



REHABILITATION MANAGEMENT PLAN

LOT 1794 FINN RD, MYALUP

July 2023

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1 INTRODUCTION

1.1 Background

GM Giacci Family Trust acting on behalf of MGM Bulk Pty Ltd (the applicant) is proposing to extract sand and limestone from a 9.17 ha area (herein referred to as the subject site) located within Lot 1794 Finn Road, Myalup (refer to **Figure 1** and **Figure 2**). The subject site is located in the municipality of the Shire of Harvey, approximately 20 km north-west of the Harvey town centre, 10 km north of Myalup to the west of Forrest Highway.

The subject site is zoned “Rural” under the *Greater Bunbury Region Scheme* (GBRS) and “General Farming” pursuant to the Shire of Harvey *Local Planning Scheme No. 1*. Under the Scheme the use class “Extractive Industry” is as an “SA” use in the “General Farming” zone. The “SA” designation “means that the council may, at its discretion, permit the use after notice for application has been given in accordance with Clause 2.3”.

This application is made for a five-year period however, the exact life of the project is difficult to estimate as it will be dependent on supply and demand trends.

The available volume of sand and limestone (*insitu* volume ranges from approximately 46,000 m³ to 963,000 m³) is to be extracted in five stages of approximately 2 ha each. Extraction will commence from the southern boundary and progress in a northerly direction. The post extraction landform will be designed with minimum batters of 1:4.

1.2 Purpose

This Rehabilitation Management Plan has been prepared to fulfil the relevant requirements provided within the Shire of Harvey’s *Local Planning Scheme No. 1* and the Shire of Harvey’s *Extractive Industries Local Law*. It is intended to provide the Shire of Harvey, the public and relevant government agencies with an understanding of the proposal and the environmental strategies and commitments proposed to address rehabilitation of the site post extraction activities.

The Plan will describe the proposed management measures necessary to ensure the return of the subject site to a safe and stable landform capable of supporting horticulture.

2 EXISTING ENVIRONMENT

2.1 Land Use

The subject site is zoned 'General Farming' pursuant to the Shire of Harvey's *Local Planning Scheme No. 1*. The extraction area has previously been cleared of all remnant vegetation.

The surrounding properties are also zoned 'Rural' under the GBRS and 'General Farming' pursuant to the Shire of Harvey *Local Planning Scheme No. 1*.

2.2 Topography and Soils

The current topography of the subject site can be described as undulating with a survey undertaken by Metric Surveying in 2023 indicating an elevation ranging between approximately 6.5 to 16.5 metres (m) Australian Height Datum (AHD) with the highest point a hill located in the north of the subject site.

The subject site lies on the western side of the Swan Coastal Plain. The Plain at this point consists of a broad almost flat alluvial plain that slightly undulates, with seasonal wetlands occurring in the depressions.

The subject site is located within the Perth Coastal Zone landform characterised by coastal sand dunes and calcarenite, and the Spearwood Land System described as "*sand dunes and plain. Yellow deep sands, pale deep sands and yellow/brown shallow sands*" (Tille 2006).

Within the Spearwood Land System, the subject site is located within the following sub-system:

- Spearwood S1b Phase – Dune ridges with deep siliceous yellow brown sands or pale sands with yellow brown subsoil and slopes up to 15%
- Spearwood S2b Phase – Lower slopes (1-5%) of dune ridges with shallow to deep siliceous yellow-brown sands and common limestone outcrops.

The Quaternary deposits within the subject site are the Tamala Limestone. This and its associated sand form the Spearwood Dunes physiographic unit and are located immediately west of the Bassendean Sand. In general, these dunes are higher than the Bassendean Dunes, have steeper slopes, especially at their eastern edge and exist in two continuous ridges running parallel to the coast (Geological Survey of Western Australia 1978).

2.2.1 Acid Sulfate Soils

Acid Sulfate Soils (ASS) is the common name given to naturally occurring soil and sediment containing iron sulfides. They have become a potential issue in land development projects on the Swan Coastal Plain when the naturally anaerobic conditions in which they are situated are disturbed and they are exposed to aerobic conditions and subsequently oxidise. When oxidised, ASS produce sulfuric acid, which can result in a range of impacts to the surrounding environment. ASS that has oxidised and resulted in the creation of acidic conditions are termed "Actual ASS" (AASS), and those that have acid generating potential but remain in their naturally anaerobic conditions are termed "Potential ASS" (PASS).

ASS risk mapping (DWER 2020) indicates that there is a 'moderate to low' risk of ASS occurring within a small portion of the subject site located in the north eastern corner (**Figure 3**). The remainder of the subject site is not mapped as having any risk of ASS occurring. Potential impacts associated with ASS are expected to be low given the presence of limestone in the area and that the excavation of low lying areas will not occur.

2.3 Climate

The climate of the locality is classified as Mediterranean with warm to hot summers and cool wet winters.

The closest weather recording station is Bunbury (Station 9965). Temperatures are highest on average in February, at approximately 30.0°C. July has the lowest average temperature of the year of 7.3°C.

Rainfall for the area is approximately 730 mm per annum with approximately 90% of the rain falling during the winter months, April to October inclusive. Evaporation exceeds rainfall in all but the wettest winter months.

Rainfall intensity has been calculated using the Bureau of Meteorology (BoM) Intensity-Frequency-Duration (IFD) data system which yields the two hour, 1 in 10 (10%) annual exceedance probability storm event for the subject site as 38 mm/hr.

The wind direction is predominantly from the east in the morning and from the southwest in the afternoon during the summer months. During the winter months the directions are more variable and lighter but with a predominance of east - northeast in the morning and south west in the afternoon due to the presence of winter lows (BoM 2023).

2.4 Vegetation and Fauna

The flora and vegetation within the subject site has been subjected to prolonged land degradation processes including land clearing and horticulture. Vegetation within the subject site has been cleared previously to accommodate the existing land use (horticulture). Vegetation has been planted on the northern and portions of the eastern boundary of the subject site. This vegetation is comprised of introduced Eucalyptus spp. and introduced Acacia spp. (i.e. *Acacia longifolia*) (refer to **Plates 1 - 3**). This planted and non-endemic vegetation will be removed to accommodate the batters.



Plate 1. Planted non-endemic vegetation on eastern boundary which will be removed.



Plate 2. Planted non-endemic Acacia spp. on the northern boundary.



Plate 3. Planted non-endemic Eucalyptus and Acacia spp. on northern boundary.

In the absence of any native vegetation, the subject site does not provide any habitat suitable for conservation significant fauna.

2.5 Hydrology

2.5.1 Groundwater

Within the subject site, the underlying aquifers are the Superficial and the Leederville. The Superficial aquifer, which is mainly unconfined and shallow, contains fresher groundwater resting on saline groundwater. The Superficial aquifer is hydraulically connected to the underlying Leederville aquifer (Deeney 1989).

In consideration of the permeable nature of the soils, drainage within the subject site is internal and infiltrates into the underlying groundwater at deeper levels of the Superficial Aquifer, flow is towards the west.

The nearest Department of Water and Environmental Regulation (DWER) groundwater monitoring bore, Lake Clifton D2, with data that encapsulates maximum groundwater levels, is located approximately 850m from the southeast corner of the subject site (refer to **Figure 4**). Data from this bore indicates maximum groundwater elevations over the last ten years have ranged from 0.186 m AHD to 0.866 m AHD.

From this data and comparison with surrounding dam levels, the highest groundwater level at the pit is approximately 1 m AHD. Given maximum excavation depths of approximately 6 m AHD to ensure continuity with the surrounding landforms, a minimum separation of approximately 5 m to maximum groundwater will be maintained.

2.5.2 Surface Water

The subject site is located within the Harvey surface water area. The subject site does not contain any defined natural surface water channels or wetlands (as defined within the *Geomorphic Wetlands of the Swan Coastal Plain* dataset (DBCA 2021)) and is not located within a 'Public Drinking Water Source' area (DWER 2021).

Wetlands within Western Australia are classified on the basis of landform and water permanence pursuant to the Semeniuk (1995) classification system (refer to **Table 1**).

Table 1. Wetland classifications (Semeniuk 1995).

Water Longevity	Landform				
	Basin	Channel	Flat	Slope	Highland
Permanent Inundation	Lake	River	-	-	-
Seasonal Inundation	Sumpland	Creek	Floodplain	-	-
Intermittent Inundation	Playa	Wadi	Barlkarra	-	-
Seasonal Waterlogging	Dampland	Trough	Palusplain	Paluslope	Palusmont

Areas of wetlands in Western Australia have been mapped and this mapping has been converted into a digital dataset that is maintained by the Department of Biodiversity, Conservation and Attractions (DBCA) and is referred to as the '*Geomorphic Wetlands of the Swan Coastal Plain*' dataset. This dataset contains information on geomorphic wetland types and assigns management categories that guide the recommended management approach for each wetland area. The wetland management categories and management objectives are listed in **Table 2**.

Table 2. DBCA wetland management categories (Semeniuk 1995).

Category	Description	Management Objectives
Conservation	Wetlands support a high level of ecological attributes and functions.	<p>Highest priority wetlands. Objective is to preserve and protect the existing conservation values of the wetlands through various mechanisms including:</p> <ul style="list-style-type: none"> • Reservation in national parks, crown reserves and State owned land, • Protection under Environmental Protection Policies, and • Wetland covenanting by landowners. <p>No development or clearing is considered appropriate. These are the most valuable wetlands and any activity that may lead to further loss or degradation is inappropriate.</p>
Resource Enhancement	Wetlands which may have been partially modified but still support substantial ecological attributes and functions	<p>Priority wetlands. Ultimate objective is to manage, restore and protect towards improving their conservation value. These wetlands have the potential to be restored to Conservation category. This can be achieved by restoring wetland function, structure and biodiversity.</p>
Multiple Use	Wetlands with few remaining attributes and functions	<p>Use, development and management should be considered in the context of ecologically sustainable development and best management practice catchment planning through landcare.</p>

A Multiple Use (MU) (UFI 1203) wetland is located approximately 100 m to the north-east of the subject site. The MU wetland surrounds a Resource Enhancement (RE) (UFI 1204) wetland located approximately 190 m from the subject site. A Conservation Category (CC) wetland (UFI 15480) is located approximately 570 m to the west of the subject site (refer to **Figure 4**).

3 EXTRACTION ACTIVITIES

The sand and limestone quarry will cover an area of approximately 9.17 ha with a current maximum elevation of 16.5 m AHD. It will be excavated to approximately 6 m AHD in five stages, each approximately 2 ha in size. Indicative stages are shown within **Figure 2** to illustrate their relative scale.

The boundaries of the subject site will be designed with a minimum of 1:4 batters.

The quarry has been designed to provide a 10 m setback from the drip line of the roadside vegetation adjacent to Finn Road and at least a 4 m setback to the property to the north (refer to **Figure 2**).

It is anticipated that between approximately 46,000 m³ and 963,000 m³ of sand and limestone will be extracted in total with a maximum of approximately 200,000 m³ excavated each year, depending on supply and demand. The proposal involves the screening of the sand and crushing of limestone onsite. The duration of screening and crushing operations will be dependent on the timing and requirements of specific campaigns.

The planned end use of the quarry is to restore a natural soil profile and return the area to horticulture, ensuring that there is no net loss of productive agricultural land.

4 REHABILITATION MANAGEMENT PLAN

4.1 Objectives

The overarching closure objective for the rehabilitation plan is:

Upon completion of each stage, establish a safe and stable landform capable of supporting horticulture, in which the following completion criteria will be achieved.

Table 3. Rehabilitation closure objectives and completion criteria.

Closure Objectives	Completion Criteria	Measurement Tool
A self sustaining cover crop.	Crops cover the entire stage after completion of the revegetation works.	Annual monitoring
Weed levels that are not likely to impact on the viability of the reconstructed soils.	No declared weed species are present. Weed species are not competing with cover crop across the site.	Annual monitoring
A safe and stable landform suitable for the proposed future land use.	No areas of erosion or soil collapse are observed.	Annual monitoring

4.2 Topsoil and Overburden Removal

The following measures will be implemented during topsoil and overburden removal:

- Where possible topsoil and overburden will be directly transferred to an area being rehabilitated.
- Overburden, as subgrade sand, will be pushed to the perimeters of the excavation, to assist with visual and noise screening. From there it can be used for the rehabilitation process.
- If deemed necessary, the stockpiles will be covered with polymer agents and seeded with pasture species to reduce erosion and to discourage weeds.
- Excavation will be worked progressively in the stages as shown.
- Where possible topsoil clearing will be undertaken in the wetter months.

4.3 Landform Reconstruction and Contouring

Landform reconstruction and contouring will involve the following:

- The final landform will be formed to approximately 6 m AHD.
- The land surface will be left as a flat to gently sloping floor with minimal need for batter slopes.
- The post extraction landform will be designed with minimum batters of 1:4.
- The excavated floor will be deep ripped in two directions. The width between rip lines will be 1 m intervals.
- A minimum of 200 mm of overburden will be spread over the surface where available to provide a substrate for agricultural soils, followed by topsoil.

4.4 Pre-Planting/Seeding Weed Control

Pre-seeding weed control is only likely to be required where topsoils are used that contain weed species. Given the current land use, it is not anticipated that weed control will be other than normal agriculture practice.

If required, weed control will only be conducted after overburden and topsoil have been spread and any seeds have been allowed to germinate. Broadscale weed treatment may be required if the weed load is significant. This will involve the following measures:

- In April to May, after the first autumn rains, check for broadleaf weed germination.
- Any weeds likely to significantly impact on the rehabilitation will be sprayed with Roundup or similar agriculture herbicide or grubbed out, depending on the species involved.
- Weed affected topsoil and overburden will be buried. Depending on the nature of the planting substrate, a broad spectrum spraying program may be used.

4.5 Cover Crops

As previously discussed, it is proposed to return the extraction area to its former land use, horticulture. If a cover crop is required prior to re-commencing horticulture, planting with pasture species will be undertaken in autumn using a mixture of oats, rye and medic at an approximate rate of 60/25/5 kg/ha. Fertiliser will be applied at a rate of approximately 240 kg/ha. The seed/fertiliser mix may vary depending on the specific requirements of the landowner.

Upon completion of planting, the following will be implemented:

- A monitoring and maintenance schedule will be implemented to ensure that appropriate procedures are undertaken as necessary, including:
 - Repair of any erosion damage;
 - Re-seeding areas that may not have taken; and
 - Weed control.
- The monitoring and maintenance schedule will be undertaken for a two year period after completion of works with monitoring undertaken on an annual basis.

4.6 Decommissioning

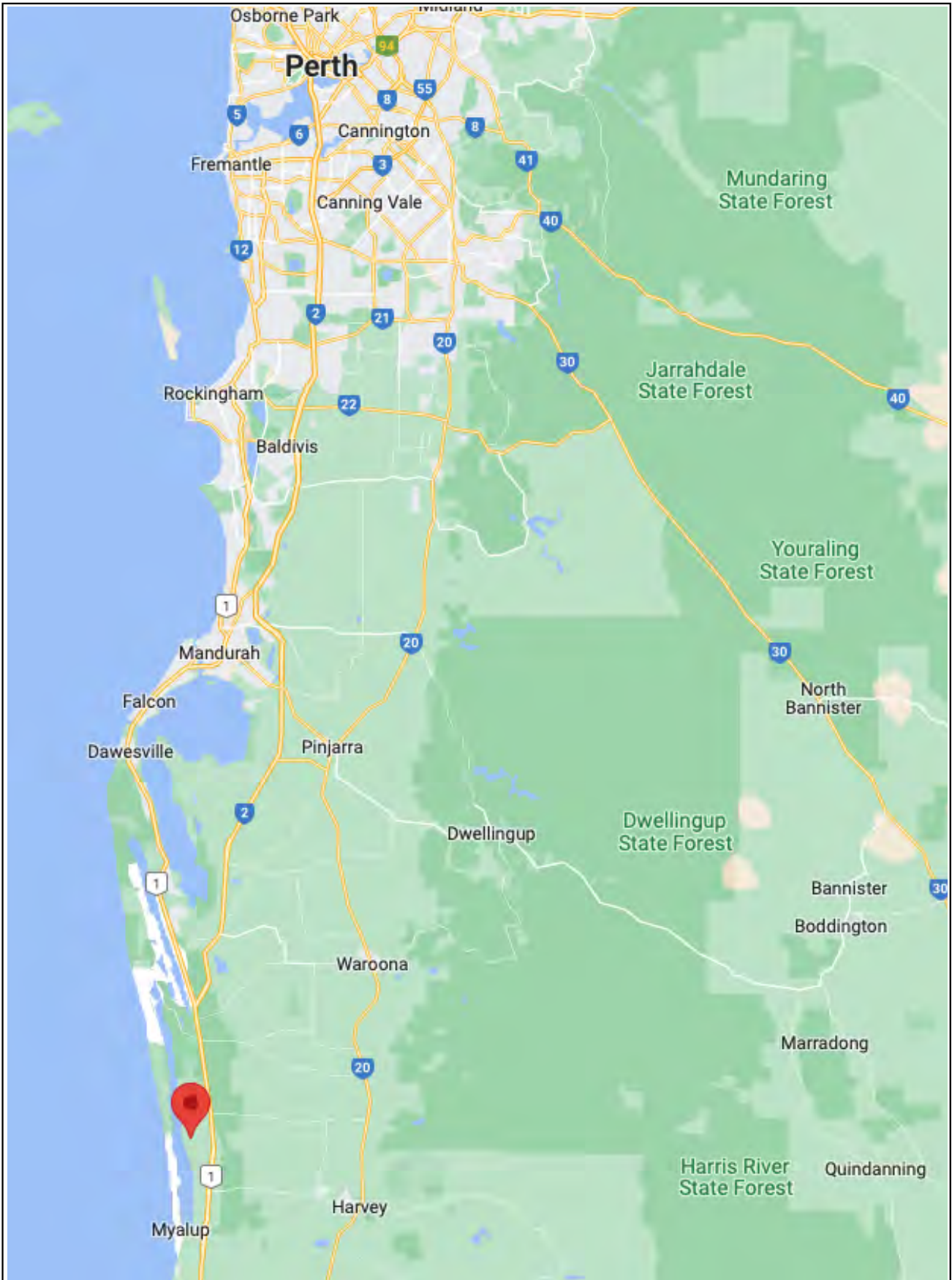
Following completion of the extraction activities, the applicant will undertake the following actions to decommission the site:

- All buildings and infrastructure will be removed;
- Any hard stand surfaces will be removed and used to backfill the pit;
- Overburden will be used as backfill;
- The area will have the slopes and soils constructed to allow for the future proposed land use.

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FIGURES



PROJECT Lot 1794 Finn Rd, Myalup

DRAWING TITLE Figure 1 – Site Locality

CLIENT GM Giacci Family Trust



Project Number 2342
 Drawing Number Figure 1
 Revision A

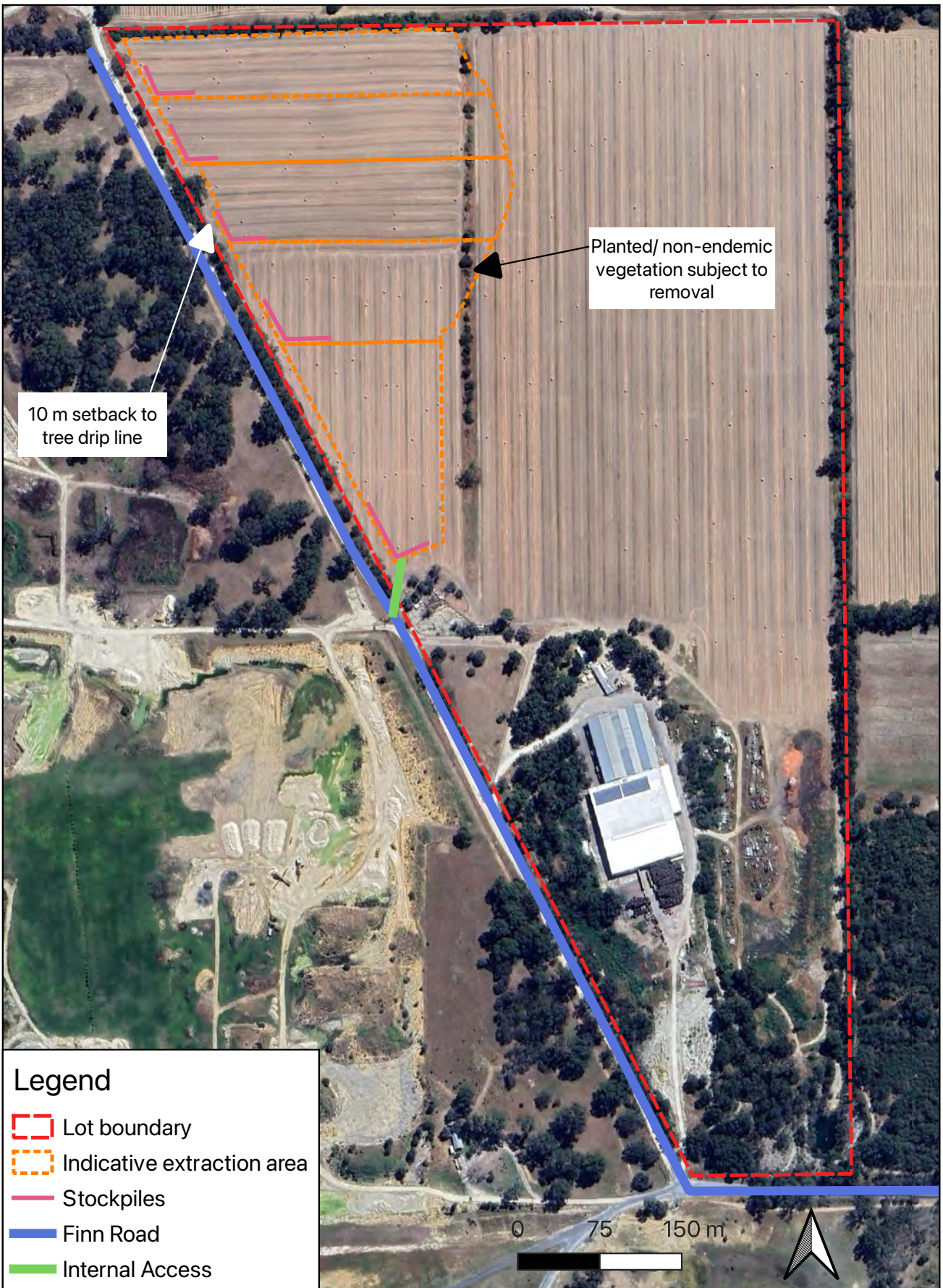
Designed PN
 Drawn PN
 Checked Approved

Date 27/06/2023
 Local Authority Shire of Harvey

Sheet 1 of 1

PO Box 5178
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10 m setback to tree drip line

Planted/ non-endemic vegetation subject to removal

Legend

- Lot boundary
- Indicative extraction area
- Stockpiles
- Finn Road
- Internal Access

PROJECT Lot 1794 Finn Rd, Myalup

DRAWING TITLE Figure 2 – Site Locality

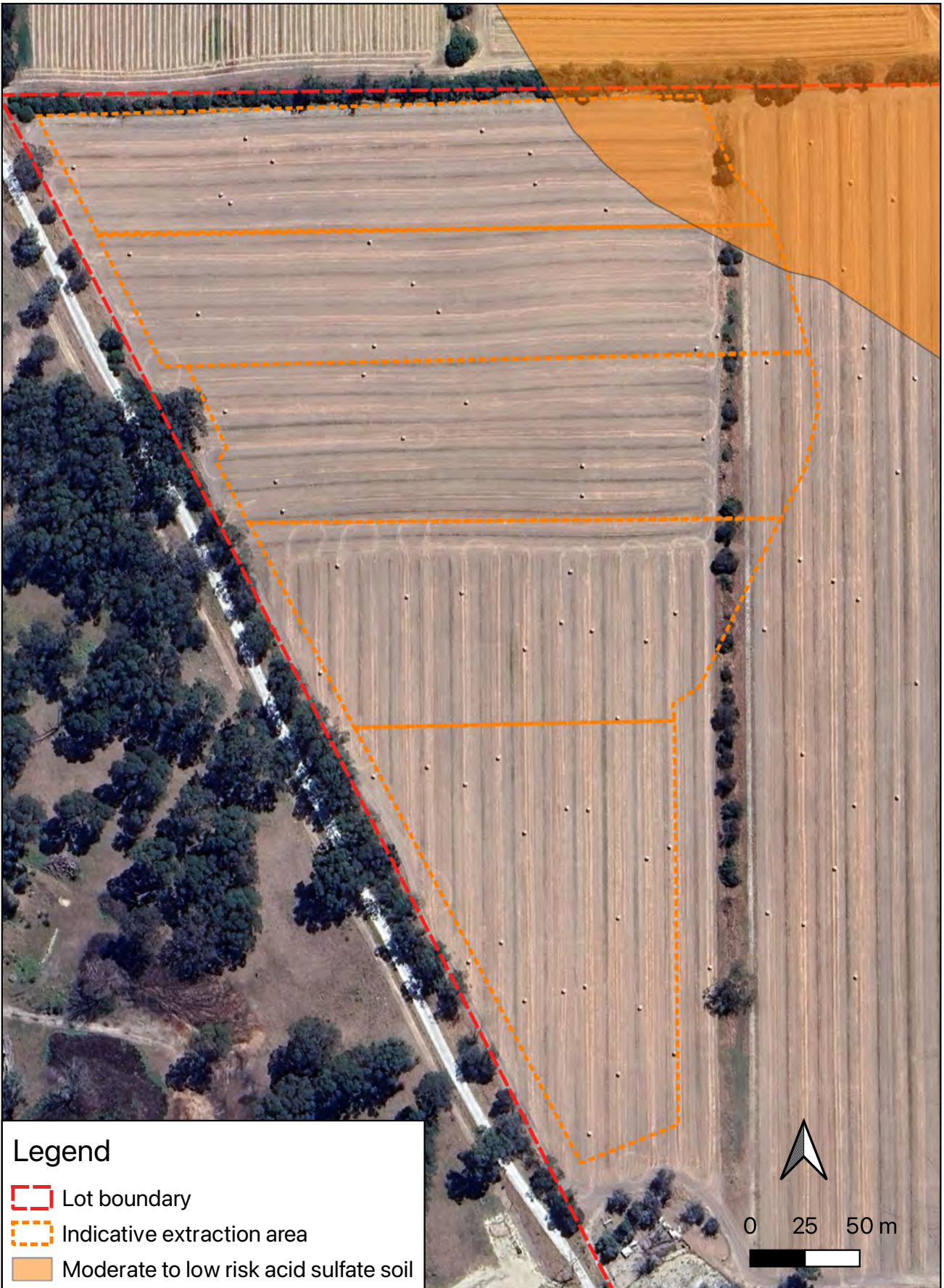
CLIENT GM Giacci Family Trust



Project Number	Drawing Number	Revision
2342	Figure 2	A
Designed PN	Checked	
Drawn PN	Approved	
Date	10/07/2023	
Local Authority	Shire of Harvey	
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Legend

- Lot boundary
- Indicative extraction area
- Moderate to low risk acid sulfate soil

PROJECT Lot 1794 Finn Rd, Myalup

DRAWING TITLE Figure 3 – Acid sulfate soil mapping

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Project Number
2342

Designed PN
Drawn PN

Date
Local Authority
Sheet 1 of 1

Drawing Number
Figure 3

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Approved

12/07/2023
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Revision
A


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Legend

 Lot boundary


 Indicative extraction area

Geomorphic Wetlands Swan Coastal Plain

 Conservation

 Multiple Use

 Resource Enhancement

 DWER GW monitoring bore

PROJECT Lot 1794 Finn Rd, Myalup

DRAWING TITLE Figure 4 – Water Features

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Figure 4

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Revision
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