Department of Conservation and Land Management

Dwellingup Disposal Site

Remediation Action Plan

April 2002

Contents

Appendices

1. Introduction

1.1 General

Gutteridge, Haskins and Davey Pty Ltd (GHD) were appointed by the Department of Conservation and Land Management (the Department) in March 2002 (ref. 045976F2002 dated 13 March 2002) to develop a Remediation Action Plan (RAP) for the site remediation of alleged former drum disposal sites at Dwellingup.

The RAP provides details regarding the steps required for site remediation and validation, materials and plant required, monitoring details and appropriate Health and Safety Guidelines.

In January and February 2002, GHD carried out a series of reconnaissance ground geophysical surveys at the alleged former drum disposal sites at Dwellingup. The surveys were carried out at four different localities, referred to as Sites 1-4. Site 1 comprises a small area of partially vegetated Crown Reserve, while Sites 2-4 are located in State Forest. The latter three sites appear to be old borrow pits that have been excavated and then backfilled, possibly following disposal of drums or wastes.

The surveys were carried out to try to pinpoint the location of any shallow buried metallic objects without resorting to widespread excavation and unnecessary degradation of the sites. Details of the survey methods, instrumentation and outcomes are provided in separate GHD reports (refer reference section) for each site.

The surveys mapped a number of geophysical anomalies generally consistent with the presence of shallow buried drums. The eleven priority anomalies were located as follows:

- Site 1 – Crown Reserve 15355 – six priority anomalies
- Site 2 – State Forest 23 – no requirement for clean up (no anomalies)
- Site 3 – State Forest 23 – two priority anomalies
- Site 4 – State Forest 23 – three priority anomalies

The nature of any chemicals within or associated with these drums has not been confirmed by the Department. Mr Peter Ryan of the Management Audit Branch for the Department (pers. comm.) reported that anecdotal information indicates that the drums at some sites may only have contained residues left behind from the cleaning of empty pack sprays. Anecdotal information also points to the possibility that the drums containing chemical residues could have been incinerated and crushed prior to disposal.

There is also some corroborated anecdotal evidence that phenoxy acetic acid herbicides, specifically 2,4,5-T and 2,4-D were used in the area and may be present in the drums. The Department have undertaken a survey of chemicals used previously in the area but this is limited to their functional uses as; herbicides, fungicides, insecticides, fire retardants, sterilants, wood preservatives, fertilisers and rodenticides. Combinations of these chemicals could potentially be deposited in the drums.

1.2 Environmental Legal Requirements

There is currently no specific legislation for site contamination. However, the Environment Protection Act 1986 and its amendments set up the environmental legislative framework in Western Australia. The Department of Environmental Protection (DEP) has the Authority to administer this Act and any regulations and orders made there under. The act is largely concerned with pollution, and would be relevant if a site was considered to be contributing pollution to the environment. Waste disposal is controlled under the Landfill Waste Classification and Waste Definitions 1996, as amended 2001, which were promulgated from the Environmental Protection Act 1986.

WorkSafe WA administers the Occupational Health, Safety and Welfare Act 1998.

1.3 Investigation and Cleanup Guidelines

The two most relevant series of reference documents currently available in Western Australia as regards contaminated sites and related investigations are the:

- The National Environmental Protection (Assessment of Site Contamination) Measure (NEPM) series of schedules.
- The Department of Environmental Protection's Contaminated Sites Management Series (CSMS) publications.

The NEPM was finally promulgated by the National Environmental Protection Council (NEPC) in 1999, after being widely distributed as a proposed draft protocol since 1992. The DEP's Contaminated Sites Management Series will provide local enforcement of these measures and support proposed Contaminated Sites legislation. Schedule B (1) of the NEPM provides general guidance in relation to investigation levels for Soil and Groundwater. Schedule B (9) provides guidelines on the Protection of Health and the Environment During the Assessment of Site Contamination.

The DEP's Contaminated Sites Management Series publications are intended to provide a number of guidelines including;

- Certificate of Contamination Audit Scheme
- Contamination Site Assessment – A General Guideline for Reporting
- Contaminated Site Assessment Criteria
- Contaminated Site Assessment – Guideline for the Development of Sampling and Analysis Programs
- Disclosure Statements
- Guidelines for the Proposed Contaminated Site Auditor Accreditation Scheme
- Planning Guidelines
- Potentially Contaminating Activities, Industries and Land uses

These guidelines allow for site-specific criteria to be developed on the basis of health and environmental risk assessment. However, solely using a risk assessment approach for the Dwellingup case may not be advisable given that there is considerable public sensitivity surrounding the issue. To ensure community acceptance of the investigation and remediation, any

potentially contaminated material will therefore need to be identified, stored, tested and potentially disposed of after classifications of any identified contaminants is completed. All waste material, drums, metal, rubbish associated with the excavation work will also need to be removed and similarly classified and disposed of.

1.4 Sampling, Chemical Testing and Off Site Disposal of Contaminated Materials

Sampling at the sites will be undertaken in accordance with the relevant NEPM and CSMS Guidelines. Samples will be taken of any remaining liquid wastes or chemical residues found in any drums located at the sites, as well as any soils in the immediate vicinity of the drums that show physical signs of contamination. The size of the excavation will be gradually increased until there is no longer any physical evidence of contamination. A set of validation samples will then be collected, which hopefully will confirm that the potential 'zone' of contamination associated with the drums has been reasonably delineated and that, after analysis, the validation set of samples indicates a 'clean' environment. It should be noted that there may be no easy physical way of identifying contaminated soil or material. If this is the case, progress will be slowed by the requirement to wait for analysis results before progressing.

Laboratory analysis of samples taken at the sites will be carried out by a NATA certified laboratory, in accordance with standard contaminated sites testing procedures and protocols. Chemical testing will be undertaken in the light of available anecdotal evidence, or any new evidence that comes to light during the excavations. Chemical tests will be conducted to check for the presence of a broad range of chemical species such as insecticides and herbicides, as well as specific chemicals of possible concern, such as 2,4,5-T and 2,4-D. If 2,4,5-T is identified and the levels are high enough to be of concern, then testing for the possible presence of dioxins will be undertaken.

Following laboratory analysis and verification of the presence of any chemical contaminants associated with the drums or surrounding soils, the materials removed and stockpiled will be classified and disposed of in accordance with the requirements of the Landfill Waste Classification and Waste Definitions 1996, as amended 2001. It is not envisaged, at this stage, that concentrations of any remaining chemicals in the soils at the site would be sufficiently high as to result in a Class IV or higher classification, which would trigger controlled waste regulations and possibly require an assessment of remediation or disposal options.

2. Background Information

2.1 Site Description

The three sites containing the eleven priority areas for investigation are located at varying distances of between 300-800m north west of the town of Dwellingup. The sites are located in a jarrah marri regrowth forest setting that is relatively flat and slopes to the southwest. The locations of the sites with respect to the Caravan Park, roads, access routes, agricultural lands and dams are depicted in Figure 1.

The locations of priority areas were pegged in the field following completion of the geophysical surveys. Survey co-ordinates for the priority areas at Site 1 were collected by the Department but later found to be unreliable. The six priority areas at Site 1 are individually small but highly clustered in a 12m x 20m area (refer geophysical reports for details). These areas can therefore be viewed as comprising a 'single' site from the point of view of planning and managing the excavation and remedial works.

GPS survey co-ordinates for the priority areas at Site 3 (2) and Site 4 (3) were obtained from the Department and were used to define the locations of the areas to be excavated (yellow circles plotted on Figure 1).

2.2 Geology and Hydrogeology

The geology of the area consists of a 4 to 5m layer of massive laterite overlain by pisolitic gravel and lateritised sand. Below the laterite is the granite of the Yilgarn Block.

The surficial gravels and sands can be assumed to have reasonable permeability. The permeability of the underlying laterite is uncertain and can vary from near impermeable to permeable in places, depending mainly on the degree of cementation and/or the presence of weathered and fractured zones transecting the laterites.

The nearest surfacewater body to the sites is the farm dam located approximately 450m to the northwest. It would not be unreasonable to assume that over a long period any significant contamination could reach these water bodies via either surfacewater runoff or shallow groundwater through flow associated with permeable layers within or immediately below the laterite layer.

On a sub-regional scale Dwellingup is located in the upper reaches of Marrinup Brook. There exists a very low probability that any mobile and recalcitrant forms of contamination associated with the sites could eventually migrate to the brook over many years. It is highly unlikely however that the discharge concentrations to any surfacewater bodies would be of any concern.

2.3 Previous Assessments

Shallow soil sampling was undertaken at site 4 in 1992 by the Department. The sampling undertaken did not identify any potential sources of contamination.

Exploratory work using excavators, backhoes or drilling equipment has not yet been undertaken at the investigation sites. Current knowledge on the possible locations of contaminant sources is

based entirely on the available anecdotal information and the results of the geophysical surveys undertaken in January and February 2002 by Landline Geophysics, under contract to GHD.

Landline Geophysics conducted shallow sub-surface reconnaissance electromagnetic surveys of the site and mapped the anomalies identified in Section 1.1. The mapped anomalies are indirect evidence of the presence of buried metallic objects and therefore it cannot be used to ascertain the nature and content of any contaminating material, beyond the verbal evidence of herbicide drum disposal and the corroborating evidence of the geophysical survey, which indicates probable metallic objects buried less than 4m deep.

3. Soil Remediation

Depending on the exact nature of the contaminants found it is unlikely that on-site soil remediation will be undertaken. Rather, any contaminated material will be characterised and disposed of at appropriate landfills or remediated at a less sensitive location.

Potential issues relating to the access, cleaning of vehicles for dieback control, transport, routing, temporary storage and disposal of drums and any contaminated soils will be addressed prior to commencement of any operations.

The dieback control programme will be implemented as part of the remediation strategy plan. The plan will allow for:

- Instruction to the agencies, consultants and contractors, and any other person or organisations involved who will need vehicle access to the site, that they would be responsible for ensuring that their vehicles are appropriately cleaned prior to entering the site.
- Vehicles that will be used on site will be inspected prior to their entry to the site. It is proposed that the lay down area at the Department's Dwellingup office, which is located adjacent to the site, be used for this purpose. A temporary wash down facility will be established in the lay down area in the event that any soil or caked grit is found on the transport vehicles.
- Wash down of vehicles leaving the site will also be undertaken at the temporary wash down facility.

The key task involved to limit the risk of spreading any dieback contamination, while limiting the degradation at the site, will be to correctly delimit areas of contaminated and clean soil so that there is not excessive and unnecessary disposal of soil.

All waste/rubbish of non-chemical nature unearthed during excavation will be removed to an appropriate landfill facility.

With respect to the clean up objectives, the following is considered reasonable;

- All gross contaminants (metal, drums rubbish) will be removed.
- The site will be cleaned to an unrestricted level suitable for residential land use.
- Where detectable contamination is left on site it may be necessary to undertake an environmental risk assessment and if necessary, a health risk assessment.

If contamination of groundwater is found (an unlikely scenario) then this will require further investigation beyond the scope of this remediation action plan.

4. Scope of Work

The following section presents the proposed work plan and technical guidelines for site clean-up/remediation. It should be noted that this work plan deals with environmental issues, therefore a close coordination between the project environmental consultant and the operational personnel is essential. The works are structured in such a way that each element should be completed prior to or in conjunction with the next activity.

4.1 Communications

There is a significant degree of community and public interest in this work. The Department have developed a communications plan and it is essential that due regard is given to ensure information dissemination is appropriate. As such it is important that all communications outside of the project team are coordinated through The Department in order that a comprehensive and up to date position is communicated. All requests for information relating to this project shall be referred to the consultant's project manager who will then refer the matter to the Department. The only exception to this rule is for officers from Department of Environmental Protection, who may be kept informed of progress at all times.

The communications plan developed by the Department identifies the requirement to inform local residents in close proximity to the investigations sites and in particular, staff and residents at the Dwellingup Caravan Park, of the timing and any precautionary measures required prior to and during the remediation works. The Consultant's Environmental Site Manager will also ensure that he/she is familiar with the Department's communications plan and will assist with checking on compliance with the plan before any remediation is undertaken.

4.2 Development of Appropriate Occupational Health and Safety Plan

A project specific OH&S Plan has been developed for the remediation and is included as Appendix A. All personnel working on this site or who are given permission to enter cordoned areas will need to read and sign a copy of the OH&S plan, which will then be kept on the project's Safety Register.

4.3 Identification and Disconnection of Appropriate Services

Prior to undertaking any excavation operations, all services shall be identified and cleared (marked or disconnected). Such services include power, telecommunications, gas, water, sewerage pits and any other underground services. Appropriate marking flags, stakes, lime and/or flagging ribbon will be required for this activity. Although, it is expected that these services will be of limited extent in this area, the above still need to be conducted to avoid any unnecessary damage or health and safety impact.

4.4 Access

Access to Site 3 and Site 4 will be from the Pinjarra – Williams Rd only, as this will ensure that the traffic volumes near the Nursing Post or Caravan Park Units and entrance will not be adversely affected. Access to Site 1 will be off Del Park Rd near the entrance of the Caravan Park.

4.5 Project Staging

The project will be undertaken in a staged approach with priority anomalies on Site 3 and Site 4 being investigated prior to complete excavation and remediation of Site 1, and any of the priority anomalies on Sites 3 and 4 identified as potentially contaminated. This will allow sufficient time to investigate the smaller anomalies, prior to undertaking the excavation at Site 1. The second stage will involve complete excavation, remediation and validation of all sites identified as contaminated.

4.6 Stage 1 – Investigation of Site 3 and 4

Initial exploration of Site 3 and Site 4 will occur in order to allow better planning of remediation requirements and confirm the nature of anomalies at these sites. Site 1 is situated very close to the Del Park Road and entrance to the Caravan Park and will require a larger excavation. To minimise disturbance, the investigation and remediation of this site will occur concurrently in Stage 2.

4.6.1 Establishment of a Perimeter

A site perimeter will be established for each area of interest. The perimeter will be established using trees/star pickets and tape. Appropriate signage at each corner will warn that safety equipment should be worn if passing inside the perimeter. The signs will also warn that the site is subject to an excavation hazard. The perimeter will be sufficiently large to allow for safe movement of excavation equipment and trucks and to allow stockpiling of overburden.

4.6.2 Excavation of Overburden

In order to minimise waste disposal it is important that overburden is excavated carefully and segregated for certification. Therefore a stockpile area for overburden will be established within the perimeter of each site. Overburden should be extracted in a manner that minimises earth removal whilst allowing proper investigation of the anomaly. It is envisaged that a series of trenches will be excavated across the anomaly. When any items are found, further excavation will be stopped and the hole made safe for entry.

4.6.3 Investigation of Drums or other Discrete Items

Following stabilisation of the hole, investigation of any items will proceed with caution and be guided by a scientist located in the hole. Investigation can proceed in a number of ways including;

- Directed excavation by backhoe,
- Manual excavation,
- Hand augering,

- Exploration of the contents of any drums, by dipping – this may require careful drilling of exploration holes using a battery powered drill or suitable alternative.

Any intact drums are not to be moved until any liquid contents have been removed. This may require hand or electrical pumping into a secure vessel and will occur after samples have been taken for analysis.

4.6.4 Stabilisation of exploratory sites

Following extraction of any drums content and collection of soil samples, the exploratory excavation may be stabilised and made safe by replacement of some/all overburden at the discretion of the site environmental engineer. This step is necessary in order confirm the presence of contaminating chemicals prior to undertaking full scale remediation of the site, involving extraction of all contaminated material and stockpiling in bins for validation and determination of disposal options.

4.7 Stage 2 - Remediation

Remediation will occur at site 1 and any anomalies at Site 3 and Site 4 where the presence of contaminated material or drums has been confirmed.

4.7.1 Establishment of a Perimeter

After 4.6.1.

4.7.2 Excavation of overburden

After 4.6.2.

4.7.3 Segregation of contaminated material

It is not clear if all material in any site will be; contaminated to the same level, contaminated with the same material or contaminated at all. Therefore as far as possible material will be segregated into discrete portions for assessment and determination of analytical status. Thus a drum and the soil associated with that drum may be stored separately from other suspect contaminated material from the same hole. The supervising site environmental engineer will make these decisions.

4.7.4 Storage of material

Subject to the provision of sections 4.7.3 and 4.7.5 material will be stored in covered bins and stockpiled at the Department's compound until laboratory analysis results are received and the waste classification status of the material can be determined. No material, known or suspected of being contaminated will be stockpiled at the excavation site or in the open.

Any storage bins used for disposal will be checked for water tightness and covered with tarpaulins or lids to prevent further contamination of the site. Any minor spillages will be cleaned up immediately and disposed of as mentioned above.

4.7.5 Investigation of drums or other discrete items.

After 4.6.3.

4.7.6 Site Validation

All soil/overburden left on site will be validated for the presence of phenoxy acetic acid herbicides.

At sites where soil/ wastes have been removed a validation program will be developed and implemented in order to ensure that the site clean up objectives have been achieved. Prior to implementation of the validation sampling and analysis program, agreement with the Department of Environmental Protection will be sought. This validation stage is part of the regulatory requirement for any clean up work undertaken to ensure that the clean up conducted was successful and achieved its objectives.

The analytes selected shall be decided on the basis of the contaminants identified in any contaminated material, but may include pheoxy acetic acid herbicides, triazine herbicides, metals (including arsenic) and organochlorine herbicides.

4.7.7 Backfilling and Compaction

Once each designated area has been excavated, and validated, the backfilling operation can commence.

Regardless of origin, the backfill material shall be subject to a program of validation sampling. Such a program will be developed to allow for the site-specific needs. As mentioned above, overburden soil sourced from within the site, is to be used for backfilling of excavations (assuming no further contamination is present within the soil).

Compaction will be nominal and effected by on-site machinery.

5. General Operational Procedures

The procedures described in this section are designed to ensure that the excavation, clean up and/or reuse or disposal of material from the Dwellingup sites is performed in a controlled and safe manner with no adverse effects to the surrounding environment.

5.1 General Clean-up Procedures

The following principals shall be adopted for all excavations:

- All personnel involved with the remediation works on the site, as well as site visitors, will be requested to read and sign the Health and Safety Plan.
- No excavation on the site shall commence without approval and hazard clearance of the site from the Project Manager.
- All contractors involved in remediation activities must comply with regulations for the proper storage, transport and disposal of waste in Western Australia, including Controlled Waste and Environmental Protection Regulations.
- No excavation shall be carried out in windy conditions or during steady rain as defined by the Project Manager. If the surface soil is dry and dusty then it must be lightly sprayed with water to prevent any dust occurrence. An appropriate water supply must be present at all times during excavation works.
- An agreed pattern of excavation shall be defined on-site for each area to minimise exposure of the excavator and/or truck to possible contamination.
- Allowance for proper personnel protection and decontamination should be made.
- All excavations shall be undertaken under close supervision of the site supervisor and the project environmental scientist during the entire excavation period.

5.2 Determination of Area for Remediation and Disposal

Defining the initial excavation limits of any contaminated zones will be based on the information obtained from the geophysical assessment. For all areas with contamination the following shall occur:

The perimeter of each excavation area shall be marked out in the field using flagging ribbon by the Environmental Scientist and the Site Supervisor. This shall be done according to sections 4.6.1 and 4.7.1. The resulting contaminated area will be excavated and the perimeter will be extended in all directions if suspected contaminated material is still encountered.

A calibrated photo-ionisation detector (PID) will be used to identify any soils containing volatile organic compounds (VOC's), which may include some chemicals and hydrocarbons. Hydrocarbons are sometimes used to dilute chemicals for spraying.

If high levels of VOC's are encountered or a drum is perforated and the release of VOC's is suspected, then the exposed soils or drums will immediately be covered to reduce air concentrations.

The depth of excavation will be either to;

1. bedrock or competent indurated layer,
2. 5 m, which is the probable upper limit of detection of the geophysical survey and depth of any original excavation.

5.3 Survey

As part of any site validation, the site will be pegged and surveyed to AMG. In areas where contaminated material is not found the locations will be recorded using hand-held GPS.

5.4 Excavation Requirements

- A water cart or water supply must be available for dust control, washing and decontamination purposes at all times while excavating.
- All works shall be carried out to minimise the risk of contaminated material being mixed with uncontaminated material.
- All excavations and loading of trucks shall be undertaken in such a manner that ensures no spillage of contaminated material occurs outside nominated areas or outside the site boundaries. Excavator operators will take care not to overload trucks.
- The excavations shall be carried out in such a manner as to minimise the material excavated to only material that is necessary for the removal of contamination.
- Floaters and large rocks shall be separated and stockpiled for later disposal or replacement if required.
- Any spillage of contaminated material outside of the defined contaminated site shall be promptly reported to the Project Manager and cleaned up.
- To minimise the volume of soil for removal and transport off-site, excavation will initially leave vertical walls and only be stabilised if entrance to the hole is required. Once an area has been declared clean, following sampling and analysis, this excavated area will be backfilled.

5.5 Disposal of Ponded Waters

Any water collected during the excavation of known contaminated soil shall be pumped to holding tanks or directly into tankers for appropriate treatment.

5.6 Transportation Procedures

All materials transported from the site shall conform to the appropriate requirements of the DEP, Main Roads WA, local council and any other relevant authorities. The transportation procedures and conditions to be followed at all times are as follows:

- Controlled waste permit issued by the DEP shall be used for carting and disposal of controlled wastes.
- All trucks transporting impacted wastes will be covered/enclosed to prevent dust emissions.

- Before leaving the contaminated site, trucks transporting controlled waste will be inspected to ensure that no contaminated soil is adhering to the outside of the truck.
- If any spillage of contaminated material occurs along the trucking route it is to be reported immediately to the designated site supervisor who will arrange for it to be cleaned up as soon as possible.
- Haul roads on site are to be maintained to minimise dust. Should any spillage occur, labour, materials and equipment should be available for an immediate clean up of the spill.
- A water cart must be available if dust becomes a problem in dry conditions.

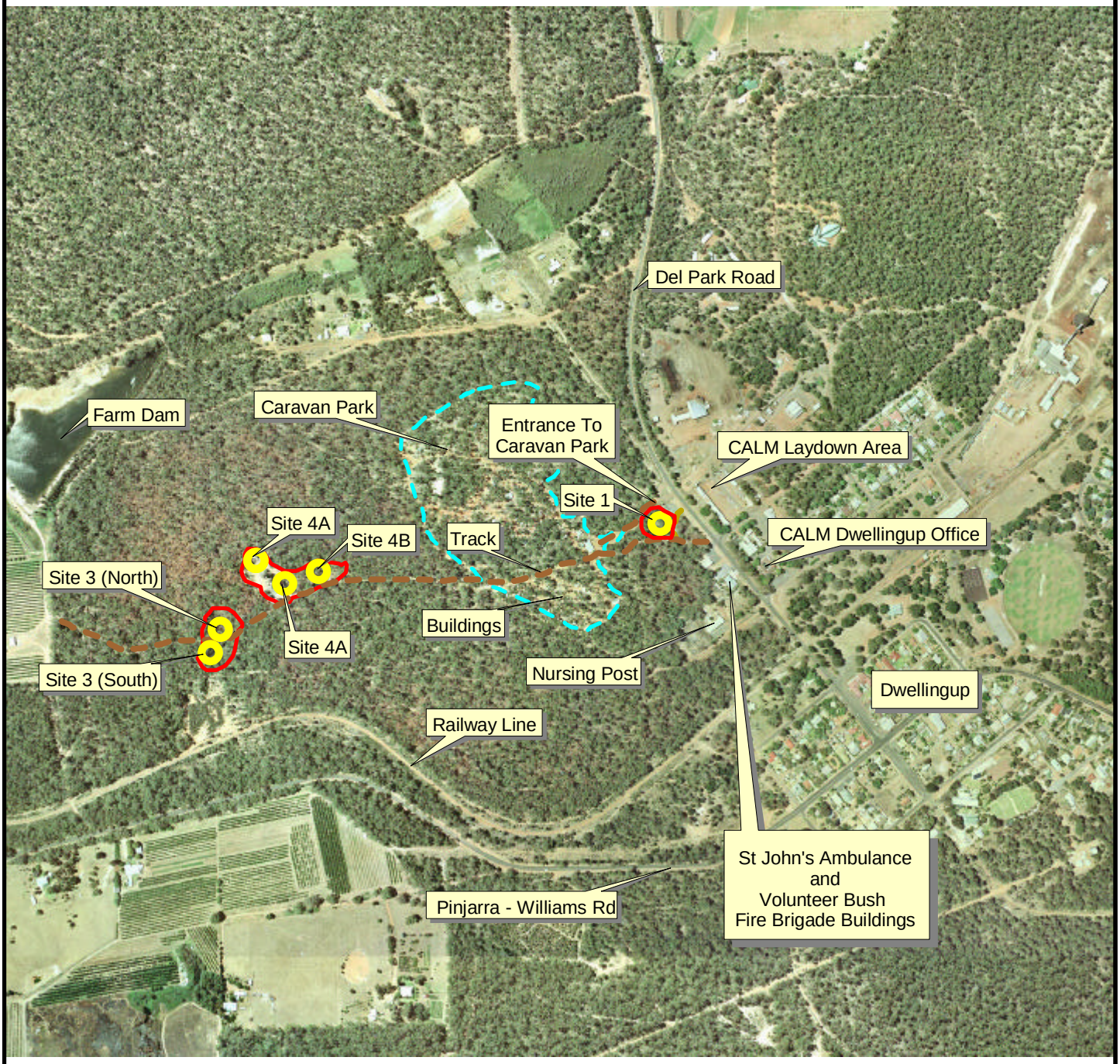
5.7 Monitoring Procedures

Formalised monitoring procedures are not required at this site. A Photo Ionisation Detector (PID) will however be present on site and used where overt contamination indicates that it is suitable for delimiting lower levels of contamination.

Any soils or drums with measurably high levels of VOC's or VOC levels which could potentially result in a health risk, will be immediately covered by uncontaminated soils or soils with low levels of contamination to reduce air concentrations.

Site Locality Plan

N
Grid North



SCALE

200 0 200 400 Meters

Raster

LEGEND

LOCALITY MAP

Western Australia

NOTES
Skyview Image Provided By DOLA And Priority Area Co-Ordinates By CALM

Notes

CHECKED	APPROVED
CG	Robey Chipps
DATE	FILE LOCATION
28/03/02	N:\61\12271\gis\aprs\proj1.apr
REVISION	DRAWING NO / LAYOUT NAME
1	61/12271/A4/FIG1 (Remediation)_Site Plan

GHD

CALM
Dwellingup Investigations
Site Locality Plan
Figure 1

Appendix A

Health and Safety Plan

Personal Protective Equipment (PPE)

The level of PPE is dependant on the occupation of the personnel involved and is detailed as follows:

The *minimum* personal protective equipment (PPE) to be worn by all personal and visitors entering the cordoned site includes an approved hardhat, approved visibility vest and safety boots/shoes.

Personnel working within chemical impacted (or potentially impacted) areas shall also wear:

- Dust mask (P2),
- Disposable overalls,
- Rubber or PVC gloves if expecting to handle chemical impacted soil.

Personnel working with liquids or drum contents should wear half face respirator fitted with fresh cartridges (organic vapour or activated carbon cartridges are suitable).

Within impacted areas the routes of exposure include ingestion and inhalation. Protection against exposure can be achieved by:

- Avoiding contact with chemical impacted soil.
- Preventing dust emissions by keeping the soil damp.
- Wearing the correct PPE.
- Following the decontamination procedures described above.
- Good personal hygiene

Site Services

As indicated in the Remediation Action Plan a site services search (Dial before you dig) will be undertaken prior to excavation. However, if any services are uncovered then the excavation should stop until the nature of the service has been established and documented. Only when it has been clearly established that excavation can undertaken safely will the work be allowed to proceed.

Working Around Heavy Machinery

- Within the cordoned area pedestrians will be instructed to give heavy vehicles right of way.
- Outside of the cordoned area and on the access track, drivers of heavy machinery will be instructed to assume that pedestrians have right of way.
- Pedestrians will be instructed they should not approach heavy machinery unless they are certain that they have been seen by the driver and various protocols will be developed to assure this.
- Areas of soft ground will be appropriately signed.

General

No food or drink will be allowed within the cordoned area except in the cabs of vehicles – driver s will be instructed to wash their hands and remove soiled overalls before eating.

Drivers of vehicles will be instructed not leave their cabs within the cordoned area, unless they are wearing the appropriate PPE.

All work will cease to provide sufficient time before nightfall to allow excavations to be made safe and signage to be put in place.

If heavy dust levels are observed a light sprinkling of water will be applied to avoid potential inhalation and spread of contaminated material.

A clean-fresh water supply will be made available for decontamination, washing and dust control at all times whilst working.

CDMA communications to the site may be required to facilitate managing site operations and ensuring the site remains secure.

Appropriate sun protection, including sun block and/or clothing, and drinking water should be allowed for if any work is undertaken in hot weather conditions.

Appendix B

Validation Soil Sampling Procedures

VALIDATION SOIL SAMPLING PROCEDURES

SOIL SAMPLING PROCEDURES

Soil sample procedures to be used during validation are described in the following sections.

A clean hand auger will be used for the collection of soil samples. The contents of the auger will be carefully transferred to a pre-cleaned glass sample jar.

Equipment Decontamination

Before commencement of operations at any given location, plastic liners will be placed around the sampling location. Equipment will be placed on plastic liners to prevent contact with the ground surface.

To avoid introduction of contamination all sampling equipment used for sampling will be decontaminated before use, between each sample and at the completion of the sampling program.

Following a mud rinse, equipment will be thoroughly cleaned in biologically degradable and phosphorus free detergent water and then rinsed thoroughly with tap water. This will be followed by a rinse with distilled water.

Documentation

Sample Point and Bore Log

A field observation log will be completed by sampling personnel. Details recorded in the log include.

– . Site number.
– . Sampling point number.
– . Soil profile notes.
– . Observations (eg. weather conditions).
– . Sampling method.
– . Sample number.
– . Sample description.
– . Sampling point/bore location measurements.

Sample Labelling

Each sample container will be clearly labelled and marked with indelible ink in the field. The following details are to be recorded on the label.

– . Job number.
– . Sampling date.
– . Site number.
– . Initials of sampler.
– . Sampling point number.
– . Sample number.
– . Sample depth.

– . Comments as required.

The lid is also to be marked with a waterproof marker pen, recording the following details, abbreviated as necessary.

– . Sampling point number.

– . Sample number.

– . Sample depth.

A unique sequential sample number will be recorded in the log and on the labels at the site office.

Samples taken as duplicates are to be labelled without the sampling point number and depth information.

Sample Register

A comprehensive master sample register will be maintained. As samples are received, they are to be given a sequential number from the sample register and the details from the label entered into the register.

Data from the sample register will be entered into a computer database, which will be updated on a daily basis.

SAMPLE PACKAGING AND TRANSPORT

Transmittal Form

Before packing and dispatch of samples for analysis a transmittal form will be completed.

This form will need to record details of the individual samples being despatched as well as the type of analysis required for each individual sample. The form will be cross checked by another staff member before being sent and appropriately signed off.

A copy of the completed transmittal form will be retained on the consultant's file and the original sent with the samples for analysis.

Packaging

Samples will be packed upright in an esky with each sample jar well protected by packaging material or a divider within the box. Ice packs will be inserted in the esky to maintain the samples at approximately $4^{o}C$. The original transmittal form will be enclosed in the esky, which will then be sealed with packaging tape, clearly labelled and addressed to the analytical laboratory.

Transport

Arrangements will be made with a courier to dispatch of the samples to the analytical laboratory as soon as possible after packing and within 18 hours of the samples being collected.

Upon receipt of the samples the analytical laboratory will cross check the samples against the transmittal form and note and report any discrepancies. The transmittal form will then be signed and returned to the consultant for filing.

Gutteridge Haskins & Davey Pty Ltd ABN 39 008 488 373

GHD House, 239 Adelaide Tce. Perth, WA 6004
P.O. Box Y3106, Perth WA 6832
T: 61 8 9429 6666 F: 61 8 9429 6555 E: permail@ghd.com.au

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