G3 56 Delhi Road
North Ryde NSW 2113
P +61-2 9812 5000
F +61-2 9812 5001
E mailbox@psm.com.au
www.psm.com.au

Our Ref: PSM3739-031L Rev 1

19 July 2022

Senior Development Manager
Mirvac
Level 28, 200 George Street
SYDNEY NSW 2000
russell.hogan@mirvac.com

Attention: Russell Hogan

Dear Russell

**RE: MIRVAC ASPECT INDUSTRIAL ESTATE -
788-904 MAMRE ROAD, KEMPS CREEK
CONSTRUCTION - SALINITY MANAGEMENT PLAN**

1. Introduction

This letter presents Construction Salinity Management Plan for the proposed Aspect Industrial Estate (AIE) development located at 788-904 Mamre Road, Kemps Creek NSW (the Site). This work has been undertaken following Mirvac's request in a meeting on 23 May 2022.

The plan has been prepared to address the requirements in NSW Government Department of Planning and Environment for Aspect Industrial Estate (SSD-10448).

This plan is prepared for the whole AIE and generally adheres to the requirements stipulated in the overarching Construction Environmental Management Plan (CEMP).

1.1 Development Overview

The site is located within the suburb of Kemps Creek, which falls within the Penrith LGA. It is in the Mamre Road Precinct within the broader Western Sydney Employment Area (WSEA) and is currently surrounded by rural land uses.

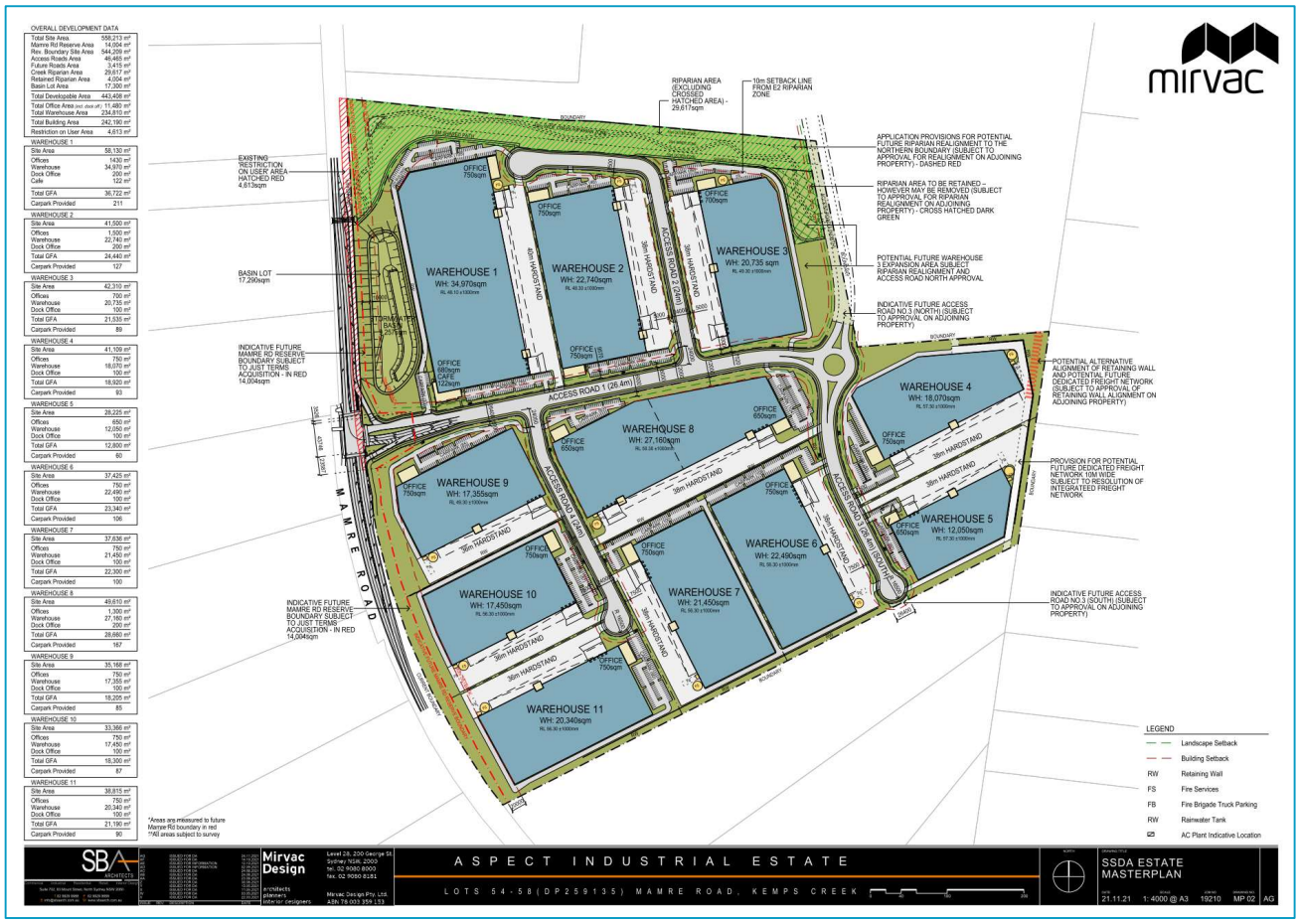
The site is bounded by Mamre Road to the west and agricultural uses to the north, south and east. The historic land uses on the site include rural residential, grazing, dairy farming, poultry farming and horticulture. This land is identified for future employment land, as this site and the broader Mamre Road Precinct has recently been rezoned to, primarily, IN1 General Industrial under the WSEA State Environmental Planning Policy (SEPP).

The Development Consent for the AIE was granted for the AIE 'Concept Proposal', 'Stage 1 Development' and all subsequent development stages. The Concept Proposal essentially comprises a 'Master Plan' to guide the staged development of AIE and core development controls that will form the basis for design and assessment of future development applications for the site. It includes:

- Buildings, internal road network layout, building locations, gross floor area (GFA), car parking, concept landscaping, building heights, setbacks and built form parameters

- Detailed Stage 1 Development of the AIE including:
  - Pre-commencement works including demolition and removal of existing rural structures, site remediation works as defined within the Remediation Action Plan, and heritage salvage works (if applicable)
  - Subdivision construction works including creation of roads and access infrastructure, clearing of existing vegetation, realignment of existing creek and planting, on-site bulk earthworks, construction of boundary retaining wall, delivery of stormwater infrastructure, trunk service connections, utility infrastructure, boundary stormwater management, fencing and landscaping, construction and dedication of internal road network to Penrith City Council, and construction and operation of signalised intersection with Mamre Road
  - Building works including construction and fit out of two warehouse and distribution buildings in Stage 1 on Warehouses 1 and 3 which will operate 24 hours/day, seven days/week and construction and fit out of a café, which will operate 12 hours/day, seven days/week
  - Subdivision of Stage 1, and Signage.

This plan has been prepared to cover the construction of AIE (Inset 1) by Construction Contractor.



Inset 1: Aspect Industrial Estate Masterplan.

1.2 Objective of the Construction – Salinity Management Plan

The objective of the Construction Salinity Management Plan (CSMP) is to effectively manage site salinity, to minimise the effect of the proposed development on the salinity processes and to protect the proposed development from salinity damage. All works are to conform with the Western Sydney Salinity Code of Practice June 2003.

2. Statutory Requirements

The Development Consent (SSD 10448) requirements stipulated for the construction of AIE, and where they have been addressed in this plan, are shown in Table 1.

Table 1 – Assessment against SSD 10448 Conditions

Conditions	PSM Response
Salinity Management *D36. The Applicant must prepare a Salinity Management Plan, which must form part of the CEMP in accordance with Condition E2, that addresses all aspects of the Stage 1 development. The Applicant must implement the most recent revision of the Salinity Management Plan for the duration of construction.*	This document is the Construction Salinity Management Plan prepared to address the Condition.

3. Project Overview

3.1 Surrounding Land Uses

The AIE Site is located within the Mamre Road Precinct, which is a part of the wider Western Sydney Employment Area (WSEA). AIE is surrounded by other rural properties with multiple existing residences located within 100 m of the nearest Site boundary, Inset 2.

Inset 2: Nearmap Aerial Photograph of the Site.

3.2 Construction Activities

Based on information provided by Mirvac, construction at AIE is scheduled to commence in mid-2022 (tbc) and be completed over a duration between 2-3 years, subject to authority approvals and inclement weather delays. The construction activities will be staged and are summarised in Table 2.

Table 2 – Construction Staging and Activities

Stage	Stage Length	Activities
Phase 1	8-12 weeks	Demolition
Phase 2	12-18 months	Excavation
Phase 3	12-24 months	General Construction

4. Relevant Guidelines

Department of Land and Water Conservation 2002 – Site Investigation for Urban Salinity provides the following salinity assessment guide for soil types and soil salinity classes.

TABLE 6.1 FACTORS FOR CONVERTING EC (1:5) TO ECe

Soil Texture Group[8]	Multiplication Factors[9]
Sands have very little or no coherence and cannot be rolled into a stable ball. Individual sand grains adhere to the fingers.	17[10]
Sandy loams have some coherence and can be rolled into a stable ball but not to a thread. Sand grains can be felt during manipulation.	14
Loams can be rolled into a thick thread, but this will break up before it is 3-4 mm thick. The soil ball is easy to manipulate and has a smooth spongy feel with no obvious sandiness.	10
Clay Loam can be easily rolled to a thread 3-4 mm thick but will have a number of fractures along its length. The soil is becoming plastic, capable of being moulded into a stable shape.	9
Light clays can be rolled to a thread 3-4 mm thick without fracture. Plastic behaviour evident, smooth feel with some resistance to rolling out.	8.5
Light medium clay is plastic and smooth to the touch and will form a ribbon of 7.5cm.	8
Medium clay handles like plasticine, forms rods without fracture, has some resistance to ribboning shear, ribbons to 7.5cm or more.	7
Heavy clays can be rolled to a thread 3-4 mm thick and formed into a ring in the palm of the hand without fracture. They are smooth and very plastic with a moderate to strong resistance to rolling out.	6

Source: Multiple sources (see below)

TABLE 6.2: ECe VALUES OF SOIL SALINITY CLASSES

Class	ECe (dS/m)	Comments
Non – saline	<2	Salinity effects mostly negligible
Slightly saline	2-4	Yields of very sensitive crops may be affected
Moderately saline	4-8	Yields of many crops affected
Very Saline	8-16	Only tolerant crops yield satisfactorily
Highly saline	>16	Only a few very tolerant crops yield satisfactorily

Source: Richards, (1954)

Separately, Department of Infrastructure, Planning and Natural Resources “Western Sydney Salinity Code of Practice” (March 2003) provides the development management guidelines and recommendations for salinity management in Western Sydney.

5. Existing Site Conditions

5.1 Salinity Mapping

Department of Infrastructure, Planning and Natural Resources (DIPNR) map of Salinity Potential in Western Sydney (2002) shows moderately salinity potential within the AIE site.

5.2 Salinity Investigation in 2018 (Ref. PSM3739-004L Rev6)

PSM have previously undertaken a salinity and sodicity investigation at the Site in 2018 (ref: PSM3739-004L REV6, dated 29 May 2020).

A total of twenty-one (21) disturbed soil samples were collected by a PSM Geotechnical Engineer for testing in an environmental laboratory. Inset 3 present the soil sample locations.

No groundwater was encountered during the investigation.

The disturbed soil samples were sent to a NATA accredited environmental laboratory and the following tests were undertaken:

- Cation Exchange Capacity (CEC) of calcium, magnesium, potassium and sodium
- Exchange sodium percentage
- Salinity (EC 1:5, one-part soil to five parts water)
- Soil pH
- Chlorides
- Sulphates
- Resistivity.

Table 3 presents a summary of the results.

Table 3 - Laboratory Testing Results

Sample ID	pH	Electrical Conductivity [µS/cm]	Moisture Content [%]	Chloride by Discrete Analyser [mg/kg]	Soluble Sulfate by ICPAES [mg/kg]	Exchangeable Cations [meq/100g]					ESP [%]
						Ca	Mg	K	Na	CEC	
BH5_4.2m	7.4	106	22.6	690	240	0.6	3.7	0.3	5.3	9.9	53.4
BH5_10.5m	7.4	227	22	280	560	1.1	17.1	0.6	7.8	26.6	29.2
BH4_1.0m	6.0	582	17.3	1200	580	0.9	9	0.1	3.4	13.4	25.2
BH4_5.0m	9.0	245	7.2	430	<100	<0.2	<0.2	<0.2	<0.2	<0.2	-
BH1_4.5m	5.3	594	13.4	820	900	0.2	6.6	0.2	2.8	9.8	28.9
TP16_1.5m	5.0	519	20.5	740	440	<0.1	5.9	0.1	2.1	8.2	25.8
TP17_1.0m	7.0	156	20.1	1060	450	5.4	14.6	0.4	3.3	23.7	14.1
TP10_1.5m	7.0	870	11.0	1410	490	0.6	8.4	0.1	2.0	11.1	17.8
TP18_0.4m	7.2	172	24.0	370	930	9.2	10.8	0.4	1.6	22.0	7.5
TP13_2.8m	5.4	361	13.3	460	320	<0.1	7.6	0.2	3.2	11.0	28.8
TP1_1.5m	8.0	1010	15.0	1730	700	0.3	9.3	0.3	7.1	17.0	41.8
TP21_0.3m	6.0	51	18.4	880	460	4.3	9.8	0.6	0.9	15.6	5.6
TP8_0.3m	8.8	1400	11.8	2460	400	2.0	3.5	<0.2	2.6	8.3	31.6
TP8_2.5m	6.7	41	18.7	960	230	4.2	9.7	0.2	1.1	15.2	7.0
TP3_0.3m	6.6	29	16.8	290	240	3.0	3.7	0.2	0.5	7.4	6.9
TP30_0.1m	6.6	27	9.0	130	30	2.2	6.2	0.2	0.8	9.4	8.6
TP31_1.0m	5.1	601	19.9	1080	200	<0.1	14.8	0.3	9.7	24.8	39.1
TP34_0.1m	7.1	81	13.6	510	70	4.7	10.1	0.6	1.0	16.4	6.2
TP33_0.3m	5.4	774	19.2	1540	<10	1.5	8.0	0.1	4.6	14.2	32.1
TP35_0.7m	5.6	909	14.7	1570	280	1.3	7.3	0.1	7.7	16.5	47.0

Inset 3: Location of sampling.

The salinity test results, summarised in Table 4 indicate the following:

- pH of the soil samples analysed was in the range of 5.0 to 9.0, with an average of 6.5
- The 1:5 soil to water extraction and subsequent electrical conductivity ($EC_{1:5}$) of the soil samples analysed to be in the range of 27 µS/cm to 1400 µS/cm
- Concentrations of chlorides in samples analysed was in the range of 30 mg/kg to 2460 mg/kg
- Concentrations of soluble sulphate in samples analysed was in the range of less than 20 mg/kg to 930 mg/kg
- Cation Exchange Capacity (CEC) in samples analysed was in the range less than 0.2 meq/100g to 29.4 meq/100g
- Exchange Sodium Percentage (ESP) in samples analysed was in the range of 5.2% to 53.4%.

5.2.1 Salinity Assessment

Site Investigations for Urban Salinity (DLWC 2002) classify soil salinity based on electrical conductivity (ECe). The method of conversion from EC1:5 to Ece (electrical conductivity of saturated extract) is based on DLWC (2002) and given by Ece = EC1:5 x M, where M is the multiplication factor based on “Soil Texture Group”.

The “Soil Texture Group” of the samples tested were assessed during our investigation. The salinity classification for the soil samples that were tested are presented in Table 4.

Table 4 - Salinity Classification

Sample ID	EC1:5 (dS/m)	Soil Type	M	ECe (dS/m)	Salinity Class
BH5_4.2m	0.106	Light Medium Clay	8	0.848	Non-saline
BH5_10.5m	0.227	Light Medium Clay	8	1.816	Non-saline
BH4_1.0m	0.582	Heavy Clay	6	3.492	Slightly Saline
BH4_5.0m	0.245	Light Medium Clay	8	1.96	Non-saline
BH1_4.5m	0.594	Light Medium Clay	8	4.752	Moderately Saline
TP16_1.5m	0.519	Heavy Clay	6	3.114	Slightly Saline
TP17_1.0m	0.156	Heavy Clay	6	0.936	Non-saline
TP10_1.5m	0.870	Heavy Clay	6	5.22	Moderately Saline
TP18_0.4m	0.172	Light Medium Clay	8	1.376	Non-saline
TP13_2.8m	0.361	Heavy Clay	6	2.166	Slightly Saline
TP1_1.5m	1.010	Heavy Clay	6	6.06	Moderately Saline
TP21_0.3m	0.051	Light Medium Clay	8	0.408	Non-saline
TP8_0.3m	1.400	Light Medium Clay	8	11.2	Very Saline
TP8_2.5m	0.041	Heavy Clay	6	0.246	Non-saline
TP3_0.3m	0.029	Light Medium Clay	8	0.232	Non-saline
TP30_0.1m	0.027	Light Medium Clay	8	0.216	Non-saline
TP31_1.0m	0.601	Light Medium Clay	8	4.808	Moderately Saline
TP34_0.1m	0.081	Light Medium Clay	8	0.648	Non-saline
TP33_0.3m	0.774	Light Medium Clay	8	6.192	Moderately Saline
TP35_0.7m	0.909	Light Medium Clay	8	7.272	Moderately Saline

It is assessed that the majority of the soils on site are classified as “non-saline to moderately saline”, except for the one sample from TP8 that is very saline. We note that TP8 is located in the proposed fill area.

We have referred to Clause 4.8.2 of Australian Standard AS3600-2009 “Concrete Structures” and note that the assessed soil electrical conductivity (ECe) is less than the upper limit of the “B1” exposure classification.

5.2.2 Sodicity

Sodicity provides a measure of the likely dispersion on wetting and to shrink/swell properties of a soil. Soil sodicity is classified based on the Exchangeable Sodium Percentage (ESP) which is the amount of exchangeable sodium as a percentage of the Cation Exchange Capacity (DLWC, 2002).

The Exchangeable Sodium Percentages calculated from these laboratory results, ranging from 5.6% to 53.4%, indicates that the soils on site range from sodic to highly sodic when compared to criteria listed in “Site Investigations for Urban Salinity”, DLWC (2002).

6. Construction Salinity Management Strategies – Mitigation Measures

6.1 Development Components

This SMP addresses the components of the proposed development at construction stage for the permanent works. Salinity management regarding the following development components are provided in the following sections:

- Earthworks
- Imported soils
- Gardens and landscaped areas
- Roads, footpaths and hardstand areas
- Surface water, stormwater and drainage
- Durability of concrete structures in contact with the ground
- Durability of steel structures in contact with the ground.

6.2 Earthworks

We understand the proposed earthworks will comprise up to approximately 15 m deep cut and 9 m deep fill in some areas. The construction of the earthworks should consider the following strategies:

- Importation of soil as per Section 6.3 of this letter
- Vegetation cover should be estimated and maintained on permanent batters upon completion to control erosion
- The final surface of all areas of the development should be graded to prevent the ponding of surface water
- Erosion control of temporary batters, stockpiles and disturbed areas should be planned prior to undertaking the earthworks and implemented during the earthworks. Consideration should be given to:
  - Grading and sealing partially completed surfaces
  - Installation of clearly visible fencing and traffic control measures to prevent unnecessary trafficking of areas and ensuring site disturbance
  - Establishing set vehicular access points and roads
  - Protecting stockpiles (temporary vegetation or mulching) where these are to be left in place for long durations.
- Sediment control shall be implemented by means of sediment traps and silt fencing where considered necessary
- Dust suppression using water carts will avoid over-watering and only use sufficient water to manage dust rise. Surface ponding will be avoided during dust suppression
- Water used for construction purposes (e.g. to achieve adequate compaction rates) will be applied sparingly.

6.3 Importation of Soil

It may be required to import soil onto site. Materials to be imported to site should be assessed for suitability for the intended use. Very to high saline soils shall not be imported to site.

6.3.1 Salinity Testing

Salinity testing shall be undertaken on imported soil and in accordance with “Site Investigations for Urban Salinity”, Department of Land and Water Conservation (2002) – Refer to Section 4. Material with ECe > 8 dS/m; i.e. very to high saline shall not be imported.

6.4 Gardens and Landscaped Areas

The proposed development will result in the majority of the site comprising roads, footpaths, and hardstand areas. Garden and landscaped areas are likely to be of limited extent. The construction of the gardens and landscaped areas should consider the following:

- Irrigation of rehabilitated or landscaped areas will utilize low-water-use fixtures such as drippers, sub-surface irrigation or similar. Water will be applied sparingly and only in quantities sufficient to promote plant growth. Subsoil moisture will be physically checked (through visual observation) regularly during irrigation to ensure watering rates are not excessive
- Selection of plant species should consider the soil conditions, including moderate salinity, relatively poor fertility and clayey low permeability soil profiles. Promotion of successful revegetation is likely to require use of nutrient rich topsoil. Saline topsoils should not be imported to site
- Potential for water logging should be minimised by:
  - Adopting plant species with minimal watering requirements
  - Adopting 'waterwise' gardening principles
  - Minimising use of potable water in landscaped areas
  - Properly designed and implemented irrigation systems
  - Establishment of perennial species and deep rooted trees.

6.5 Roads, Footpaths and Hardstand Areas

The construction of roads, footpaths and hardstand areas should consider the following measures:

- Roads, footpath and hardstand surfaces should be graded, and the grades maintained at all times to prevent ponding of surface water at locations where this can result in infiltration[1] into the underlying soils (e.g. pavement joints)
- Connections between the roads, footpath and hardstand surfaces and the surface water and stormwater drainage infrastructure should be designed, constructed and maintained to restrict infiltration[1] into underlying soils
- Services that are to be located below the roads, footpath and hardstand surfaces should be installed, where practical, at the time of construction
- Provision for a damp-proof course or membrane beneath slabs should be considered by the slab designer.

6.6 Surface Water, Stormwater and Drainage

The design and construction of surface water, stormwater and drainage measures should consider the following:

- Disturbance of natural drainage patterns should be reduced. Where these are disturbed or altered appropriate artificial drainage should be installed
- Stormwater and surface water should be managed to restrict infiltration[1]
- Temporary water retaining structures used during construction should be managed to restrict infiltration[1]
- Stormwater and surface water infrastructure should be designed and constructed to minimise the likelihood of leakage
- Guttering and down pipes should be connected and maintained

[1] In accordance with the Mamre Road Precinct DCP, infiltration is permissible subject a detailed Salinity and Sodicity Assessment which demonstrates infiltration of stormwater will not adversely impact the water table and soil salinity

- Surface water runoff should be directed around all exposed surfaces, temporary stockpiles and landscaped areas
- Disturbance to the natural hydrological system shall be minimised by maintaining good surface drainage and reducing water logging on the site
- Groundwater recharge is to be minimised to the extent it does not adversely impact groundwater dependent ecosystems downstream.

6.7 Durability of Concrete Structures in Contact with The Ground

In designing structural concrete elements in contact with the ground the design should consider the results of the salinity assessment and the durability requirements in AS2159:2009 Piling "Design and Installation" and AS3600:2018 "Concrete Structures".

Both these standards provide guidance on minimum concrete grade/strength and minimum cover requirements.

Based on the salinity and aggressivity test results (ref. PSM3739-004L REV6, dated 29 May 2020), it is recommended that:

- The design of structural concrete members in contact with the ground (excluding piles) adopt a "B1" exposure classification as defined in AS3600:2009
- The design of concrete cast in situ piles adopt a "mild" classification as defined in AS2159:2009.

6.8 Durability of Steel Structures in Contact with The Ground

Table 6.5.2(C) of Australian Standard AS2159:2009, Piling – Design and Installation provides criteria for exposure classification for steel piles based on resistivity, soil and groundwater pH, and chlorides in soil and groundwater. On the basis of soil chlorides, resistivity and pH testing completed we assess the exposure classification for steel piles in the soil to be "Non-aggressive".

Yours Sincerely

AGUSTRIA SALIM
PRINCIPAL

References

1. DIPNR (2003c). Salinity Potential in Western Sydney. NSW Department of Infrastructure, Planning and Natural Resources, Sydney.
2. WSROC (2003). Western Sydney Salinity Code of Practice. Western Sydney Regional Organisation of Councils Ltd.
3. DIPNR, 2002, Site Investigation for Urban Salinity