



ENVIRONMENTAL MANAGEMENT PLAN

Lot 6 Banksia Road and Lots 300 and 301
Boomerang Road, Oldbury

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REPORT

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1 INTRODUCTION

This Environmental Management Plan (EMP) has been prepared on behalf of the proponent Hanson Construction Materials Pty Ltd (Hanson) to satisfy the Shire of Serpentine Jarrahdale's requirements outlined in correspondence to Roberts Day dated 17 December 2013. The correspondence is an outcome of the State Administrative Tribunal mediation regarding Hanson's sand extraction Development Application on Lot 6 Banksia Road and Lots 300 and 301 Boomerang Road, Oldbury (the site) held on 11 December 2013.

The EMP details the management framework for the following issues, as required by the Shire:

1. Traffic management
2. Dust management
3. Noise management
4. Rehabilitation
5. Visual amenity
6. Urban water management.

1.1 Oldbury sand extraction background

The Oldbury site totals 32.32 hectares (ha) with the proposed staged excavation area comprising of 15.2 ha, which will support mining of sand for five years or more depending upon market demand for the product.

It is proposed that the excavation area will be restored at the completion of each mining stage back to *Banksia* spp – *Eucalyptus marginata* woodlands, utilising the 18 years of Banksia restoration research conducted by the Botanical Parks and Gardens Authority (BPGA) to maximise the regeneration of natural bushland. This objective is based on the premise that the site zoning of "Rural" under the Metropolitan Region Scheme (MRS) and the Shire of Serpentine Jarrahdale Town Planning Scheme (TPS) will remain unamended in the long-term.

This EMP details the measures to be adopted to address potential environmental impacts during the sand extraction and post-extraction phases of the project.

1.2 Structure of the EMP

This EMP is a management tool that details the methods and procedures that will be applied in order to achieve Hanson's environmental commitments and objectives.

The EMP details:

- Environmental elements – the environmental aspects requiring management consideration
- Responsibility – details responsibility for carrying out each action is assigned to a relevant person / organisation
- Management actions – the actions to be undertaken to achieve the performance objective, including any necessary approvals
- Performance indicators
- Monitoring – the intended monitoring program and the process of measuring performance
- Reporting – the process and responsibility for monitoring results
- Corrective and contingency actions – the action to be implemented in the case of non-compliance and the organisation responsible for the action.

1.3 Objectives of the EMP

This EMP has been prepared as a supporting documentation for the Development Application to be submitted to the Shire of Serpentine Jarrahdale for sand extraction at the site. The EMP provides a:

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- Practical framework for establishing best practice environmental standards to mitigate potential environmental impacts for each activity undertaken
- Mechanism to assist Hanson, site supervisors and contractors to comply with legislation and implement the delivery of the environmental management and mitigation measures
- Mechanism to reduce the potential impacts during the operation phase.

The approved EMP will provide Hanson with a practical guide to measure compliance by all parties with the agreed environmental requirements and objectives.

1.4 Scope of the EMP

The key environmental issues identified by the Shire and addressed in this EMP are:

1. Traffic management
2. Dust management
3. Noise management
4. Rehabilitation
5. Visual amenity
6. Urban water management.

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2 PROJECT DESCRIPTION

2.1 Site location

The proposed sand excavation site is located in the Shire of Serpentine Jarrahdale, with an area of approximately 15.2 ha (Figure 1).

The land subject to the Extractive Industry Licence (EIL) and Development Application consists of three privately owned lots:

- Lot 6 Banksia Road, Oldbury
- Lot 300 Boomerang Road, Oldbury
- Lot 301 Boomerang Road, Oldbury.

The site is bound by Boomerang Road and Banksia Road to the north and the Mundijong–Kwinana railway to the south. It is located approximately three kilometres (km) to the east of the Kwinana Freeway. The entire site, incorporating Lots 6, 300 and 301 is 32.32 ha, of which 15.2 ha is proposed for sand extraction. Approximately 4 ha of the proposed sand mining area has previously been cleared for hobby farming and a motorbike track (Figure 2).

2.2 Operating hours

Hanson proposes to operate the sand quarry from 7.00 am to 5.00 pm, Monday to Saturday.

Hanson will not allow trucks to enter the site prior to 7.00 am or after 5.00 pm.

2.2.1 Significant infrastructure projects

On some occasions, Hanson is requested to provide sand resources on a Sunday or public holiday to facilitate important and major infrastructure project(s), usually for the state government. On this basis, Hanson proposes to cap the number of Sunday / public holiday operations to five per year. In the event that more than five operations are required, Hanson will apply to the Shire for an operations variation approval.

On the occasions when a request for operating on a Sunday or a public holiday occurs, Hanson proposes the following:

1. Hanson will inform the Shire of Serpentine Jarrahdale two days prior to opening on a Sunday (or a public holiday) or alternatively as soon as Hanson is informed of the operating date and time expected during the day that operations are required.
2. Hanson will also inform the Shire of Serpentine Jarrahdale of the proposed opening and closing times.
3. The operating hours for Sunday (or public holidays) operations will be the same as for Monday to Saturday.

2.3 Applicant and owner details

Hanson Construction Materials Pty Ltd is the proponent for this EIL Application and the Development Application.

Hanson owns Lot 6 Banksia Road, Oldbury. Ownership of the two remaining lots (that form the EIL and Development Applications) is as follows:

- Lot 300, Boomerang Road, Oldbury is owned by Raymond Tilbury
- Lot 301, Boomerang Road, Oldbury is owned by Kenneth and Cecil Ditchfield.

Hanson has entered into an agreement with each of the landowners in connection with the extraction of the sand resource from these lots. In accordance with the Section 2.3(1)(h) of the Extractive Industries Local Law, written consent and support of the application from the landowners of the excavation site has been provided in the Development Application.

The key Hanson contact is detailed below:

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Contact person: Rachel McSkimming
 Position: Development Manager
 Phone: (08) 9311 8811
 Email: rachel.mcskimming@hanson.com.au

2.4 Oldbury sand extraction project summary

A summary of Hanson's Oldbury sand extraction project is provided in Table 1.

Table 1: Project summary

Project component	Proposal characteristic
Excavation	
Total area of project site (Lots 6, 300 and 301)	32.32 ha
Total area of mining footprint	15.2 ha
Total disturbance area	15.2 ha (11.2 ha has remnant vegetation)
Life of the project	Approximately 5 years
Dewatering requirements	Nil
Maximum depth of excavation	18 metres AHD
Processing	
Sand	Dry screening of sand only
Water requirements	For dust suppression as required
Infrastructure	
Fuel storage	5,000 litre above ground (self-bunded) tank
Transport	
Truck movements	Variable but approximately 2–4 per hour
Workforce	
Hours of operation	7.00 am to 5.00 pm, Monday to Saturday. Some operations may occur on a Sunday for major infrastructure project(s) if required by project demand

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3 LEGAL REQUIREMENTS

3.1 Environmental and planning approvals

As Hanson's proposed excavation is permissible with the grant of planning approval under Local Planning Scheme (LPS) No. 3, the Shire of Serpentine Jarrahdale may (under Clause 3.1(1) of the Extractive Industries Local Law) grant an EIL following planning approval.

Pursuant to clause 1.2(1) of the Shire of Serpentine Jarrahdale Extractive Industries Local Law, Hanson's proposed excavation of the site will be subject to the Extractive Industries Local Law.

3.1.1 Planning context

Hanson's proposed activity is subject to, and complies with the following planning framework:

- Metropolitan Region Scheme
- Shire of Serpentine Jarrahdale LPS No. 3.

In addition, the following state planning policies are relevant to Hanson's proposed activity:

- State Planning Policy 1 – State Planning Framework Policy
- State Planning Policy 2.4 – Basic Raw Materials
- State Planning Policy 2.5 – The Peel Harvey Coastal Plain Catchment.

3.1.2 Permissibility

3.1.2.1 Metropolitan region scheme zoning

Lot 6 Banksia Road and Lots 300 and 301 Boomerang Road are zoned "Rural" under the MRS (refer to the Development Application report prepared by Roberts Day).

3.1.2.2 Shire of Serpentine Jarrahdale Local Planning Scheme No. 3

Consistent with the MRS zoning, the subject land is zoned "Rural" and is within Special Control Area 4 (SCA4) – Basic Raw Material under the Shire of Serpentine Jarrahdale's LPS No. 3.

The proposal is considered to represent development for the purpose of "Extractive Industry", noting Industry – Extractive is classified as an "A" use in "Rural" zoned areas. This application seeks an extension of the approval period for the development approval and extraction licence in accordance with Clause 77 of the Planning and Development (Local Planning Scheme) Regulations 2015.

3.2 Statutory requirements

Hanson's sand extraction project will comply with all Commonwealth, state and Shire of Serpentine Jarrahdale requirements. A summary of the key legislation applying to this project is provided in Table 2.

Table 2: Key state and Commonwealth legislation

State legislation

<i>Aboriginal Heritage Act 1972</i>	<i>Environmental Protection Act 1986</i>
<i>Aboriginal Heritage Regulations 1974</i>	<i>Environmental Protection Regulations 1987</i>
<i>Biodiversity Conservation Act 2016</i>	<i>Land Administration Act 1997</i>
<i>Bush Fires Act 1954</i>	<i>Occupational Safety and Health Act 1984</i>
<i>Conservation and Land Management Act 1984</i>	<i>Planning and Development Act 2005</i>

Commonwealth legislation

<i>Environment Protection and Biodiversity Conservation Act 1999</i>	<i>Environment Protection and Biodiversity Conservation Regulations 2000</i>
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3.2.1 Clearing permit

Clearing of native vegetation requires a permit under Part V Division 2 of the *Environmental Protection Act 1986* (EP Act) except where an exemption applied under Schedule 6 of the EP Act or is prescribed by regulation in the Regulations, and it is not mapped as an Environmentally Sensitive Area (ESA). Hanson submitted a clearing permit to the Department of Water and Environmental Regulation (DWER) and was approved to clear 11.6 ha of native vegetation to facilitate the project. The clearing permit (CPS 4935/2) is valid until 7 August 2034.

3.2.2 EPBC referral

The proposal was referred to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) (then the Department of the Environment, Water, Heritage and the Arts) in August 2010 due to potential impacts to listed threatened species and communities. The proposal was approved, subject to conditions, on 8 December 2017 (2010/5622).

3.3 Stakeholders

Throughout the finalising of the EIL and Development Application for the Oldbury project, Hanson has consulted extensively with the project stakeholders. The key stakeholders include:

- Shire of Serpentine Jarrahdale
- Office of the Environmental Protection Authority (OEPA)
- Department of Water and Environmental Regulation (DWER).

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4 RESPONSIBILITY AND ACCOUNTABILITY

All personnel working at Hanson's Oldbury sand extraction site are responsible for environmental management with respect to their day-to-day activities within their respective work areas.

The primary responsibility for monitoring the potential impacts of the construction / development of sand extraction and rehabilitation will be with the project proponent, Hanson Construction Materials Pty Ltd. Hanson's operation manager, the Oldbury site supervisor and environmental officer will be responsible for the implementation of the EMP with assistance from Botanical Parks and Gardens Authority (BPGA).

4.1 Management responsibilities

4.1.1 Role responsibilities

Table 3 outlines the specific management responsibilities of the EMP.

Table 3: Management responsibilities

Role	Responsibilities
Hanson Construction Materials Pty Ltd	<ul style="list-style-type: none"> • Implementation and monitoring of the EMP. • Provide all supervisory and management staff with an awareness and understanding of their responsibilities under this EMP. • Ensure appropriate and adequate resources are allocated to allow for the effective implementation and maintenance of the EMP. • Conduct periodic reviews of environmental performance. • Report any major environmental incidents that may have a significant impact on the surrounding environment. • Provide employees and contractors with the relevant environmental instruction in relation to the EMP and awareness and understanding of their obligations and duties. • Provide personnel involved in the project, including subcontractors and visitors, with the appropriate environmental training required to provide them with awareness and understanding of their responsibilities under the EMP as well as understanding of the environmental approvals that adhere to the strategies outlined in the EMP. • Carry out all work in accordance with the procedures outlined in the EMP. • Make sure that all environmental safeguards and precautions are in place and adhered to at all times at the site and activity. • Regularly inspect and monitor all activities for adherence to proper environmental safeguards. • Ensure that all equipment used is properly serviced and that all precautions are in place to prevent the likelihood of an environmental incident occurring.

4.2 Complaints procedure

Hanson will establish the following complaints procedure for the Oldbury sand extraction site:

1. Hanson will position a sign at the entry of the Oldbury site that provides a dedicated telephone number and email address for complaints.
2. All complaints will be logged.
3. The Oldbury site supervisor will be responsible for reviewing all logged complaints within 12 hours or as soon as practical.
4. The Oldbury site supervisor will be responsible for responding to all logged complaints within 48 hours or as soon as practical.
5. The Oldbury site supervisor, as required, will direct complaints to the most appropriate person within Hanson; however, the Site Supervisor will maintain responsibility for responding to the complaints.

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5 OLDBURY SAND EXTRACTION EMP

5.1 Introduction

This EMP details the measures to be adopted to address the identified environmental impacts during the operational / rehabilitation phases of the Oldbury sand extraction project. The EMP details the following:

- Environmental objective: The environmental issue placed in context of the appropriate environmental policy and standards
- Responsibility: Responsibility for carrying out each action is assigned
- Potential impacts: Describes the identified potential environmental impacts that might arise from the proposed development at the site
- Management response: Proposed management responses are detailed where these are well defined
- Performance indicators: Criteria against which the implementation of the actions and the level of achievement of the performance objectives will be measured
- Monitoring: The intended monitoring program is outlined where applicable
- Reporting: The process for reporting monitoring results
- Corrective action: Action to be implemented in the case of non-compliance.

5.2 Traffic management

The haulage route is along Banksia Road on to Lyndon Road, Coyle Road and then King Road (which provides access to Thomas Road and the Kwinana Freeway). King Road is listed as a heavy vehicle route, with a maximum load of 87.5 tonnes and a maximum length of vehicle of 27.5 m. Coyle Road and Lyndon Road are constructed to a suitable standard to accommodate a range of vehicle types and movements consistent with the commercial (poultry farm and existing sand quarry) and agricultural land uses. This includes tractor and semi-trailer movements.

Table 4: Summary of traffic management plan

Environmental objective	To ensure truck movements to and from the quarry travel along the designated haulage route and thereby minimise any impacts on surrounding residents
Responsibilities	Hanson
Potential impacts	Noise and dust from truck movements has the potential to affect the amenity of surrounding residents
Management response	<p>External roads</p> <ul style="list-style-type: none"> • Traffic complaints will be logged in accordance with Hanson's Complaints Procedure • Hanson will upgrade the Banksia Road and Boomerang Road intersection • Hanson will inform the Shire of Serpentine Jarrahdale and trucking companies of the designated haulage route <p>Internal roads</p> <ul style="list-style-type: none"> • Restrict vehicle movements to defined roads and operational areas • Use of water as appropriate to wet down roads and trafficked areas • Limit the speed of vehicles on the site • Maintain haul road surface in a good condition and with suitable grades • Ensure all sand transport vehicles leaving the site have covered loads
Performance indicator	<ul style="list-style-type: none"> • Traffic complaints logged and managed in accordance with the Complaints Procedure • Trucks following the designated haulage route
Monitoring	<ul style="list-style-type: none"> • Completing the Banksia Road and Boomerang Road intersection upgrading • The site supervisor will monitor truck movements along the designated truck route
Reporting	The site supervisor will be responsible for maintaining a record of any truck operator / company that does not use the haulage route

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Corrective action	External roads
	<ul style="list-style-type: none"> The site supervisor will restrict access to the quarry for any truck operator/company not using the designated haulage route
	Internal roads
	<ul style="list-style-type: none"> Upgrade / maintain internal roads The site supervisor will restrict access to the quarry for any truck operator/company speeding on the internal roads

5.3 Dust management

Dust is generated during sand extraction operations primarily through extraction, screening, stockpiling, earthmoving and road traffic on unsealed surfaces. In dry, windy conditions, particles can be lifted from open or disturbed areas, resulting in visible dust emissions.

Table 5: Summary of dust management plan

Environmental objective	<p>The environmental objective relating to the protection of air quality is as follows:</p> <ul style="list-style-type: none"> To ensure that emissions do not adversely affect environmental values or the health, welfare and amenity of people and land uses.
Responsibilities	Hanson, with assistance from BGPA
Potential impacts	<p>Dust resulting from operations has the potential to affect:</p> <ul style="list-style-type: none"> Human health and amenity Natural environment Social pursuits.
Management response	<ul style="list-style-type: none"> Hanson commits to a dust monitoring program as outlined below <ul style="list-style-type: none"> It is proposed that Hanson monitors dust using a peak monitoring station within the operational area at the commencement of Stage 1 and establishes a neighbourhood monitoring station along the north-western boundary of the excavation area (closest to Lot 30). The monitors will measure levels of suspended particulates for the source and near the closest receptor (Lot 30) for an initial three-month period to determine the actual nature of the dust impact (if any) After the three-month monitoring period, Hanson will undertake an assessment of the dust information, compare the data to the NEPM criteria, review the complaints log and determine if further monitoring requirements and dust management practices on site are required. Additional key dust management measures are detailed below: <p>Dust from traffic on unsealed roads</p> <ul style="list-style-type: none"> Minimise the width and length of internal roads. Restrict vehicle movements to defined roads and operational areas. Avoiding disturbance of non-operational areas of the site. Use of water as appropriate to wet down roads and trafficked areas. Use of dust suppressants where appropriate (either mixed with water to enhance dust suppression and vegetation cover or applied periodically to specific areas). Limit the speed of vehicles on the site. Maintain haul road surface in a good condition and with suitable grades. Ensure all sand transport vehicles leaving the site have covered loads. <p>Dust from operational and non-operational areas of the site</p> <ul style="list-style-type: none"> Locate stockpiles as far away from the boundary of Lots 301 and 6 as possible. Dust control on stockpiles will be controlled using water sprays, drift fencing and daily inspections. Wind fencing along the boundary with adjacent Lot 36 to reduce wind flow from the excavation works. The windscreen will be constructed of shade cloth or hessian on an approximately 1.8 m high fence. Use of water carts to dampen dust prone areas. Establish screening vegetation and/or ground cover on non-operational areas and finished sand extraction stages as soon as practicable. Apply surface treatments (e.g. mulch, ground cover) to stabilise any bare areas which might be prone to wind erosion.

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	<ul style="list-style-type: none"> • Minimise the area disturbed or open at any one time, as far as practicable. • Define “no-go” buffer areas on the site to avoid any unnecessary disturbance of stabilised surfaces or vehicle traffic. • Cease operational activities until conditions improve and compliance can be achieved.
Performance indicator	Dust complaints logged and managed in accordance with the Complaints Procedure.
Monitoring	<ul style="list-style-type: none"> • Dust monitoring will be undertaken for an initial three-month period from fixed location dust monitors. • The site supervisor and/or environmental officer will ensure the following dust monitoring measures are implemented as necessary <ul style="list-style-type: none"> – Carry out daily visual inspections of the potential dust generating sources. <p>Internal roads</p> <ul style="list-style-type: none"> • Monitor the implementation of the traffic route watering procedure. • Monitor the maintenance of the emission control systems on any quarry plant and vehicles.
Reporting	<ul style="list-style-type: none"> • The site supervisor and environmental officer will be responsible for maintaining the following records: <ul style="list-style-type: none"> – Complaint log and complaint investigation records – Dust monitoring records <ul style="list-style-type: none"> ○ The dust monitoring report should contain, as a minimum, the following information <ul style="list-style-type: none"> • Dust monitoring methodology and instrumentation • Dust concentrations recorded • Analysis of the data and discussion of the results relative to the relevant air quality criteria.
Corrective action	Implement measures to reduce dust generation.

5.4 Noise management

Noise can originate from a number of sources and impact on external sensitive premises. Noise impacts are addressed by reducing the noise generated from the sand excavation and processing operations. The closest noise sensitive premises are the dwellings located approximately 110 m west of the excavation site.

Lloyd George Acoustics was commissioned to assess and predict the likely noise impacts from the proposed sand mining and compare the results against the Environmental Protection (Noise) Regulations 1997.

The acoustic assessment was inclusive of the following key assumptions:

- The quarry plant will consist of a mobile screen and front-end loader.
- Trucks will arrive on site via Boomerang Road (and then loaded with sand) and leave the site via designated internal road onto Boomerang Road.

The quarry floor will be at an RL (finished ground level) of 18 m AHD and will start from the south-east corner of the site working towards the north-west corner. Three phases have been assessed:

- Phase 1 – quarry face in south-east corner
- Phase 2 – quarry face at middle of site
- Phase 3 – quarry face at north-west of site.

The key conclusions from the Lloyd George Acoustics’ assessment are:

- During the initial phase of the operations (Phase 1), the operations are far enough away for the noise sensitive receivers to achieve compliance with the Regulations during the daytime period.
- The critical time is during the middle of the pit life (Stages 3 and 5). At this stage, assuming the quarry face runs straight across the site, the barrier effect from the quarry walls is insufficient to achieve compliance with the Regulations and an exceedance of up to 5 dB is likely during downwind conditions.
- As the quarry moves into the final phases (Stages 6 and 7), the walls of the quarry are high enough for the barrier effect to achieve compliance with the Regulations during the daytime period.

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- To comply with the Noise Regulations during the daytime period, a 5 dB reduction is required to the overall noise level in particular when the project reaches the middle Stages 3 and 5.
- To achieve this, Hanson should construct a temporary east to west earth bund wall at an average of RL of 25 m for the middle Stages 3 and 5. The profile of the wall should be enclosed on three sides congruent with the recommendations from Lloyd George Acoustic's assessment.

Table 6: Summary of noise management plan

Environmental objective	<ul style="list-style-type: none"> • The environmental objectives for noise management are: <ul style="list-style-type: none"> – Manage noise to ensure compliance with the Environmental Protection (Noise) Regulations 1997.
Responsibilities	Hanson
Potential impacts	Excessive exposure to noise can negatively impact upon people's health, amenity and the natural environment, in particular native fauna.
Management response	<p>There are a number of further management actions that will be undertaken to minimise noise generation. The general management actions are summarised below:</p> <ul style="list-style-type: none"> • Retain and establish vegetation between the mine site and the adjacent land holdings to provide a physical separation barrier between mine site activities and adjacent noise sensitive premises. • Maintain a minimum 150 m separation barrier between the excavation area within Lot 6 and the dwelling within Lot 36, and excavation works in Lot 301 and the dwellings within Lot 30. • Design the excavation to provide enhanced landform and constructed noise screening (i.e. bunds). This would include constructing an east-west earth bund wall along at an average of RL of 25 m for the middle Stages 3 and 5. • Maintain noise suppression devices in good condition on all operational machinery. • Shut down equipment when not in use. • Operate machinery within the designated hours of operation, 7.00 am to 5.00 pm, Monday to Saturday. Some operations may occur on a Sunday for major infrastructure project(s) if required by project demand. • Schedule activities to minimise the likelihood of noise nuisance. • Use the dedicated transport route. • Record and follow up any complaints received regarding noise disturbance immediately to minimise the cause, to the greatest possible extent.
Performance indicator	<ul style="list-style-type: none"> • Noise complaints logged and managed in accordance with the Complaints Procedure • Compliance with the noise limits as specified in Noise Regulations.
Monitoring	<ul style="list-style-type: none"> • The site supervisor will ensure the following noise amenity protection measures are implemented as necessary: <ul style="list-style-type: none"> – Carry out daily inspections of potential noise generating sources. – Monitor the compliance with the start time requirement, and the east to west bund wall as a form of noise attenuation.
Reporting	<ul style="list-style-type: none"> • The site supervisor and environmental officer will be responsible for maintaining the following record: <ul style="list-style-type: none"> – Complaint log and complaint investigation records.
Corrective action	<ul style="list-style-type: none"> • The site supervisor and/or environmental officer will be responsible for rectification of any identified non-conformance with the objectives of this EMP. • In the event that a non-conformance occurs as a result of poor practices, personnel on-site will be made aware of the problem and informed of acceptable work practices.

5.5 Screening material

Hanson will, in accordance with the granted DWER approval, implement the noise management recommendations as defined in Lloyd George Acoustics' Background Noise Survey and Environmental Noise Assessment (Appendix A).

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5.6 Rehabilitation management plan

A Restoration Management Plan (RMP) has been prepared to support the project. The RMP (Hanson 2017) is summarised in Table 7.

Table 7: Rehabilitation management plan

Environmental objective	To ensure that impacts to biodiversity resulting from implementation of the proposal are low as reasonably practicable and to comply with the requirements of the Clearing Permit CPS 4935/2 and EPBC referral.
Responsibilities	Hanson, with assistance from BGPA
Potential impacts	<ul style="list-style-type: none"> Clearing of up to 11.6 ha of native vegetation comprising potential black cockatoo habitat.
Management response	<p>Vegetation will be cleared in stages in response to market requirements. As each stage is cleared, the previous stage will be rehabilitated by directly transferring the topsoil into the previously mined area. The following actions are proposed within each rehabilitation area.</p> <p>Year 1</p> <ul style="list-style-type: none"> Seed collection will precede clearing of the bushland from the Donor site (October to March) The Receptor site is prepared by ripping and spraying for weeds, ready for rehabilitation (December to February) Clearing of the Donor site (February to March) Direct transfer of topsoil from the Donor site to the Receptor site (February to April) Compaction reduction works on the Receptor site (March to April) Broadcast canopy species seeding of Receptor site (June to August) Broadcast seeding rates will be at rate of approximately 1.5kg/hectare and include canopy, mid storey and under storey species that are expected to be missing from the topsoil germination. Seeding rate developed from previous work undertaken Monitoring of rehabilitation in the Receptor site to determine initial seedling emergence patterns against target key performance indicators provided below in this table and monitoring for weed emergence (October). <p>Year 2</p> <ul style="list-style-type: none"> Weed management in the Receptor site (June to August) Monitoring of rehabilitation in Receptor site to determine if rehabilitation is on track to meet the year 5 target KPI, including canopy species survival monitoring, and monitoring for weed emergence (October) <p>Year 3</p> <ul style="list-style-type: none"> Weed management in the Receptor site (June to August) Monitoring of rehabilitation in Receptor site to determine if rehabilitation is on track to meet the year 5 target performance indicators, including canopy species survival monitoring, and monitoring for weed emergence (October) <p>Year 4</p> <ul style="list-style-type: none"> Tubestock planting (as required June to August) Tubestock planting of canopy species Weed management in the Receptor site (June to August) Monitoring of rehabilitation in Receptor site to determine if rehabilitation is on track to meet the year 5 target performance indicators, including tube stock survival monitoring, and monitoring for weed emergence (October) <p>Year 5</p> <ul style="list-style-type: none"> Weed management in the Receptor site (June to August) Monitoring of rehabilitation in Receptor site to determine if rehabilitation is on track to meet the year 5 target performance indicators, including tube stock survival monitoring, and monitoring for weed emergence (October) Complete analysis of restoration outcome (including seedling survival patterns, and biodiversity and density outcomes) and compare to the performance indicators in the RMP and summarised in this table and report the results to DWER.

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Performance indicator	Compliance with the RMP key performance indicators summarised below.		
	Key performance indicators for plant/stem abundance (per 5m²)		
	Topsoil / woodland	Year 1	Year 5
	Good	124	15
	Medium	69	9
	Poor	33	6
	Key performance indications for species richness (per 5m²)		
	Topsoil / woodland	Year 1	Year 5
	Good	17	8
	Medium	16	7
Poor	16	6	
Monitoring	<ul style="list-style-type: none"> The restored area will be monitored by a botanist to allow early detection of locations requiring additional attention. Monitoring will include assessment of <ul style="list-style-type: none"> Species present Percentages of vegetation cover both native species and weeds Plant survival rates. 		
Reporting	Compliance report on the restoration program for Years 1 and 5 will be prepared and provided to DWER and the Shire of Serpentine Jarrahdale.		
Corrective action	<ul style="list-style-type: none"> Restoration works will be monitored for five years (to allow for active management) following the completion of each stage with key performance indicator assessment undertaken at Year 1 and Year 5. Corrective action will be in accordance with the RMP. 		

5.7 Visual amenity

A site finished floor level and view analysis is provided in the Oldbury Development Application report (Roberts Day 2013).

Table 8: Summary of visual amenity and rehabilitation management plan

Environmental objective	To ensure that aesthetic values are considered and measures are adopted to reduce visual impacts on the landscape to as low as reasonably practicable.
Responsibilities	Hanson with assistance from BGPA
Potential impacts	The clearing of the native vegetation will temporarily alter the appearance of the natural environment.
Management response	<p>The following management actions, as summarised below, will be utilised across the site:</p> <p>Visual amenity</p> <ul style="list-style-type: none"> Stage workings and progressive restoration to provide visual protection of later excavations. Minimise the amount of open ground at any one time. Wind fencing along the boundary of Lot 36 to reduce wind flow from the excavation works. The windscreen will be constructed of shade cloth or hessian on an approximately 1.8 m high fence. This will also act as a visual screen to the sand excavation works. Plant screening trees at appropriate locations. Maintain a minimum 30 m vegetation buffer from Boomerang and Banksia roads to the north and north-west of the excavation area. While not anticipated due to the existing natural topography and pit design Hanson can position overburden dumps so they form screening barriers if required. Hanson will undertake planting of screening vegetation along the Lot 36 and Lot 6 boundary (buffer area) to improve the visual amenity and along the boundary of Lot 6 (and create an ecological corridor) prior to the commencement of any excavation works. However, in line with the staging plan the proposed sand extraction area closest to Lot 36 will be the last area mined. This approach will maximise the time for the vegetation to be established as a screen. Hanson is committed to the revegetation (restoration), at the completion of each stage, of the site back to the pre-excavation indigenous Banksia spp – <i>Eucalyptus marginata</i> woodlands.

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	<ul style="list-style-type: none"> The sand extraction site will be contoured in accordance with the approved finished floor levels. Use screening fencing along Lots 6, 300 and 301's boundary if required. <p>Rehabilitation</p> <ul style="list-style-type: none"> A RMP will be prepared and implemented. The RMP will include restoration key performance indicators and monitoring requirements.
Performance indicator	Compliance with the RMP key performance indicators
Monitoring	<ul style="list-style-type: none"> The restored area will be monitored by a botanist to allow early detection of locations requiring additional attention. Monitoring will include assessment of <ul style="list-style-type: none"> Species present Percentages of vegetation cover both native species and weeds Plant survival rates.
Reporting	Compliance report on the restoration program for Years 1 and 5 will be prepared and provided to DWER and the Shire of Serpentine Jarrahdale.
Corrective action	<ul style="list-style-type: none"> Restoration works will be monitored for five years (to allow for active management) following the completion of each stage with key performance indicator assessment undertaken at Year 1 and Year 5. Corrective action will be in accordance with the RMP

5.8 Urban water – hydrology management strategy plan

At the request of the Department of Environmental Regulation (now DWER), Hanson has prepared a hydrology management strategy plan for the Oldbury site. The focus of this plan is to maintain the pre-development hydrological flows and protect the wetland L120 from any potential direct and/or indirect impacts as a result of sand excavation. Wetland L120 is located south of the railway line, approximately 80 m from the proposed sand extraction area.

Table 9: Summary of urban water – hydrology management strategy plan

Environmental objective	<ul style="list-style-type: none"> General stormwater management objectives and criteria for the L120 Wetland is: <ul style="list-style-type: none"> The maintenance of a similar hydrological regime (during and following sand extraction) to that which currently exists.
Responsibilities	Hanson
Potential impacts	<ul style="list-style-type: none"> Potential impacts to the water quality of the L120 Wetland include: <ul style="list-style-type: none"> Alteration to groundwater levels The contamination of surface / groundwater resources from "point sources" such as fuel spills.
Management response	Implement the DWER-required Hydrology Management Strategy Plan.
Performance indicator	Compliance with the Hydrology Management Strategy Plan
Monitoring	<ul style="list-style-type: none"> Hanson will monitor groundwater levels at the southern edge of the site for the duration of the clearing and revegetation program (approximately five years). Groundwater trigger levels have been determined (at 0.5 m above the model simulated groundwater increase of 0.21 m) and if exceeded for a period of more than two sampling events consecutively, contingency measures will be implemented. It is proposed that groundwater levels be collected quarterly during sand extraction and revegetation periods from all six existing monitoring bores.
Reporting	DWER will be advised of any breaches of water level and or quality triggers within two weeks of Hanson obtaining the information. DWER will also be consulted in relation to any contingency measures required.

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Corrective action

- The 0.5 m trigger was selected to take into account groundwater variability. The first contingency measure would be:
 - Assess whether long-term average increase exceeds 0.3 m.
 - If long-term average increase is less than 0.3 m, continue existing monitoring program.
 - If long-term average increase exceeds 0.3 m, assess in conjunction with the appropriate regulator, whether the increase is due to regional groundwater variation (e.g. due to climate factors).
 - If increase is deemed due to natural regional variability, continue existing monitoring program if increase is deemed due to sand extraction, it is proposed that contingency measures be undertaken, including
 - Ensuring open drains in the immediate vicinity are not blocked and allow free transmission of water, by contacting Water Corporation as the regulatory agency responsible for drain performance
 - Accelerated planting of cleared stages where applicable
 - Planting of phreatophytes (deep-rooted plants) along the southern boundary of the site to increase water uptake
 - Installation of groundwater abstraction bores along the southern boundary to decrease groundwater levels if required. The water could be used in dust suppression or to accelerate plant growth in rehabilitated areas.

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6 AUDIT TABLE

Using the Post Assessment Guideline for Preparing an Audit Table (EPA 2012) as a framework the management measures for the sand extraction proposal and details of the requirements, time frames and how and what standard implementation shall occur is summarised in Table 10.

Table 10: Audit table

Subject	Requirement	How	Evidence	Phase	Time frame	Status
Compliance reporting	Prepare and submit an audit program to the Shire of Serpentine Jarrahdale	Prepare an audit program	Provide the Shire with an annual audit	Overall	Annually for the length of the project	
Traffic management	Provide a designated truck route to the Shire of Serpentine Jarrahdale and trucking companies.	Prepare a complaint register. Undertake an induction. The induction will instruct truck drivers on the designated truck route.	<ul style="list-style-type: none"> Completion of the Boomerang Road and Banksia Road intersection upgrade The truck drivers will be required to sign a register following the completion of their induction. A sign at the entry of the Oldbury providing the telephone number and email address for complaints is in place. Complaints register has been undertaken in accordance with the complaints procedure. 	Operation	Annually for the length of the project	
Dust	Prepare a dust monitoring report	Implement three-month dust monitoring program from fixed location dust monitors	Dust monitoring report A sign at the entry of the Oldbury providing the telephone number and email address for complaints is in place. Complaints register has been undertaken in accordance with the complaints procedure.	Operation	Dust monitoring report will be finalised three months from the completion of the dust monitoring	
Noise	Prepare a complaints register	Put into operation the complaints register.	The construction of the earth wall bund for sand extraction Stages 3 and 5. A sign at the entry of the Oldbury providing the telephone number and email address for complaints is in place. Complaints register has been undertaken in accordance with the complaints procedure.	Overall	Annually for the length of the project	
Visual amenity and rehabilitation	Prepare a restoration management plan.	Implement the restoration management plan	Compliance report on the restoration program and finished floor levels.	Overall	<ul style="list-style-type: none"> Annually for the length of the project for finished floor levels. Restoration works will be monitored annually for five years in accordance with the restoration management plan. 	
Urban water management	Prepare a hydrology management strategy plan	Implement the hydrology management strategy plan	Groundwater monitoring reporting	Overall	Annually for the length of the project	

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7 REFERENCES

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