, the potent a ong and short term econom c, env ronmenta , hea th and soc a mpacts, the potent a benef c a and detr menta mpacts, the potent a d rect and nd rect mpacts, and the potent a cumu at ve mpacts.	The proponent has eva uated these factors and taken them nto account when des gn ng and p ann ng the fac ty.
Sect on 17 (4) sets out the re evant cons derat ons for EPA n hav ng regard to the potent a contr but on to the State's greenhouse gas em ss ons. These are the potent a short term and ong term greenhouse gas em ss ons, the potent a d rect and nd rect greenhouse gas em ss ons, the potent a ncreases and decreases n greenhouse gas em ss ons, and the potent a cumu at ve mpacts of greenhouse gas em ss ons.	The proponent has eva uated these factors and taken them nto account when des gn ng and p ann ng the fac ty.

7 Water use

There will be no connection to reticulated water and no supplementary water is used at the site. Therefore, water use is zero.

8 Air emissions

EVAPORATION BASINS

There are no air emissions associated with the operation of the evaporation basins.

SLUDGE DRYING

The sludge is expected to have a low strength earthy smell and therefore offensive odours are not expected to be generated.

Dust could be an issue during movement of the dried sludge windrows and stockpiles.

Windrowing and windrow turning will not be undertaken when wind speeds are greater than 25 km/h, the daytime temperature is greater than 30 C, or there is rain.

Odours will be continuously monitored by staff/contractors if sludge is moved around the site, such as windrowing. Work will be stopped if offensive odours are detected.

Tree screens will be planted along the site perimeter to minimise dust movement beyond the site.

SEPARATION DISTANCES

Separation distances are required to provide a buffer distance between the facility and any sensitive receptors, in the event that there are any off-site impacts from the proposed activity. As specified in Table 1 of EPA Publication 1518 *Recommended separation distances for industrial residual air emission*s, a separation distance of 250 m is required for a waste transfer station. Although the Water Sustainability Farm will not be a typical waste transfer station, this industry type has been selected from the table so that a conservative approach to separation distances is considered.

For such facilities located in a rural location, this distance would be applied from the basin embankment to a sensitive receptor such as a house or surface water. Figure 8-1 shows the location of sensitive receptors relative to the evaporation facility.

In addition to this, it is recommended that the basins are set back at least 10 m from the site boundary, as detailed in Table 7 of EPA Publication 500 *Code of practice for small wastewater treatment plants*.

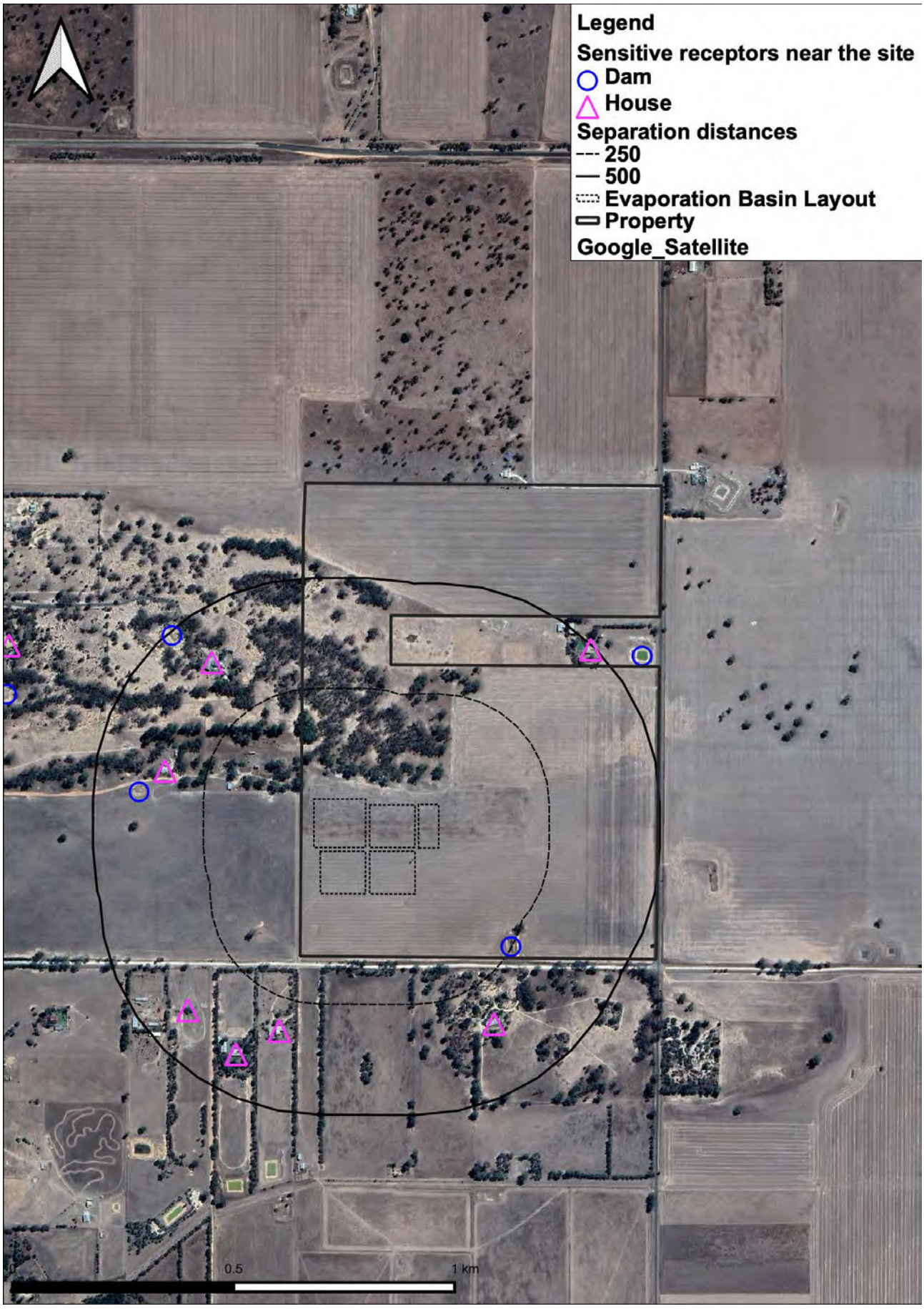


Figure 8-1: Separation from sensitive receptors

9 Noise emissions

The facility is located in a rural area, approximately 300 m from the nearest house. The potential source of noise emissions from the facility is traffic noise caused by trucks moving to and from the site. Periodically, heavy mobile plant, such as loaders, may be used to windrow sludge, and harvest super saline waste and dried sludge.

Typical traffic movements are summarised in Table 9-1.

Table 9-1: Typical traffic movements

DAY	TIME	TRAFFIC MOVEMENTS
Monday to Fr day	07:00–16:00	Up to 3 trucks per day sa ne waste. Up to 1 truck per day s udge.
Saturday and Sunday	07:00–16:00	Up to 3 trucks per day sa ne waste.

There is no other machinery on site and therefore no other sources of noise.

10 Water

10.1 STORMWATER MANAGEMENT

EVAPORATION BASINS

Rain falling on the evaporation basins will be contained in the basins and become part of the saline brine mixture that will be dried off over time by evaporation.

‘Turkey nest’ basins will be constructed, to prevent stormwater draining into the evaporation basins.

Climate modelling has been undertaken to confirm the long term water balance, and accounts for rain falling on the evaporation basins as well as stormwater collected from the sludge drying pad.

SLUDGE DRYING

Rain falling on the sludge drying pad can create contaminated run off. The clay pad will be bunded and a drainage channel located along the lowest edge of the pad (natural fall is to the south-east). Any run-off collected will be transferred to the evaporation basins for disposal.

Annual average rainfall is approximately 400 mm and wet year rainfall is 550 mm. A portion of this (say 25%, although it may be higher) will be lost to localised evaporation from the pad. Annual runoff from the pad is estimated to average 1.5 ML/yr and up to 2 ML/yr in wet conditions. The evaporation basins will have ready capacity to receive this additional volume.

11 Land and groundwater

11.1 PROTECTION OF LAND

SOILS

Soil information provides an understanding of how suitable the site is for the facility. The soil types and depths, as discussed below, then inform the potential land impact and risk management.

In *A Land Resource Assessment of the Wimmera Region* (Robinson et al, 2006), the site is mapped within the Quantong landform unit. This comprises linear dunes with swales in between. The soils of the dunes are deep sandy soils (Tenosols) or yellow and brown sodic texture contrast soils (Sodosols) with deep sandy topsoils. These have high permeability. The soils of the swales are yellow and brown sodic texture contrast soils. These have shallower topsoils (by comparison to the Sodosols in the dunes) and slow permeability.

Earlier soil mapping is available from *Major Agricultural Soils of the Wimmera Irrigation Area* (Martin et al, 1996). The site is mapped as Haven sandy loam, just south of an area of Quantong sand. Figure 11-1 shows the Haven sandy loam as medium dark green and Quantong sand as yellow. In the dune and swale landscape unit, Haven sandy loam usually occurs in the swale component. The generalised soil type is detailed in Table 11-1.

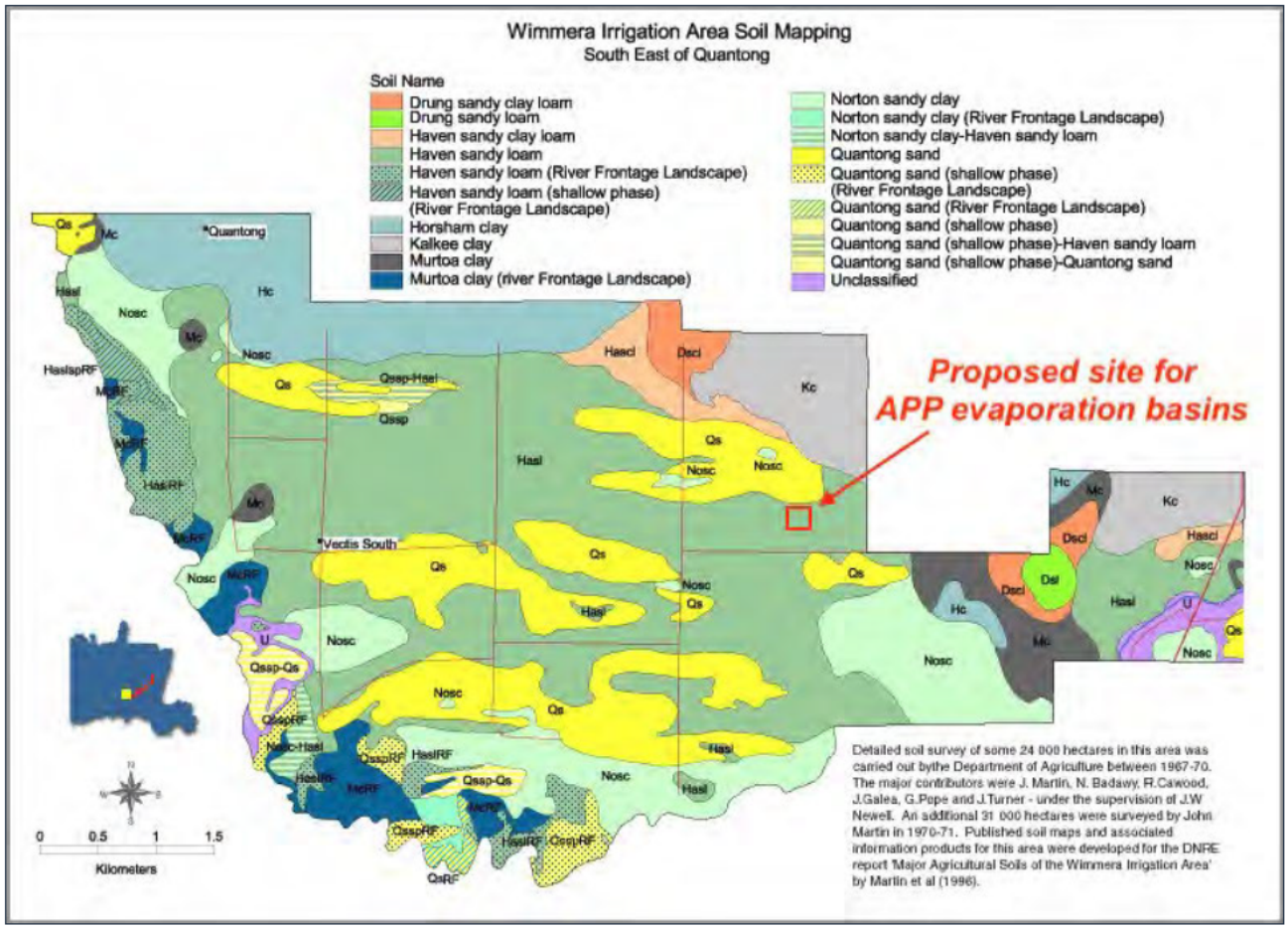


Figure 11-1: Soils map

Table 11-1: Haven sandy loam generalised soil type[4]

HORIZON	DEPTH	DESCRIPTION
Surface Soil		
A1	0–5/20 cm	Brown, dark brown or dark grey sh brown sandy oam or oamy sand; hard sett ng or oose surface cond t on; weak med um or coarse granu ar or b ocky structure; sharp change to A2 hor zon.
A2	5/20–15/35 cm	Strong brown, brown or brown sh ye ow, sporad ca y or consp cuous y b eached sandy oam or sandy c ay (occas ona y med um or heavy c ay); may form a cemented capp ng; sharp or gradua change to subso .
Subsoil		
B21	15/35–55/90 cm	Ye ow sh red, ght brown, ght brown sh grey, strong brown or brown sh ye ow, occas ona y w th redd sh brown or pa e brown mott ed *medium* or *heavy clay* (occas ona y *sandy clay*); p ast c; coarse co umnar, pr smat c or weak med um b ocky structure; strong cons stence dry, st cky cons stence wet; usua y conta ns a trace (< 2%) amount of hard carbonate; gradua or c ear change to B22 hor zon.
B22	55/90–120/140 cm	Ye ow sh brown, ght brown sh grey, brown sh ye ow or ye ow w th pa e ye ow, ye ow sh red or red mott ed *light* to *heavy clay* or *sandy clay*; p ast c; weak med um to coarse b ocky structure; strong cons stence dry, st cky cons stence wet; conta ns a trace (< 2%) amount of hard carbonate and a s ght (2-10%) amount of soft carbonate.

Preliminary geotechnical samples were taken in September 2020 by earthmoving contractor John Glover from two pits located in the area selected for the evaporation basins and analysed by Douglas Partners. A copy of these reports is provided in Attachment 7. The findings from the geotechnical analysis indicate that:

- The soils from both pits were described as silty clay.
- Samples were taken from 600 mm depth in one pit and 1000 mm depth in the other.
- Remoulded samples from both pits achieved a co-efficient of permeability of 6 x 10^{-11} m/s using Melbourne tap water as the permeant.

Given the site is underlain by the Parilla Sands Aquifer (refer to Section11.3 below), it is expected that sands could occur in the deeper subsoil.

TOPOGRAPHY

The site sits on a low ridge located 2 km north of the Wimmera River (Refer Figure 2-3) approximately 130 m above sea level. There are no watercourses in the immediate area, but an old water supply channel from the now-defunct Wimmera Irrigation District once crossed the site.

Contour information has been derived from Data.Vic digital terrain. These maps indicate that:

- North and northwest of the site is an elevated area, higher than the Wimmera River floodplain but also higher than the broader plain to the north.
- Many of the hills in the area show uniform slope and form, but the area immediately west of the subject property exhibits a “lumpy” ground elevation, perhaps corresponding to the sand ridge identified above.
- The total fall across the specific site selected for the evaporation basins is only 2.0 m from one edge to the other. The average slope across the site is approximately 1:400.

[4] Martin et al 1996 http //vro agriculture vic gov au/dpi/vro/wimregn nsf/pages/natres soil irrigation-region haven

A detailed contour map is provided in Figure 5-2.

Figure 11-2: Half metre contours immediately surrounding the site

MANAGEMENT OF LAND RISKS

Risks to land, and their management, are as follows:

- Potential for leakage of saline waste from the evaporation basins or contaminated stormwater from the sludge drying pad causing salinisation of subsoils. Clay lining will be used to prevent leakage occurring. Refer to discussion of groundwater risks in Section 11.3 for further details. Visual monitoring will occur to check for land salinisation occurring in proximity to the evaporation basins – indicators include deterioration of grass health, growth of salt-tolerant plants, waterlogging after rainfall and presence of bare earth/salt scalds.
- Soil removal and compaction to construct the facility. An area of approximately 6 ha will be impacted. Topsoils removed will be stockpiled on site. At the conclusion of the facility's life, all super saline waste will be removed for offsite disposal. Compacted areas will be rebuilt using tillage, replacement of topsoils and addition of organic matter (potentially the dried sludge). The site can then return to agricultural land.
- Erosion is not expected given relatively flat topography and bunded nature of proposed facilities.

11.2 REUSE OF DRIED SLUDGE

BENEFICIAL USE

Given the proximity of the facility to dryland cropping farms, this type of agriculture presents the most obvious choice for beneficial use. The final solids product is expected to provide a rich source of nutrients and organic matter that can be used to off-set manufactured fertilisers and provide soil conditioning. For dryland cropping, an annual program of sludge incorporation is expected. This would generally be undertaken between March and June, and usually prior to sowing winter crops such as barley, wheat and canola. An Environmental Management Plan (EIP) shall be prepared prior to beneficial use and this will detail all aspects of the reuse site and how land application will be managed.

DRIED SLUDGE QUALITY

Testing will occur to understand the sludge quality following drying. A prediction is included in the following table, based on the design details of the APP wastewater treatment plant. The nutrient content will be high and beneficial to agriculture.

Table 11-2: Predicted sludge quality post-drying

PARAMETER	RAW SLUDGE QUALITY (5% SOLIDS)	CHANGE DURING DRYING	PREDICTED FINAL SLUDGE QUALITY (70% SOLIDS)
pH	Neutra	-	Neutra
Sa n ty	3,100 µS/cm EC	M nor each ng nto stormwater, conta ned n evaporat on bas n.	To be conf rmed
Sod um	420 mg/L	M nor each ng nto stormwater, conta ned n evaporat on bas n.	~5,000 mg/L
Ch or de	900 mg/L	M nor each ng nto stormwater, conta ned n evaporat on bas n.	~11,000 mg/L
N trogen	~1,000 mg/L	Loss through vo at sat on dur ng dry ng and m nor each ng nto stormwater, conta ned n evaporat on bas n.	~9,800 mg/L
Potass um	400 mg/L	M nor each ng nto stormwater, conta ned n evaporat on bas n.	~5,000 mg/L
Phosphorus	To be conf rmed	Concentrate n so ds.	To be conf rmed

DRIED SLUDGE REUSE SITE SUITABILITY

Although the sludge is not biosolids (that is, not of human waste origin), best practice guidance provided in EPA Publication 943 has been applied in determining the suitability of sites for the spreading of the dried sludge. The guidelines offer advice on site characteristics that may render the site unsuitable for land application. The key criteria are:

- Topography: the slope of the land will not promote excessive run-off and therefore the potential for contaminants to leave the site and enter nearby waterways.
- Surface waters: sludge application separation distances of 50 m to surface waters or 25 m to farm dams should be achievable, and land is not regularly subject to waterlogging or flooding.
- Groundwater: there should be low risk of groundwater contamination.

- Native vegetation: no detrimental impact to native vegetation.
- Cultural heritage: no detrimental impact to areas of highly sensitive ecological value, areas of conservation, and/or cultural or heritage values.
- Soils: application promotes healthy plant growth and maintains beneficial use of the land.
- In addition to the guidance provided in EPA Publication 943, site selection should also consider:
  - The proximity of the farm to the drying facility and the ease of spreading
  - The farm has an active cropping program that will beneficially utilise the nutrients applied
  - The farmers have good management skills, understand the use of industrial waste and will be prepared to participate in monitoring and reporting requirements.

There is ample farm land near the proposed Water Sustainability Farm that is suitable for dried sludge reuse.

DRIED SLUDGE REUSE SITE SEPARATION DISTANCES

Buffer distances will be applied to ensure sensitive land uses are not negatively impacted by the reuse of dried sludge.

The buffer distances for the scheme are recorded in Table 11-3 and based on guidance provided in EPA Publication 943 *Guidelines for Environmental Management, Biosolids Land Application*. A conservative approach to the buffer distances has been adopted, with buffer distances associated with treatment grade T3 biosolids selected, even though the quality of the sludge will be significantly better than T3 biosolids.

Table 11-3: Recommended buffer distances – EPA Publication 943 (2004)

LAND USES	DISTANCE (M)
Res dent a zone, urban zone	250
Occup ed dwe ng	50
Surface water	50
Dr nk ng water bores	250
Other bores (not nc ud ng mon tor ng bores ons te)	50
Farm dams	25
An ma enc osures	50
Farm dr veways, access roads and fence nes	5
S gn f cant f ora and fauna	50
Sens t ve areas (as per Sect on 5.3 EPA Pub cat on 943)	100

DRIED SLUDGE REUSE SITE MONITORING

Soil testing of potential farmland will be used to determine the bioavailable phosphorus (Olsen P) already present in the soil. The results will be used to calculate a sustainable loading rate as outlined in Table 11-4. The application rate is also influenced by the frequency of application the farmer wishes to use. That is, maintenance applications can be done on a site every year, but if the preference is for application only every three years, then the application rate could be higher.

Table 11-4: Determining phosphorus application based on existing soil conditions

SOIL OLSEN P (mg/kg)	P APPLIED IN SLUDGE (kg/ha/annum)	CONCEPT
< 10	50–100	Cap ta app cat ons to ra se so P to opt mum eve s.
10–20	20–50	As above.
20–30	< 20	Ma ntenance app cat ons to ma nta n eve s (nutr ent ba ance).
30–40	< 20	As above.
> 40	0	Do not app y.

Nitrogen applications for dryland farming should not exceed 250–300 kg/ha/annum.

The dried sludge will not be applied to any paddocks that have:

- Olsen P ≥40 mg/kg
- Class B (moderate) soil salinity or worse, i.e. ≥3.8 dS/m ECe
- Soil sodicity (ESP) >10%
- pH outside preferred agricultural range 5.5 to 8.

11.3 PROTECTION OF GROUNDWATER

GROUNDWATER

The Groundwater Resource Report[5] for the site indicates a depth to watertable of 20–50 m, with a depth of 10-20 m to the south of the site. The watertable occurs within an Upper Tertiary Aquifer (marine sand) known as the Parilla Sands and has a salinity in the range 3,500 – 7,000 mg/L TDS. Figure 11-3 shows the mapped groundwater depth and salinity as presented on the Visualising Victoria's Groundwater web site.

Flow direction in the Parilla Sands is to the north-west towards the Wimmera River. Recharge occurs from rainfall and stream leakage (e.g. from the nearby Wimmera River). Discharge also occurs from the watertable to the Wimmera River[6].

The Upper Tertiary Aquifer (Parilla Sands) is underlain by an Upper Tertiary Aquitard (46–62 m), known as the Winnambool Formation and a Low Mid-Tertiary Aquitard (62–86 m) known as Geera Clay. Below these is a Lower Tertiary Aquifer and then Bedrock[7].

The Winnambool Formation acts as a low permeability barrier and the Geera Clay is a moderate – low permeability layer[8]. There is expected to be minimal hydraulic connection between the Upper and Lower Tertiary aquifers at this location.

5 DELWP 2019 https //www water vic gov au/groundwater/groundwater-resource-reports
6 *HORSHAM Hydrogeological Map* (1 250000 scale) McAuley et al Rural Water Corporation 1992
7 DELWP 2019 and McAuley et al 1992
8 *Groundwater SAFE (Secure Allocations, Future Entitlements), Victorian Groundwater Catchment Systems Framework* DSE 2012

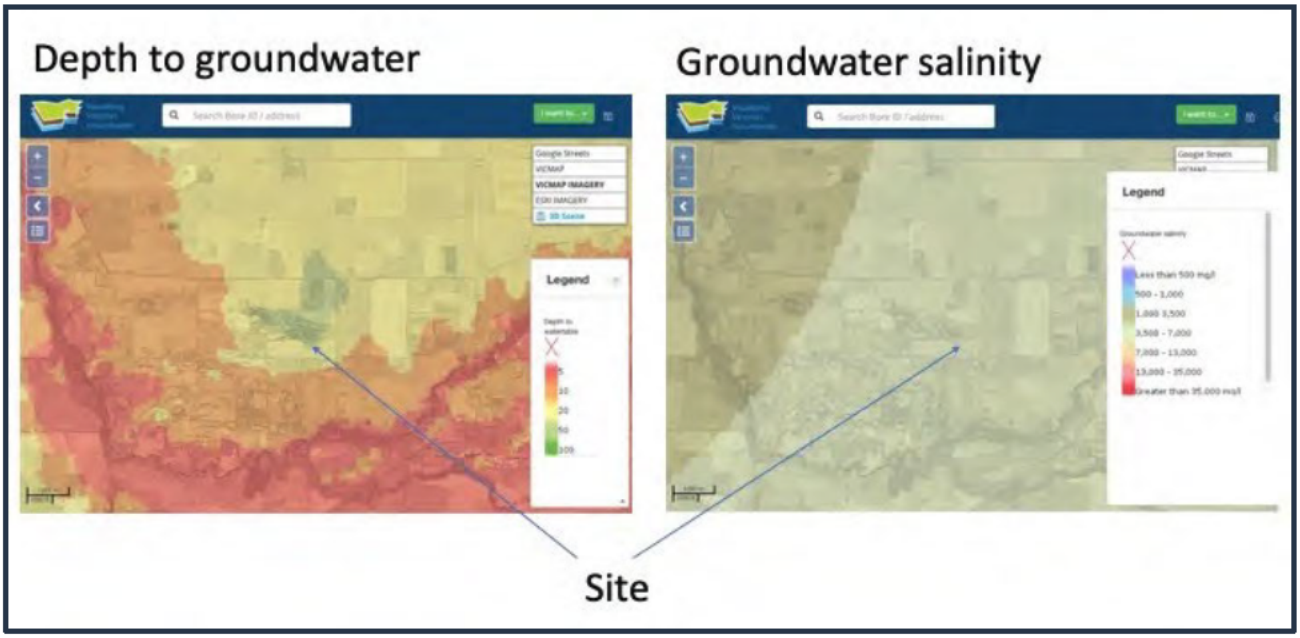


Figure 11-3: Mapped groundwater depth and salinity

GROUNDWATER RISKS

The key risk is seepage or leakage of the saline brine impacting on surrounding soils and groundwater. If seepage occurs, it could create a plume below the evaporation basin until it reaches the watertable as shown in Figure 11-4.

Subject to the permeability of the subsoils, there is also potential for creation of a perched watertable and lateral movement of saline seepage. This could occur if there are sand "lenses" above heavier clays. Therefore, seepage could reduce beneficial use of groundwater and potentially create land salinization.

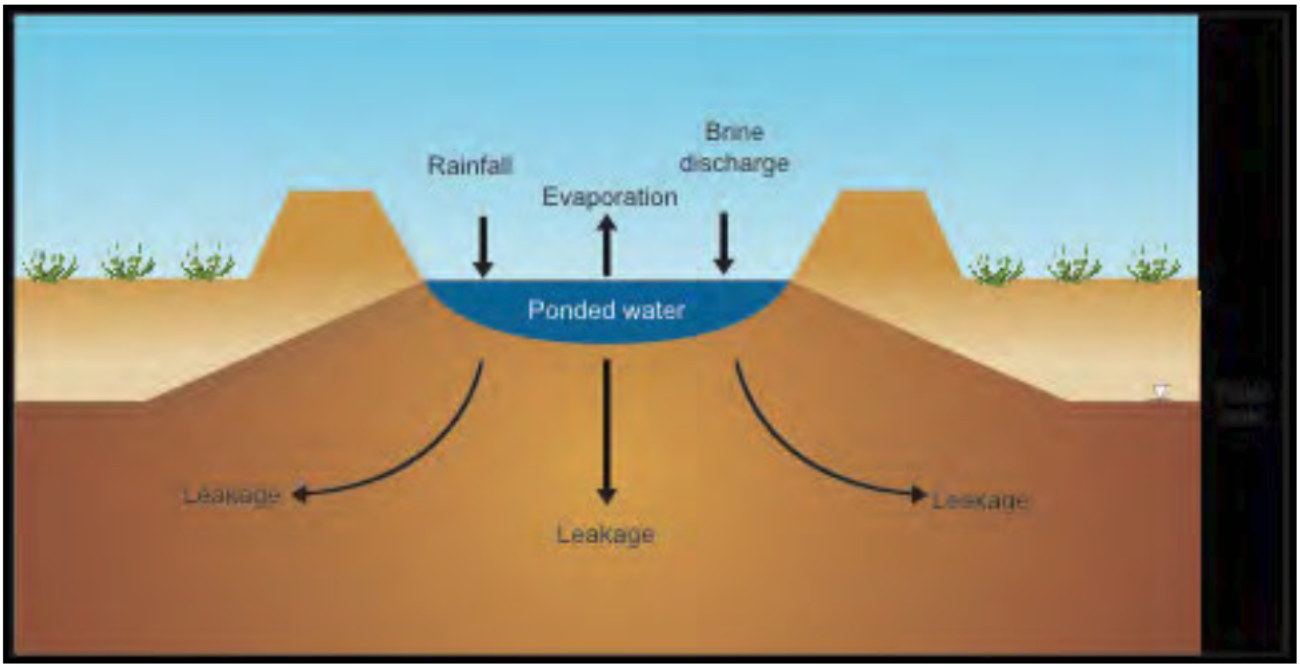


Figure 11-4: Conceptual diagram of leakage impact

MANAGEMENT OF GROUNDWATER RISKS

To avoid the groundwater risks described above, the brine evaporation pans and the sludge drying pad will be contained within an engineered clay pad, graded to 1:1000 and compacted to ≤1 x 10^{-9} m/s permeability. The clay pad will prevent seepage/leakage to subsoils and groundwater. As mentioned, the site clay is able to achieve co-efficient of permeability of 6 x 10^{-11} m/s. Therefore, given correct construction, essentially impermeable evaporation basins and sludge drying pad will be possible and there is a low risk of leaching to groundwater.

In addition to correct construction, monitoring and protection of the compacted clay liners/pad will be included in ongoing site management.

The clay pad integrity will be protected by not permitting vehicle access during wet weather and setting loader bucket height to just above the clay, when dried sludge or super saline waste are removed.

The brine can interact with the clay and change the permeability properties of the clay liner. Research, and experience at other sites, indicates that increasing water salinity can increase the hydraulic conductivity and therefore the level of seepage through compacted clay storage liners. Increasing salinity of the water in the basin results in flocculation (i.e. aggregation) of the clay particles which creates larger pore channels through which flow can occur. This does not necessarily occur at all sites, with research suggesting this may be due to plasticity of the clay. The hydraulic conductivity of low plasticity clays does not change significantly with increasing salinity.[9]

The installation and routine monitoring of groundwater bores will be used to monitor the long-term level and quality of the local groundwater and performance of the clay liners. Annual maintenance of these bores will also be part of overall site management. At least four monitoring bores will be installed around the basins to monitor the water table and detect any changes. The preliminary location of these monitoring bores is shown in Attachment 5 – Site layout.

[9] G Y Imaz T Yetimoglu and S Arasan 2008 "Hydraulic conductivity of compacted clay liners permeated with inorganic salt solutions" *Waste Management & Research* Vol 26 ssue 5

12 Waste

12.1 INDUSTRIAL WASTE GENERATION

Over time a super saline waste liquid will accumulate in the evaporation ponds. This material will reach a depth as crystal salt of 200 mm across the four basins in 30 years' time.

12.2 WASTE HANDLING AND TREATMENT PREMISES

The ultimate fate of the super-saline waste, post evaporation, will be assessed closer to when harvesting becomes necessary. There may be technology changes during the intervening period which provide new options for beneficial use or safe disposal of the super-saline waste.

The most likely option is landfill disposal. Depending on quality, it may be possible to harvest the salt and use it beneficially. However, the presence of processing contaminants and low market demand for the product are likely to inhibit beneficial use.

13 Environmental management

13.1 RISK ASSESSMENT OF NON-ROUTINE OPERATIONS

Evaporation and drying processes would be impacted by excessive rain at the site. 'Turkey nest' basins will be constructed, to prevent stormwater draining into the evaporation basins. The evaporation basins have been sized to contain direct rainfall onto their surface in wet years. The sludge drying pad will be bunded and stormwater runoff will be transferred to the evaporation basins.

13.2 ENVIRONMENT IMPROVEMENT PLAN

As discussed in Section 11.2, the beneficial use of the dried sludge will be according to a site-specific EIP. This will be developed once sludge is available for reuse and local farmland has been identified (approximately two years from site commissioning).

13.3 CONSTRUCTION IMPACT MANAGEMENT

A Construction Environment Management Plan (CEMP) will be developed prior to construction commencing. All practicable measures will be taken to ensure construction impacts are minimal. The risks during construction include:

- Noise
- Dust
- Sediment and uncontrolled stormwater
- Construction traffic.

The CEMP will reference relevant EPA publications for managing these impacts.

As this is a greenfield site previously used for dryland farming, it is unlikely there will be any previous site contamination.

14 Other approvals

14.1 NEW LICENCE SUBSEQUENT TO WORKS APPROVALS

It is expected that the Water Sustainability Farm will be classified as A04 (Industrial wastewater treatment) Scheduled Premises according to Environment Protection (Scheduled Premises) Regulation 2017, Schedule 1. Therefore, an EPA licence will be required for operation and it is requested that this is forthcoming from EPA, once they are satisfied that the works have been constructed in compliance with the Works Approval.

It is expected that the EPA licence will specify the limit for general odour from the site at 1 odour unit at or beyond the boundary, according to Schedule A of the State Environment Protection Policy (Air Quality Management). No other discharges from the site will be permitted.

15 Post decision operational requirements

It is anticipated that the EPA licence for the site will outline monitoring for site odours and groundwater impacts, once the site is licenced and operational.

Attachment 1: Property title

REGISTER SEARCH STATEMENT (Title Search) Transfer of Land Act 1958

VOLUME 09451 FOLIO 688

Security no : 124087409952L
Produced 06/01/2021 11:09 AM

LAND DESCRIPTION

Crown Allotment 247C Parish of Vectis East.
PARENT TITLE Volume 03508 Folio 404
Created by instrument J668097 07/10/1981

REGISTERED PROPRIETOR

Estate Fee Simple
Joint Proprietors
PETER THOMAS BLAIR of 22 BARNES BOULEVARD HORSHAM VIC 3400
THOMAS REGINALD BLAIR of 141 CAMERON ROAD HORSHAM VIC 3400
AN019109N 15/08/2016

ENCUMBRANCES, CAVEATS AND NOTICES

MORTGAGE AN019110E 15/08/2016
WESTPAC BANKING CORPORATION

For details of any other encumbrances see the plan or imaged folio set out under DIAGRAM LOCATION below.

DIAGRAM LOCATION

SEE TP269935B FOR FURTHER DETAILS AND BOUNDARIES

ACTIVITY IN THE LAST 125 DAYS

NIL

----------END OF REGISTER SEARCH STATEMENT----------

Additional information: (not part of the Register Search Statement)

Street Address: LINDNERS ROAD QUANTONG VIC 3401

ADMINISTRATIVE NOTICES

NIL

eCT Control 16320Q WESTPAC BANKING CORPORATION
Effective from 22/10/2016

DOCUMENT END

Imaged Document Cover Sheet

The document following this cover sheet is an imaged document supplied by LANDATA®, Victorian Land Registry Services.

Document Type	**Plan**
Document Identification	**TP269935B**
Number of Pages (excluding this cover sheet)	**1**
Document Assembled	**06/01/2021 11:14**

	TITLE PLAN		EDITION 1	TP 269935B

Location of Land

Parish: VECTIS EAST
Township:
Section:
Crown Allotment: 247C
Crown Portion:

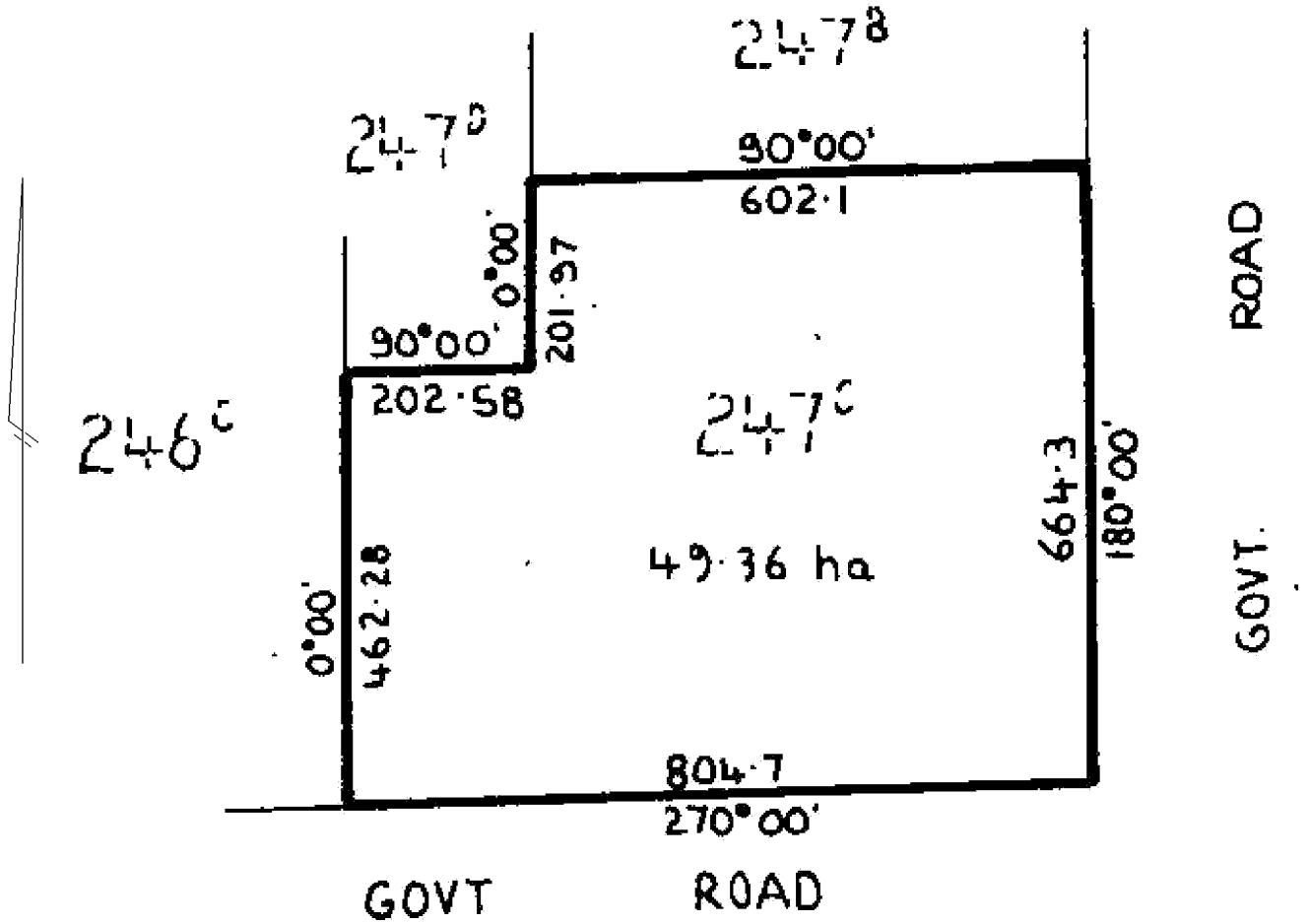
Last Plan Reference:
Derived From: VOL 9451 FOL 688
Depth Limitation: NIL

Notations

ANY REFERENCE TO MAP IN THE TEXT MEANS THE DIAGRAM SHOWN ON THIS TITLE PLAN

Description of Land / Easement Information

THIS PLAN HAS BEEN PREPARED FOR THE LAND REGISTRY, LAND VICTORIA, FOR TITLE DIAGRAM PURPOSES AS PART OF THE LAND TITLES AUTOMATION PROJECT
COMPILED: 12/01/2000
VERIFIED: EWA



LENGTHS ARE IN METRES	Metres = 0.3048 x Feet Metres = 0.201168 x Links		Sheet 1 of 1 sheets

Attachment 2: Property report

Property Report from www.land.vic.gov.au on 06 January 2021 11:00 AM

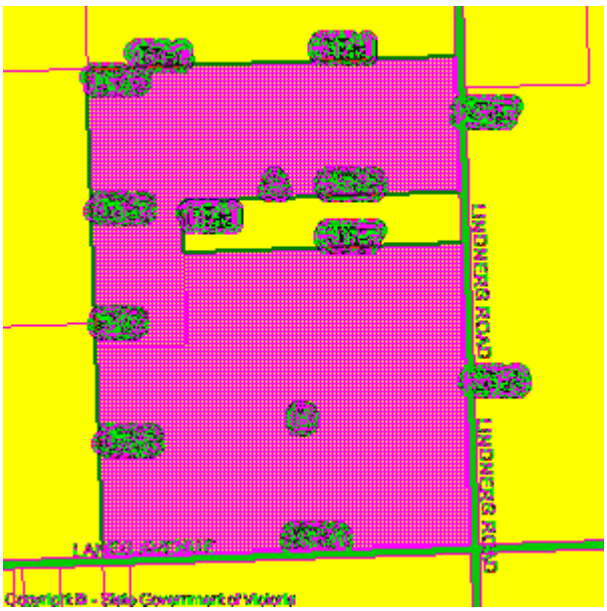
Address: LINDNERS ROAD QUANTONG 3401
Lot and Plan Number: This property has 2 parcels. See table below.
Standard Parcel Identifier (SPI): See table below.
Local Government (Council): HORSHAM **Council Property Number:** 9577
Directory Reference: VicRoads 40 C5

This property is in a designated bushfire prone area.
Special bushfire construction requirements apply. Planning provisions may apply.

Further information about the building control system and building in bushfire prone areas can be found in the Building Commission section of the Victorian Building Authority website www.vba.vic.gov.au

Site Dimensions

All dimensions and areas are approximate. They may not agree with the values shown on a title or plan.



Area: 796161 sq. m
(79.6 ha)
Perimeter: 4970 m

For this property:
Site boundaries
Road frontages

Dimensions for individual parcels require a separate search, but dimensions for individual units are generally not available.

For more accurate dimensions get copy of plan at
Title and Property Certificates

Parcel Details

Letter in first column identifies parcel in diagram above

	Lot/Plan or Crown Description	SPI
A	Lot 2 PS802643	2\PS802643
B	PARISH OF VECTIS EAST Allot. 247C	247C\PP3686

State Electorates

Legislative Council: WESTERN VICTORIA
Legislative Assembly: LOWAN

Utilities

Rural Water Corporation: Grampians Wimmera Mallee Water

Urban Water Corporation: Grampian Wimmera Malle Water

Melbourne Water: outside drainage boundary

Power Distributor: POWERCOR (Information about choosing an electricity retailer)

Planning Zone Summary

Planning Zone: FARMING ZONE (FZ)
SCHEDULE TO THE FARMING ZONE (FZ)

Planning Overlay: None

Planning scheme data last updated on 22 December 2020.

A **planning scheme** sets out policies and requirements for the use, development and protection of land.
This report provides information about the zone and overlay provisions that apply to the selected land.
Information about the State and local policy, particular, general and operational provisions of the local planning scheme that may affect the use of this land can be obtained by contacting the local council or by visiting Planning Schemes Online

This report is NOT a **Planning Certificate** issued pursuant to Section 199 of the *Planning and Environment Act 1987.*
It does not include information about exhibited planning scheme amendments, or zonings that may abut the land.
To obtain a Planning Certificate go to Titles and Property Certificates

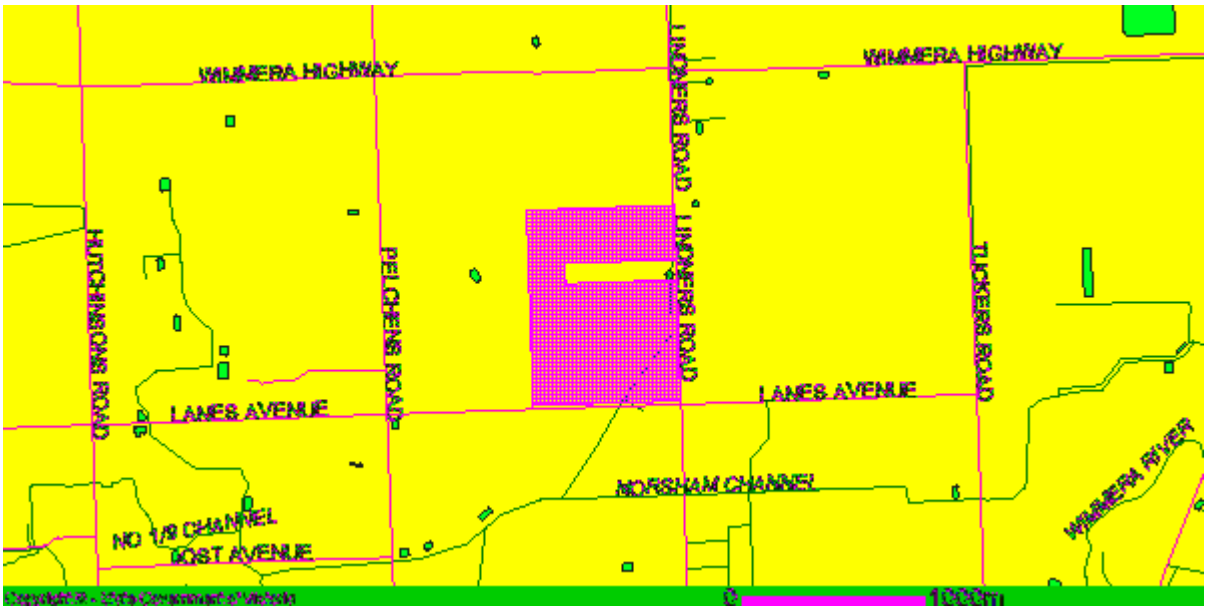
The Planning Property Report includes separate maps of zones and overlays

For details of surrounding properties, use this service to get the Reports for properties of interest

To view planning zones, overlay and heritage information in an interactive format visit Planning Maps Online

For other information about planning in Victoria visit www.planning.vic.gov.au

Area Map



Attachment 3: Offence declaration and statement of track record

08/02/2021

I, PETER BLAIR, have not been found guilty of any relevant offences in the last ten years.

"relevant offence" means -

a) an indictable offence;

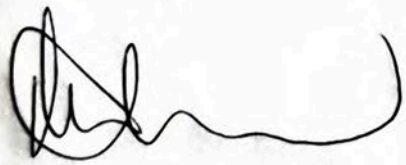
b) an offence committed outside Victoria that would have been an indictable offence if it had been committed in Victoria on the date it was committed;

c) a summary offence under this Act, the *Dangerous Goods Act 1985*, the *Occupational Health and Safety Act 2004* or the *Equipment (Public Safety) Act 1994*.

Indicate the recent track record of any other operations in Victoria or interstate.

- Peter Blair is a Horsham based land-holder, businessman and farmer running various operations including
    - PB Seeds in Kalkee,
    - Local machinery / agri business in Horsham
    - Horse stud
    - Several farming operations growing lentils and oats
- The Blair family has a strong interest in sustainability, investigating projects such as waste-to-energy and solar power generation in recent times. The development of the Water Sustainability Farm provides a safe and long term wastewater disposal option for APP and fits in well with the applicant's vision for the future.

Signed,



Peter Blair

PB Seeds

Attachment 4: Engagement plan

To be provided shortly

RMCG

Community engagement plan for Water Sustainability Farm, Quantong

Waterform Technologies
February 2021

1 Introduction

OVERVIEW

The proposed Water Sustainability Farm at Quantong, Victoria, is currently applying for Works Approval with EPA. As part of the Works Approval process, engagement with interested third-parties is necessary. The purpose of this report is to document the work that has been undertaken by the landholder, Peter Blair and Australian Plant Proteins (APP).

ACKNOWLEDGMENT OF COUNTRY

We acknowledge the Wotjobaluk, Jaadwa, Jadawadjali, Wergaia and Jupagalk Nations as the Traditional Owners of the Country on which this project was conducted. We recognise their continuing connection to land, waters and culture and pay our respects to their Elders past, present and emerging.

Moreover, we express gratitude for the knowledge and insight that Traditional Owner and other Aboriginal and Torres Strait Islander people contribute to our shared work.

2 Engagement objectives

The landholder and APP shall undertake community engagement as part of their obligations for EPA Works Approval and to be responsible community members.

The objectives of the engagement are:

- Ensure that stakeholders are provided with accurate information about the proposed works, their construction and long-term operation
- Provide opportunities for the landholder and APP to hear community concerns
- Provide timely information about the proposed works
- Encourage community support for the project by being open and transparent
- Minimise inconvenience to neighbours and the community during construction and operation.

3 Stakeholders

Due to the small scale, use of passive treatment (solar evaporation) and the rural location of the proposed works, it is not expected to impact on the community beyond immediate neighbours at Quantong. The Rural City of Horsham are aware of the project through discussion regarding planning approvals and the development of the APP site in Horsham.

The landholder is a long-term community member with existing relationships with many of the neighbours and has a direct interest in maintaining neighbourly relationships.

4 Engagement to date

The landholder, Peter Blair, has discussed the proposed works with the neighbours and has provided written information about the project. The consultation register and a copy of this letter is provided in Appendix 1.

Based on the feedback from these discussions, the neighbours are very positive about the proposed works at Quantong and are also keen to visit the APP processing facility in February.

5 Ongoing engagement

Ongoing engagement regarding the project will include:

- Maintenance of a stakeholder contact list, for future communications
- Contact with neighbours prior to construction commencing and when construction is complete
- Contact with neighbours (and potentially other nearby landholders) when dried solids are available for reuse.

Appendix 1: Engagement register & letter

Australian Plant Proteins

Water Sustainability Farm (WSF)

Community Consultation Register

No.	Name	Address	Contact No.	Date of Visit	Any Comments...
1	Neighbour 1	Lindner Rd	Provided upon request	06/01/2021	Visit offered to App
2	Neighbour 2	Lane Ave	Provided upon request	06/01/2021	Away, left one pager with brother in-law (house sitter)
3	Neighbour 3	Lindners Rd	Provided upon request	06/01/2021	Visit offered to APP
4	Neighbour 4	Lane Ave	Provided upon request	10/02/2012	Visit offered to APP
5	Neighbour 5	Lane Ave	Provided upon request	10/02/2021	Visit offered to APP
6					
7					

Australian Plant Proteins Pty. Ltd.
18 Carine Street, Horsham Vic. 3400

Water Sustainability Farm

(Lanes Avenue, Quantong)

1. Plan involves changing the use of a previously unproductive piece of land in order to take salty water and evaporate.
2. The salt pans are purpose built to naturally evaporate the water and leave a salt residue. It's likely to be 10 years before a sufficient salt crust has formed allowing it to be harvested
3. Pans have been conservatively designed and placed, factoring in:
    a. 100 year rainfall events
    b. High winds that can cause wave action
    c. Elevated area with no threat to natural water courses.
4. No offensive odours will occur. If sludge is taken to the site, a natural earthy smell may be detectable if standing nearby.
5. Traffic is expected to be between 2 – 3 tanker loads per day.
6. Pans are a 'turkey nest' design with a compacted clay layer.
7. Expected service period is 30+ years
8. Threat to the water table through leakage is very low. The site is elevated with >25m to the underlying water table. Pan excavation is <1m below natural ground level.

SIGNED [redacted]

Full name [redacted]

Position with company Director
Company name Australian Plant Proteins Pty Ltd

This report has been prepared by:

RM Consulting Group Pty Ltd trading as RMCG

135 Mollison Street, Bendigo Victoria 3550

(03) 5441 4821 — rmcg.com.au — ABN 73 613 135 247

Offices in Victoria, Tasmania, ACT and NSW

Key RMCG contact

[redacted]

[redacted]

Document review and authorisation

Project Number: #1018

Doc Version	Final/Draft	Date	Author	Project Director review	BST QA review	Release approved by	Issued to
1.0	Draft	11/02/2021	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] Waterform Techno og es
1.1	F na	12/2/2021	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] Waterform Techno og es

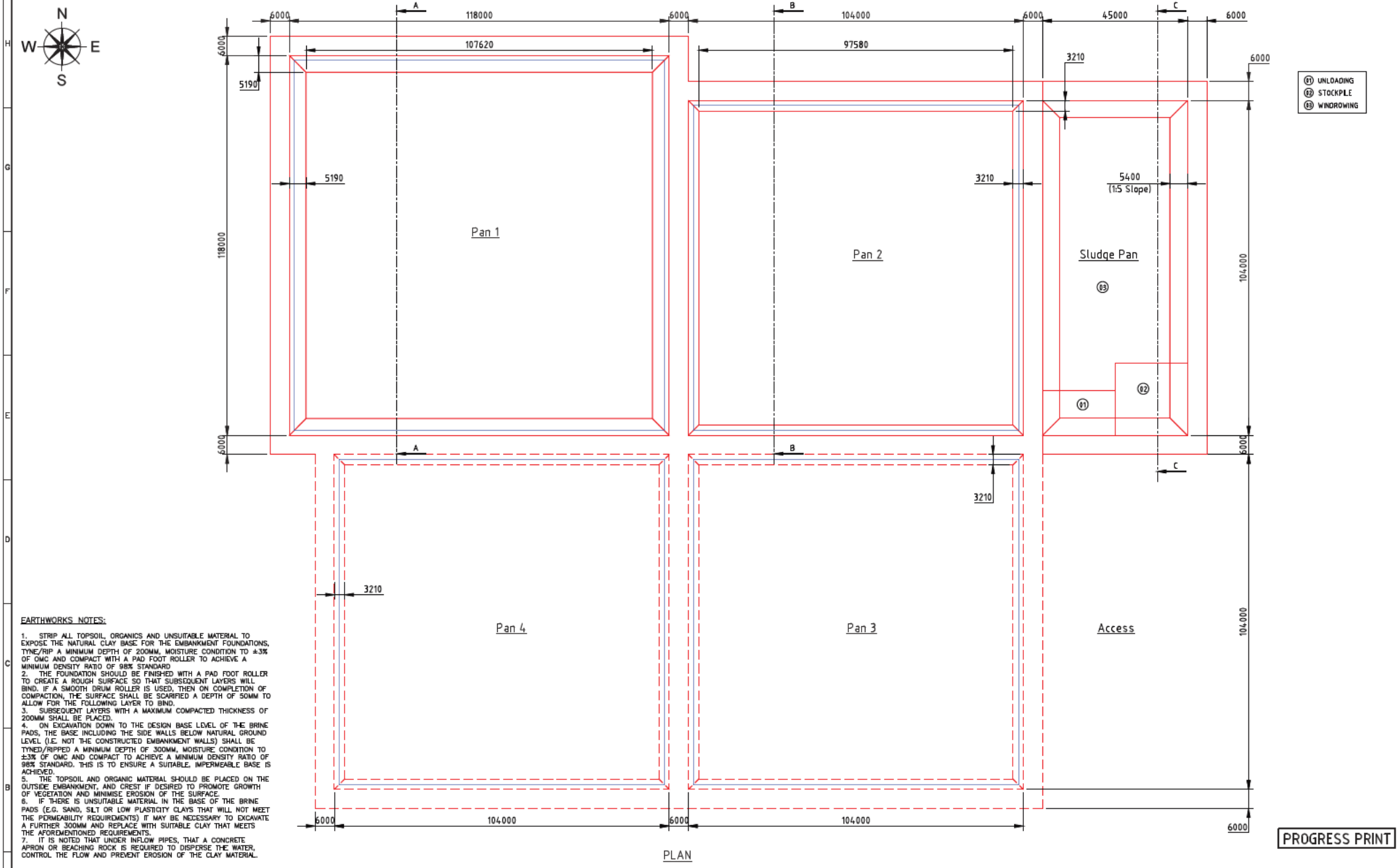
Attachment 5: Site layout

Prepared by: D Wallis
Checked by: ---
Tuesday 02/02/2021, 05:09pm
Job number: 1018
Projection: MGA94 Zone 54

Sustainable Water Farm

RMCG

Attachment 6: Civil drawings



PLAN

PROGRESS PRINT

EARTHWORKS NOTES:

1. STRIP ALL TOPSOIL, ORGANICS AND UNSUITABLE MATERIAL TO EXPOSE THE NATURAL CLAY BASE FOR THE EMBANKMENT FOUNDATIONS, TYNE/RIP A MINIMUM DEPTH OF 200MM, MOISTURE CONDITION TO ±3% OF OMC AND COMPACT WITH A PAD FOOT ROLLER TO ACHIEVE A MINIMUM DENSITY RATIO OF 98% STANDARD
2. THE FOUNDATION SHOULD BE FINISHED WITH A PAD FOOT ROLLER TO CREATE A ROUGH SURFACE SO THAT SUBSEQUENT LAYERS WILL BIND. IF A SMOOTH DRUM ROLLER IS USED, THEN ON COMPLETION OF COMPACTION, THE SURFACE SHALL BE SCARIFIED A DEPTH OF 50MM TO ALLOW FOR THE FOLLOWING LAYER TO BIND.
3. SUBSEQUENT LAYERS WITH A MAXIMUM COMPACTED THICKNESS OF 200MM SHALL BE PLACED.
4. ON EXCAVATION DOWN TO THE DESIGN BASE LEVEL OF THE BRINE PADS, THE BASE INCLUDING THE SIDE WALLS BELOW NATURAL GROUND LEVEL (I.E. NOT THE CONSTRUCTED EMBANKMENT WALLS) SHALL BE TYNED/RIPPED A MINIMUM DEPTH OF 300MM, MOISTURE CONDITION TO ±3% OF OMC AND COMPACT TO ACHIEVE A MINIMUM DENSITY RATIO OF 98% STANDARD. THIS IS TO ENSURE A SUITABLE, IMPERMEABLE BASE IS ACHIEVED.
5. THE TOPSOIL AND ORGANIC MATERIAL SHOULD BE PLACED ON THE OUTSIDE EMBANKMENT, AND CREST IF DESIRED TO PROMOTE GROWTH OF VEGETATION AND MINIMISE EROSION OF THE SURFACE.
6. IF THERE IS UNSUITABLE MATERIAL IN THE BASE OF THE BRINE PADS (E.G. SAND, SILT OR LOW PLASTICITY CLAYS THAT WILL NOT MEET THE PERMEABILITY REQUIREMENTS) IT MAY BE NECESSARY TO EXCAVATE A FURTHER 300MM AND REPLACE WITH SUITABLE CLAY THAT MEETS THE AFOREMENTIONED REQUIREMENTS.
7. IT IS NOTED THAT UNDER INFLOW PIPES, THAT A CONCRETE APRON OR BEACHING ROCK IS REQUIRED TO DISPERSE THE WATER, CONTROL THE FLOW AND PREVENT EROSION OF THE CLAY MATERIAL.

NOTE:
ALL DIMENSIONS ARE IN MM.

LEGEND:
STAGE 1
STAGE 2
WATER LEVEL

REVISIONS

Sr.No	DATE	APPROVED	DESCRIPTION
A	20/11/2020		ISSUED FOR INITIAL REVIEW
B	25/01/2021		UPDATED AS PER COMMENTS

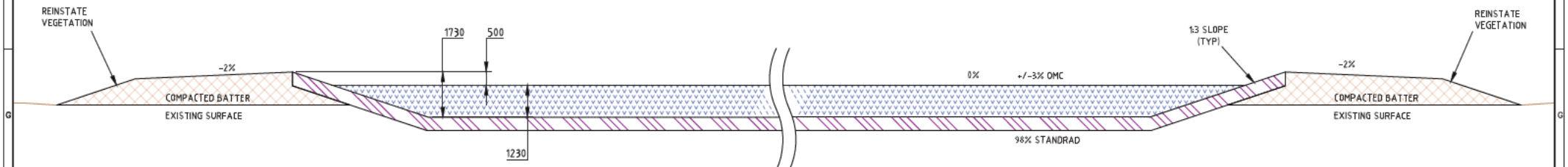
	NAME	DATE
DRAWN BY	SYN	20/11/2020
DESIGNED		
CHECKED		
APPROVED		

DRAWING STATUS : FOR REVIEW

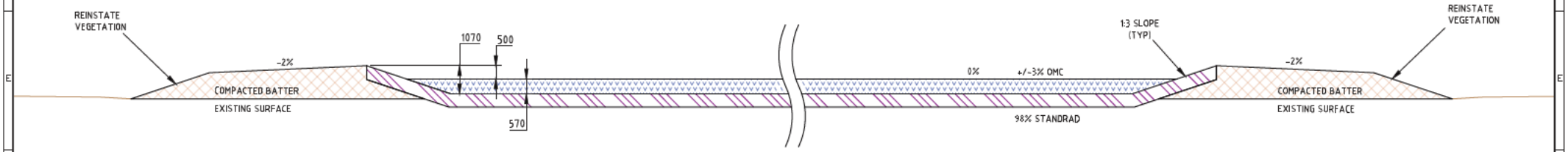
DRAWING NAME : EVAPORATION PAN PLAN
CLIENT : HORSHAM

Waterform TECHNOLOGIES
WATERFORM TECHNOLOGIES KANGAROO FLAT VIC AUSTRALIA
www.waterform.com.au

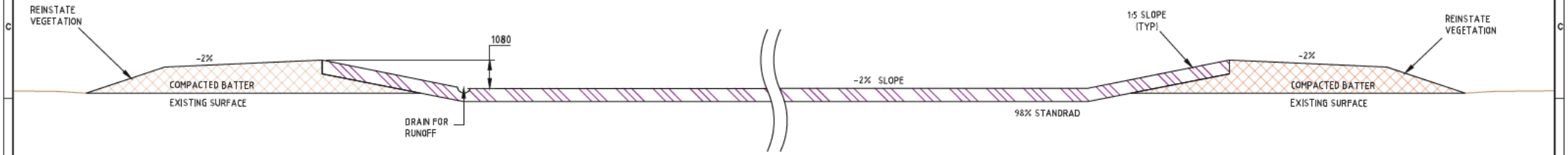
SCALE:	DRAWING SIZE:	DRAWING NUMBER:	REVISION:	SHEET:
1:1100	A3	WF-PR-XXXX-GA-001	B	1 OF 2



SECTION A-A
PAN 1



SECTION B-B
PAN 2



SECTION C-C
SLUDGE PAN

PROGRESS PRINT

REVISIONS	Sr.No	DATE	APPROVED	DESCRIPTION
	A	20/11/2020		ISSUED FOR INITIAL REVIEW
	B	25/01/2021		UPDATED AS PER COMMENTS

	NAME	DATE
DRAWN BY	SYN	20/11/2020
DESIGNED		
CHECKED		
APPROVED		

DRAWING STATUS : FOR REVIEW

DRAWING NAME : EVAPORATION PAN ELEVATIONS
CLIENT : HORSHAM

Waterform TECHNOLOGIES
WATERFORM TECHNOLOGIES 155 KANGAROO FLAT VIC AUSTRALIA
www.waterform.com.au

SCALE:	DRAWING SIZE:	DRAWING NUMBER :	REVISION:	SHEET:
1:150	A3	WF-PR-XXXX-GA-001	B	2 OF 2

Attachment 7: Geotechnical sampling report

Douglas Partners
Geotechnics / Environment / Groundwater

Douglas Partners Pty Ltd
Melbourne Laboratory
www.douglaspartners com au
231 Normanby Road
PO Box 5051
South Melbourne VIC 3205
Phone (03) 9673 3500
Fax (03) 9673 3599

Results of Constant Head Permeability Test using a Flexible Wall Permeameter

Client :	Roadlab Pty Ltd	**Project No. :**	679146
		Report No. :	679146.00-1
Project :	Glover Earthmoving, Quantong, Materials Testing (Perme	**Report Date :**	06 Oct 2020
		Date Samped:	08 Sep 2020
Location :	1 Clark Street, Horsham	**Date of Test:**	22 Sep 2020
		Page:	1 of 1

Sample No:	ME-1608A	
Depth / Layer:	Hole 1 / Sample Depth 1000mm	
Sample Description:	Silty CLAY	
Sample Preparation:	Remoulded	
Oversized Material Retained:	NIL% on 19mm Sieve (Excluded)	
Averaged Sample Length:	51	mm
Averaged Sample Diameter:	51	mm
Length-to-Diameter Ratio	1.0 :1	
Moisture Content After Test:	28.1	%
Permeant Used:	Melbourne Tap Water	
Mean Effective Stress:	50	kPa
Coefficient of Permeability:	**6×10^{-11}**	m/s

Test Method(s): AS1289.6.7.3, AS 1289.2.1.1

Sampling Method(s): Sampled by Client - The results apply to the sample as recieved

Remarks: Achieved Density Ratio 97.8%, Achieved Moisture Ratio 100.4%

NATA Accredited Laboratory No 828

Accredited for compliance with ISO/IEC 17025 - Testing

Tested: CL
Checked: SB

Scott Benbow
Laborator Manager

Douglas Partners Pty Ltd
Melbourne Laboratory
www.douglaspartners com au
231 Normanby Road
PO Box 5051
South Melbourne VIC 3205
Phone (03) 9673 3500
Fax (03) 9673 3599

Results of Constant Head Permeability Test using a Flexible Wall Permeameter

Client :	Roadlab Pty Ltd	**Project No. :**	679146
		Report No. :	M20068002
Project :	Glover Earthmoving, Quantong, Materials Testing (Perme	**Report Date :**	06 Oct 2020
		Date Samped:	08 Sep 2020
Location :	1 Clark Street, Horsham	**Date of Test:**	22 Sep 2020
		Page:	1 of 1

Sample No:	ME-1608B	
Depth / Layer:	Hole 2 / Sample Depth 600mm	
Sample Description:	Silty CLAY	
Sample Preparation:	Remoulded	
Oversized Material Retained:	NIL% on 19mm Sieve (Excluded)	
Averaged Sample Length:	51	mm
Averaged Sample Diameter:	51	mm
Length-to-Diameter Ratio	1.0 :1	
Moisture Content After Test:	31.0	%
Permeant Used:	Melbourne Tap Water	
Mean Effective Stress:	50	kPa
Coefficient of Permeability:	**6 x 10** $^{-11}$	m/s

Test Method(s): AS1289.6.7.3, AS 1289.2.1.1

Sampling Method(s): Sampled by Client - The results apply to the sample as received

Remarks: Achieved Density Ratio 97.7%, Achieved Moisture Ratio 98.1%

NATA Accredited Laboratory No 828

Accredited for compliance with ISO/IEC 17025 - Testing

Tested: CL
Checked: SB

Scott Benbow
Laboratory Manager

This report has been prepared by:

RM Consulting Group Pty Ltd trading as RMCG

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(03) 5441 4821 — rmcg.com.au — ABN 73 613 135 247

Offices in Victoria, Tasmania, ACT and NSW

Key RMCG contact

[redacted]

Document review and authorisation

Project Number: #1018

Doc Version	Final/Draft	Date	Author	Project Director review	BST QA review	Release approved by	Issued to
1.0	Draft	04/02/2021	[redacted]	[redacted]	[redacted]	[redacted]	Waterform Techno og es
1.1	F na	8/2/2021	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] Waterform Techno og es
1.2	F na	12/3/2021	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] EPA V ctor a