



Faith Constructions (NT) Pty Ltd

Lot 3, 110 Freds Pass Rd, Humpty Doo, NT 0836

53X Environmental Audit Report

May 2017



Certificate of Environmental Audit

I, John Throssell of GHD Pty Ltd, 180 Lonsdale Street, Melbourne, a person appointed by the Environment Protection Authority ("the Authority") under the Environment Protection Act 1970 ("the Act") as an Environmental Auditor for the purposes of the Act, having:

1. been requested by Mr Peter Poniris of Faith Constructions (NT) Pty Ltd to issue a certificate of environmental audit in relation to the site located at Lot 3, 110 Freds Pass Road, Humpty Doo, NT 0836, located in the Litchfield Council, comprising the land defined by the Certificate of Title Volume 767 Folio 697 ("the site"), owned by Faith Constructions (NT) Pty Ltd and occupied by Faith Constructions (NT) Pty Ltd.
2. had regard to, amongst other things, -
 - a. guidelines issued by the Authority for the purposes of Section IXD of the Act;
 - b. the beneficial uses that may be made of the site; and
 - c. relevant State environment protection policies/industrial waste management policies, namely: State environment protection policy (Prevention and Management of Contamination of Land) 2002, State environment protection policy (Groundwaters of Victoria) 1997, State environment protection policy (Waters of Victoria) 2003, and Industrial Waste Management Policy (Prescribed Industrial Waste) 2000.
3. in making a total assessment of the nature and extent of any harm or detriment caused to, or the risk of any possible harm or detriment that may be caused to, any beneficial use made of the site by any industrial processes or activity, waste or substance (including any chemical substance); and
4. completed an environmental audit report in accordance with section 53X of the Act, a copy of which has been sent to the Authority and the relevant planning and responsible authority.

HEREBY CERTIFY that I am of the opinion that the condition of site is neither detrimental nor potentially detrimental to any beneficial use of the site.

Other related information

- All imported fill proposed for use at the site must be assessed by a suitably qualified person to confirm its suitability.

This Certificate forms part of environmental audit report: GHD Pty Ltd, titled *Faith Constructions (NT) Pty Ltd. Lot 3, 110 Freds Pass Rd, Humpty Doo, NT 0836. 53X Environmental Audit Report, January 2017*. Further details regarding the condition of the site may be found in the environmental audit report.

DATED: 15 May 2017

SIGNED: ..



MR JOHN THROSSELL

ENVIRONMENTAL AUDITOR

Appointed Pursuant to the Environment Protection Act 1970, and recognised in the Northern Territory under section 68 of the *Waste Management and Pollution Control Act (NT)*.

Certificate of Title

Date Registered: 04/07/2012
Duplicate Certificate as to Title issued? No

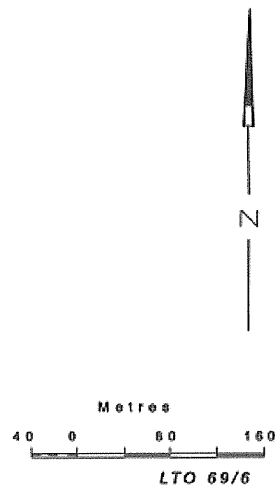
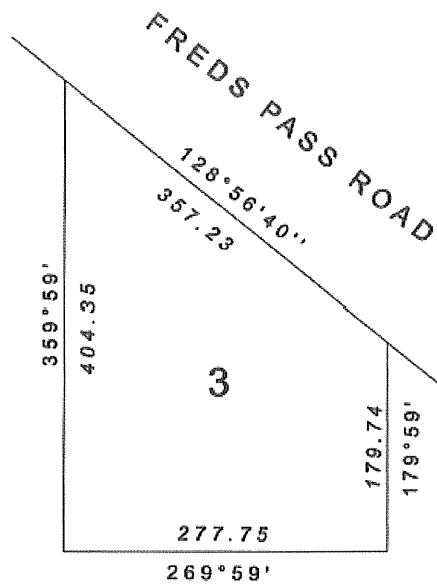
Volume 767 Folio 697

SEARCH CERTIFICATE

Lot 3 Hundred of Strangways from plan(s) LTO69/006
Area under title is 8 hectares 1100 square metres

Owner:
Tolincho Pty Ltd (ACN 158 399 234)
of Unit 20, 16 Charlton Court, Woolner NT 0820

Registered Date	Dealing Number	Description
		Previous title is Volume 736 Folio 174
End of Dealings		



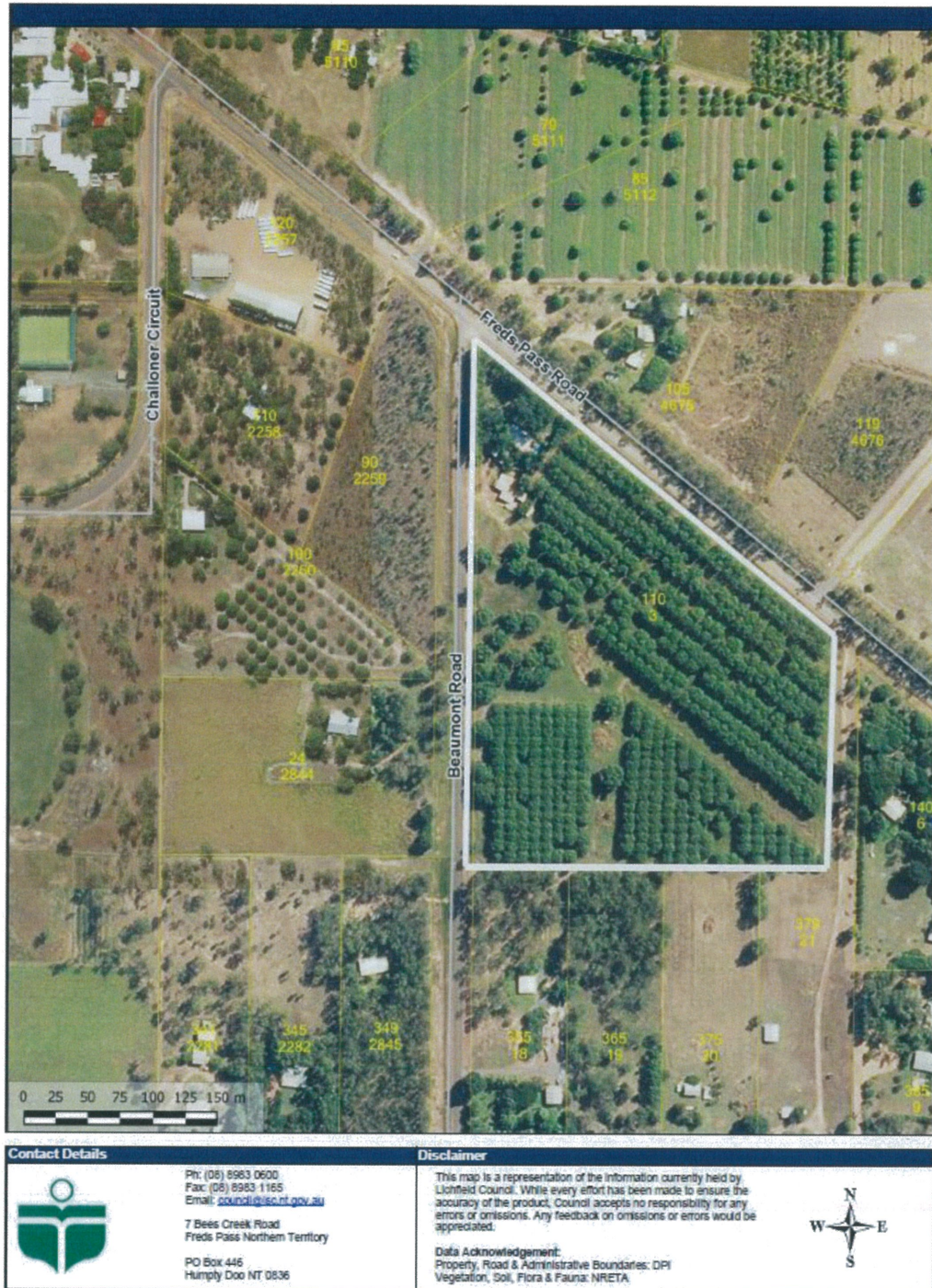


Figure 2 Site Location

Source: Appendix B, DP 2015a



Abbreviations

ANZECC	Australian and New Zealand Environment and Conservation Council
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
EIL	Environmental Investigation Level
EPA	Environment Protection Authority
ESL	Ecological Screening Level
HIL	Health Investigation Level
HSL	Health Screening Level
m	Metres
MAH	Monocyclic aromatic hydrocarbons
mg/kg	milligrams per kilogram
NATA	National Association of Testing Authorities
NEPC	National Environmental Protection Council
NEPM	National Environmental Protection Measure
NHMRC	National Health and Medical Research Council
OCPs	Organochlorine Pesticides
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PID	Photo-ionisation Detector
QA	Quality Assurance
QC	Quality Control
RPD	Relative Percent Difference
SEPP	State environment protection policy
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons (represents extracted biological and petroleum hydrocarbons (TPH) and is the normal laboratory analysis method)



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Appendices

Appendix A - Assessment Guidelines

Appendix B - Report on Preliminary Environmental Site Investigation, Revision 1, Lot 3 Freds Pass Road, Humpty Doo, NT. Apr 2015 (DP Ref: 78156.00, Rev 1)

Appendix C - Report on Detailed Site Investigation, Lot 3 Fred Pass Road, Humpty Doo, NT. Dec 2015 (DP Ref: 78156.01.R.001.Rev2)

Appendix D - Report on Remediation Action Plan, Proposed Residential Subdivision, Lot 3 Freds Pass Road, Humpty Doo. May 2016 (DP Ref: 78156.01.R.003.Rev0)

Appendix E - Report on Remediation and Validation Assessment Single Dwelling (SD) Zone Proposed Residential Subdivision Lot 3 Freds Pass Road, Humpty Doo, NT. Oct 2016 (DP Ref: 78156.02.R.002.Rev0)

Appendix F - Report on Remediation and Validation Assessment Multiple Dwelling (MD) Zone Proposed Residential Subdivision Lot 3 Freds Pass Road, Humpty Doo, NT. Dec 2016 (DP Ref: 78156.02.R.004)

Appendix G - Permission from the client to conduct audit

Appendix H - Photographs: 20 April 2017, Audit Verification Visit

Appendix I - Earthworks Plans

Appendix J - City of Darwin Tip Receipts

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1. Introduction

1.1 Background

The NT EPA requires contaminated sites that may pose serious or material environmental harm as defined in the Waste Management and Pollution Control Act ("the Act") to be assessed in accordance with the requirements for environmental audits in the Act. NT EPA has not published guidance specific to the conduct of environmental audits. In the absence of such guidance, this audit has been carried out generally in accordance with the Victorian environmental audit system, consisting of Part IXD of the Victorian Environment Protection Act, 1970, and the associated policies and guidelines.

This Environmental Audit Report (the 'Report') sets out the findings of an Environmental Audit conducted in accordance with Part IXD of the Environment Protection Act, 1970. The Report was completed in accordance with the guidelines issued by the EPA for environmental audits of contaminated sites.

The subject site, Lot 3 (#110) Freds Pass Road, Humpty Doo, NT (hereafter referred to as 'the site') was formerly used as a market garden and orchard, and is noted for the production of fruit and vegetables.

This report presents the results of detailed environmental site investigation (DSI) which was carried out at Lot 3 Freds Pass Road, Humpty Doo, NT (here in referred to as 'the site'). The investigation was commissioned by Mr Peter Poniris of Faith Constructions (NT) Pty Ltd (Faith), owner of the site, through their appointed agent, Ms Linda Henning of Masterplan (Town + Country Planners).

It is understood that the site will be divided into two zones for future residential subdivision, these being a single dwelling (SD) zone and a multiple dwelling (MD) zone. It is understood that the SD zone will be developed first followed by the MD zone, although, both zones were investigated at the same time.

The assessment of the suitability of the site for the proposed use is subject to an Environmental Audit by a 'Qualified Person' under the Victorian contaminated land auditor system. Mr John Throssell of GHD Pty Ltd ("GHD") was appointed as the Auditor for the project.

The purpose of initiating the audit was due to the proposed development of the site to a more sensitive use. Where potentially contaminated land is proposed to be redeveloped (such as housing on former industrial land), an Environmental Audit is required to satisfy planning permit requirements. Table 1 below presents the details on the appointment of the auditor and details to describe the site. Attached Figure 2 shows the site locality.

Table 1 Details on the appointment of the auditor and site background

Name of Auditor	Mr John Throssell.
Term of appointment of Auditor	8 August 2014 to 7 August 2019
Date Certificate requested	25 September 2014
Owners of the site	Faith Constructions (NT) Pty Ltd
Person requesting a Certificate	Ms Linda Henning of Masterplan (Town + Country Planners). Refer to correspondence in Appendix G for owners authorisation to conduct audit.
Municipality	Litchfield Council

Title Information	Certificate of Title Volume 767 Folio 697. Lot/Plan - Lot 3 / LTO69/006
Zoning	'Residential' purposes, with the northern portion zoned 'Multiple Dwelling Residential' and the southern portion zoned 'Single Dwelling Residential', under the City of Northern Territory (NTPS) Planning Scheme. Refer to report Figure 1 of DP (2015b), Appendix C of this Report.
Address of the Site	Lot 3, 110 Freds Pass Road, Humpty Doo, NT 0836
Current Occupier	Tolinchlo Pty Ltd, operating as Faith Constructions (NT) Pty Ltd
Site Area	81,100 m ² (8.11 ha)
Site Assessor	Douglas Partners Pty Ltd (DP) – 2/14 Caryota Ct, Coconut Grove NT 0810
EPA Reference Number	N/A
Audit Completion Date	15 May 2017

1.2 Input to this report by auditor's support team

The Auditor's expert support team were not involved with this audit.

1.3 Issue of Certificates and Statements of Environmental Audit

The Environmental Audit system provides a mechanism of assuring planning and responsible authorities, prospective purchasers and others that potentially contaminated land is suitable for particular uses. If the contamination status of the site does not preclude any beneficial uses, then a Certificate of Environmental Audit will be issued. If the Auditor is of the opinion that contamination may render a site unsuitable for some beneficial uses, the auditor must issue a Statement of Environmental Audit to that effect.

The Statement will outline the specific uses that will not be compromised by the contamination present at the site, and any conditions or restrictions on activities at the site that may need to be observed.

1.4 Documents reviewed

The following documents have been reviewed for the purposes of this audit and are included in Appendices B through F of this report.

Table 2 Documents reviewed

Author	Date	Document Title
Douglas Partners Pty Ltd	Apr 2015	Report on Preliminary Environmental Site Investigation, Revision 1, Lot 3 Freds Pass Road, Humpty Doo, NT (DP Ref: 78156.00, Rev 1) GHD reference DP (2015a) and (DP, 2015a)
Douglas Partners Pty Ltd	Dec 2015	Report on Detailed Site Investigation, Lot 3 Fred Pass Road, Humpty Doo, NT (DP Ref: 78156.01.R.001.Rev2) GHD reference DP (2015b) and (DP, 2015b)
Douglas Partners Pty Ltd	Dec 2015	Detailed Environmental Site Investigation – Groundwater Conditions, Proposed Residential Development, Lot 3 Fred Pass Road, Humpty Doo, NT (DP Ref: 78156.01.C.002.Rev0) GHD reference DP (2015c) and (DP, 2015c)

Author	Date	Document Title
Douglas Partners Pty Ltd	May 2016	Report on Remediation Action Plan, Proposed Residential Subdivision, Lot 3 Freds Pass Road, Humpty Doo (DP Ref: 78156.01.R.003.Rev0) GHD reference DP (2016a) and (DP, 2016a)
Douglas Partners Pty Ltd	Oct 2016	Report on Remediation and Validation Assessment Single Dwelling (SD) Zone Proposed Residential Subdivision Lot 3 Freds Pass Road, Humpty Doo, NT (DP Ref: 78156.02.R.002.Rev0) GHD reference DP (2016b) and (DP, 2016b)
Douglas Partners Pty Ltd	Dec 2016	Report on Remediation and Validation Assessment Multiple Dwelling (MD) Zone Proposed Residential Subdivision Lot 3 Freds Pass Road, Humpty Doo, NT (DP Ref: 78156.02.R.004) GHD reference DP (2016c) and (DP, 2016c)

1.5 Information about your audit report

This statutory environmental audit report 'Lot 3, 110 Freds Pass Rd, Humpty Doo, NT 0836 - 53X Environmental Audit Report, April 2017' ("Report") has been prepared in accordance with Part IXD of the Environment Protection Act 1970. The Report represents the Auditor's opinion of the condition of the site in relation to the presence and impact of contamination at the site and its suitability for beneficial uses stated in the Certificate of Environmental Audit at the date the Certificate of Environmental Audit is signed. This Report:

1. *has been prepared by Mr John Throssell of GHD Pty Ltd ("GHD") and his team as indicated in the appropriate sections of this Report for Faith Constructions (NT) Pty Ltd;*
2. *may be used and relied on by Faith Constructions (NT) Pty Ltd;*
3. *may be used by and provided to EPA for the purpose of meeting statutory obligations in accordance with the relevant sections of the Environment Protection Act 1970;*
4. *may be provided to other third parties but such third parties' use of or reliance on the Report is at their sole risk because of, and subject to, the uncertainties associated with this audit as noted in the following paragraphs and in this Report; and*
5. *may only be used for the purpose as stated in Sections 1.5 of the Report (and must not be used for any other purpose).*

To the maximum extent permitted by law, all implied warranties and conditions in relation to the services provided by GHD and the Report are excluded unless they are expressly stated to apply in this Report.

The services undertaken by the Auditor and his team in connection with preparing this Report were undertaken in accordance with current profession practice and by reference to relevant environmental regulatory authority and industry standards in accordance with Part IXD of the Environment Protection Act 1970.

The opinions, conclusions and any recommendations in this Report are based on assumptions made by the Auditor when undertaking the audit and preparing the Report. The assumptions are specified throughout this Report.

In undertaking the audit and preparing this Report, the Auditor is required to make judgments regarding the completeness, reliability and accuracy of the information, and the potential for contamination to impact human health and the environment. The Auditor makes these judgments based on the information available, the potential impact of contaminants based on the current scientific understanding of the significance and behavior of contaminants, the specific characteristics of the contaminants matrices and current regulatory policy and legislation. The nature of contaminated site investigations is such that there is always some uncertainty in these matters; as new information can arise, the science underlying these matters can change, and regulatory policy and legislation can change. The Auditor and his team have formed their opinion on the basis of the information available and their understanding of the current science and regulatory policy and legislation, applying processes and considerations in accordance with professional practice. It is possible that new information, a changed scientific understanding or changed regulatory policy and requirements will become available in the future that may lead to a different interpretation. The Auditor and GHD expressly disclaim responsibility for changes that arise because of any such new information, changed science or changed regulatory policy or legislation.

The Auditor and GHD have prepared this Report on the basis of information provided by Faith Constructions (NT) Pty Ltd, assessment consultant and others who provided information to GHD (including Government authorities). The Auditor and GHD have verified the information received to the extent practicable and within the scope specified in the Environmental auditor (contaminated land): Guidelines for Issue of Certificates and Statements of Environmental Audit (EPA Victoria, February 2014). There is some information which it has not been practicable to verify or check, and the Auditor and GHD are not responsible for this information, including (but not limited to) errors in, or omissions from, the Report, which were caused or contributed to by errors in, or omissions from, this unverified information.

The Auditor and GHD are not responsible for the Unverified Information, including (but not limited to) errors in, or omissions from, the Report, which were caused or contributed to by errors in, or omissions from, the Unverified Information.

This Report should be read in full and no excerpts are taken to be representative of the findings of this Report.

2. Assessment guidelines

The NT EPA requires contaminated sites that may pose serious or material environmental harm as defined in the *Waste Management and Pollution Control Act* ("the Act") to be assessed in accordance with the requirements for environmental audits in the Act.

Assessments of site contamination through an integrated framework shared between the NT EPA and the Department of Lands, Planning and the Environment (DLPE). This approach is led by the DLPE through the land use planning and approvals process, with input requested from the NT EPA. The DLPE may request an assessment of site contamination as a condition of a Development Permit when there is a change of land use to a more sensitive use; and/or sensitive use subdivision and there is evidence of current and/or historical potentially contaminating activities.

The assessment of site contamination is conducted in accordance with the *National Environment Protection (Assessment of Site Contamination) Measure* ("the NEPM"). The NEPM establishes a nationally consistent approach to the assessment of site contamination to ensure sound environmental management practices by the community which includes regulators, site assessors, contaminated land auditors, land owners, developers and industry. The NEPM was developed under section 14 of the *National Environment Protection Council Act 1994* has been implemented by participating jurisdictions including the Northern Territory Government.

This Environmental Audit Report sets out the results of a Statutory Environmental Audit for the site. NT EPA has not published guidance specific to the conduct of environmental audits. In the absence of such guidance, the audit has been carried out generally in accordance with the Victorian environmental audit system, consisting of Part IXD of the *Victorian Environment Protection Act, 1970*, and the associated policies and guidelines. The site assessment approach is in accordance with that specified in the National Environmental Protection Measure for Assessment of Site Contamination 1999 (as amended 2013), consistent with the requirements of the *Northern Territory Environment Protection Authority Act 2012 (Act No. 28, 2012)*.

This approach is also consistent with the NT Development Consent Authority (DCA) request for tender for the audit that specified a work requirement that the environmental audit be undertaken to 'confirm the condition of the site and whether it is suitable for the proposed use in general conformance with the "Guidelines for Issue of Certificates and Statements of Environmental Audit", Victorian EPA publication 759b, Version 1.2 June 2002'. It is noted that this has been superseded by publication 759.2 released in February 2014.

2.1 Land use setting

The site is intended to be developed for residential use with gardens and accessible soil. The analytical results from the laboratory testing have been assessed against the investigation and screening levels in set out in Schedule B1 of the *National Environment Protection (Assessment of Site Contamination) Measure, 1999* (amended 2013). Schedule B1 provides general guidance in relation to investigation levels for soil and groundwater in the assessment of site contamination including, where relevant, the soil type and the depth of contamination.

Section 4.3 in Schedule B7b of the NEPM proposes four land use categories representing potential exposure scenarios to soil contamination. These are:

1. Residential
 - Soil accessible; substantial home grown food consumption (with and without poultry)
 - Soil accessible; minimal home grown food consumption (less than 10% of diet)
 - Minimal opportunities for soil access (e.g. high-rise apartments/fully paved flats or units)
2. Commercial / Industrial
3. Parklands / Recreational
4. Agricultural / Horticultural

Further to the land uses described above, the Victorian *State Environment Protection Policy (Prevention and Management of Contamination of Land) 2002*, commonly referred to as the 'Land SEPP', outlines protected Beneficial Uses associated with land uses and provides indicators and objectives for protection of land. The land use categories and relevant beneficial uses to be protected are presented in Appendix A.

In respect to groundwater, under the NEPM Schedule B (6), '*Groundwater is assessed on the basis of its suitability for current or realistic future use*'. In the absence of a viable shallow aquifer, the availability of scheme water, the limited potential for point sources of contamination, and the low mobility of the contaminants identified in association with the historical use of the site (refer to Section 3.5), the Auditor considers that risk to groundwater is negligible.

3. Site definition

3.1 Site physical definition and description

The description and definition of the site are as follows.

Table 3 Site definition and description

Aspect	Comments
Site Locality	The assessor provided site locality plans as Drawing 1 in their reports
GIS Coordinate of Site centroid (GDA94) ¹	
Longitude / Northing	131.107328
Latitude / Easting	-12.580173
Area	The site encompasses an irregular shaped area of approximately 404 m by 278 m, or 81,100 m ² (8.11 ha)
Surrounding Land Use	North: Rural residential allotments, Salvation Army store East: Rural residential with allotments South: Humpty Doo Pre-School, rural residential with allotments West: Rural residential with allotments
Topography	The topography of the local area is generally flat, sloping down slightly toward the south
Vegetation	No vegetation was present at the time of reporting, following a surface remedial soil scrape

This information satisfactorily defines the site for the purposes of the audit.

3.2 Site physical status at audit commencement

The site was formerly a mango orchard, and contained the following infrastructure:

- A concrete slab holding two shipping containers and one demountable shed (north-western corner of the site)
- Double Garage (north-western corner)
- Large shed (northern site)
- Above ground storage tank (AST) (north-western corner)
- Septic tank (north-central site) – removed during the audit process
- Former waste chemical disposal area, including postharvest chemicals (“spent drip”) comprising dilute solutions of dimethoate and Sportak fungicide (DP, 2015b)
- Groundwater bore (RN007082), connected to the above ground water storage tank located in the north-west corner of the site. This bore is operational (north-western corner)
- Groundwater bore (RN009550) (central site)
- Groundwater bore (RN009500) (south-eastern corner)

¹ Coordinates estimated from Google Maps, reference <https://www.google.com.au/maps/place/12%C2%B034'48.6%22S+131%C2%B006'26.4%22E/@-12.580173,131.1064055,18z/data=!3m1!4b1!4m5!3m4!1s0x0:0x0!8m2!3d-12.580173!4d131.107328>.

A plan showing the former site layout is shown in Drawing 4 DP 2015c (Appendix C of this Report) and the attached Figure 2.

3.3 Site physical status at audit completion

At audit completion (time of reporting), the site contained the following infrastructure:

- A concrete slab (north-western corner of the site)
- A water AST (north-western corner), that was fed by the bore RN009550
- Non-operation groundwater bore (RN007082)

All vegetation was removed during soil remedial work (refer to Section 6).

3.4 Proposed site development

With reference to the Northern Territory Planning Scheme (NTPS), the site is zoned 'Residential' purposes. The northern portion is zoned 'Multiple Dwelling Residential', defined as providing '*for a range of housing options to a maximum height of two storeys above ground level*' (DP, 2015b). The southern portion is zoned 'Single Dwelling Residential'.

The proposed site development into a 59 lot residential subdivision. The development will comprise two sections. The northern corner will be developed into several multiple dwelling (MD) lots and the remaining site area will be developed for single dwelling (SD) lots. The proposed development is shown in drawings which are provided in Appendix A of DP's (2015b) Detailed Environmental Site Investigation (DSI).

During the latter stages of the investigation, assessment and validation works for both the area designated for SD development, and also the MD area, were undertaken and reported separately as DP (2016b) and DP (2016c), respectively.

3.5 History of use

The site history review undertaken by the DP included Development Consent Authority Information, personal interviews, a title search, interrogation of council records, and an aerial photograph search. No photographs of the site, prior to 1995, were available. The available photos are presented in Appendix B of DP's (2015b) DSI.

The site history review undertaken by DP indicated that, prior to 1970, the site was likely unallocated crown land and occupied by virgin bushland. Use of the site, at least partially, as a mango orchard may have occurred from 1970; the site is confirmed as having been occupied by a mango orchard from at least 1995, and until sometime between 2012 and 2014, when the trees were removed and the site rezoned to residential land use (the proposed development plans were approved).

Anecdotal information was provided to DP by a representative of Faith (Mr Tony Whear), indicating that at least a part of the site operated as a banana orchard in the 1970s. Tomatoes replaced bananas in the late 1980s, and mangos replaced tomatoes in the early 1990s (DP, 2015a).

Landuse in the surrounding area between 1995 and 2014 comprised orchards, rural residential allotments, and virgin bushland. Presently, a number of commercial premises are located on nearby sites, including Humpty Doo Pre-School (south), a commercial site operated by Shuker Bus Services (north-west), and a Salvation Army store (north-east).

The Auditor considered that the site history investigation was adequate for the purpose of identifying potential contamination at the site. The potential contaminants of concern identified from the site history description are summarised in Table 4. The Auditor notes that no link between potentially contaminating historical or current site activities and any identified off-site receptor has been made by the assessor. In the Auditor's opinion, there may be potential for exchange of wind-blown horticultural sprays between neighbouring orchards and it is also understood that pesticides and herbicides have not been used on the site since 1999.

Table 4 Potential contaminants of concern

Site Activity / Source	Location	Activity description	Timeframe over which activity occurred	Potential Contaminants of Concern
Growing mangoes, bananas and tomatoes	Whole of site	Storage, use and disposal of chemicals for plants and/or fruit, including dimethoate and Sportak fungicide (i.e. OPPs)	40+ years	Pesticides, herbicides, insecticides, and asbestos.
Solvent	North-western corner	Solvent for herbicide and pesticide concentrates	40+ years	Petroleum hydrocarbons
Construction material of former on-site dwelling	North-western corner	Demolition	3+ years	Asbestos containing
Septic system	Central-north and north-western corner	Waste management	40+ years	Nutrients (e.g. phosphorus, potassium, nitrogen), and pathogens

3.6 Site soils and hydrogeology

Based on the investigations conducted by DP, lateritic soils are generally encountered at depths of between 0.5 m and 1 m, becoming increasingly cemented at a depth of approximately 2 m. Siltstone is indicated to underlie the lateritic material, generally at depths greater than 5 m.

The soil and groundwater bore-logs recorded at the site are contained within Appendix B of the assessor's report (DP, 2015b), which is included within Appendix C of this report.

3.6.1 Soils

The assessor indicated that the soils on site generally consisted of:

- Sand to gravel, with minor sand, silt or gravel or with rare clay component, between the ground surface and approximately 1 m depth
- Clayey gravel/gravelly clay between 1 m and approximately 5.5 m deep (5.5 m below ground level represents the deepest intrusive assessment, at location GW/TP28 shown as TP28; refer to Drawing 1 of DP, 2016c)

At the time of reporting, and as part of site remediation (refer to Section 6.2.5), soil (to a maximum depth of 50 mm) was removed from the surface of the entire site (DP, 2016c). A review of test pit logs (Appendix B (DP, 2015b)) indicates that the dominant soil types removed in the scrape to be silty sand and gravelly sand. Removal of the upper 0.5 m of these soils likely exposed soils with a clay and or gravel content greater than the removed material.

3.6.2 Geology and aquifers

With reference to the Noonamah 1:100 000 Geological Series map (Sheet 5172), DP (2015b) infers that the site is underlain by Quaternary age soil deposits laterite gravel and ferricrete. These soil materials overlie early Proterozoic age siltstone, shale and argillite belonging to the Wildman Siltstone Unit. The bore-logs provided by the assessor were consistent with this description (refer to Appendix B (DP, 2015b)).

The site is located within the Howard East Aquifer. The generalised aquifer stratigraphy for the Darwin region is indicated as (DP, 2015b):

- Uppermost aquifer – lateritised profile of the Cretaceous sediments which extends to approximately 30 m in depth
- Intervening aquifer – sandstone developed in the weathered upper profile of the Lower Proterozoic Koolpinyah Dolomite, which extends to between 35 to 45 m (Fell-Smith and Sumner, 2011)
- Lower aquifer – Proterozoic Koolpinyah or Coomalie Dolomite (Fell-Smith and Sumner, 2011)

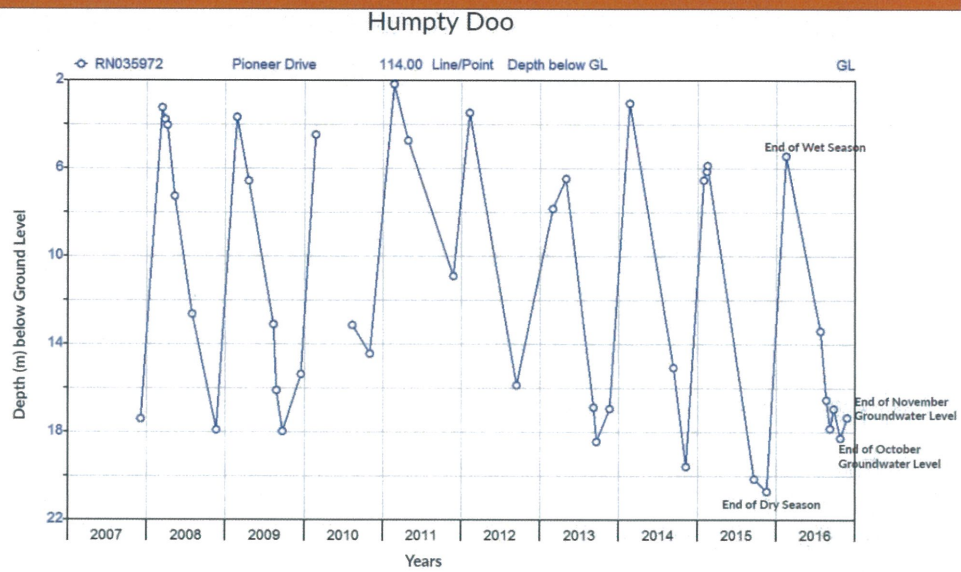
3.6.3 Groundwater flow system

Edwins Creek is located approximately 1 km east of the site and Horns Creek is located approximately 2.5 km south-west of the site. Both creeks drain into the Howard and Elizabeth Rivers, respectively, as shown on Drawing 6 in Appendix A. (DP, 2015b).

The upper surface of the phreatic zone is likely to be within the shallow lateritic horizon, locally the Cretaceous-aged Bathurst Island Group² (Yin Foo, 2004), and within the highest permeability zone, to a maximum of about 12 m depth (DP, 2015b). However, seasonal variations in standing water level (SWL) are likely to be in the order of ± 10 m locally (refer Figure 1).

² Formerly the Bathurst Island Formation.

Figure 1 Hydrograph of Groundwater Level – Humpty Doo



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Online source: https://denr.nt.gov.au/data/assets/pdf_file/0006/368862/Humpty-Doo.pdf. Accessed 16/01/2017

DP (2015a) report that from interrogation of Northern Territory Government Natural Resource Maps, groundwater quality in the vicinity of the site is indicated as suitable for most purposes, and bore yields could be expected to be 0.5 – 15 L/s.

The direction of groundwater flow has not been indicated by the assessor, and groundwater movement within the uppermost lateritic aquifer has not been established.

Groundwater movement in the weathered Dolomite (intervening aquifer) is likely to be from the topographically higher to topographically lower areas and the regional discharge areas are primarily the Howard River and tributaries (Radke *et alia*, 1998).

3.6.4 Groundwater database and groundwater quality

A search of the Northern Territory Natural Resource Maps groundwater database, undertaken by DP (2015a) identified three registered groundwater bores located on the site and 12 registered groundwater bores on the surrounding lots; refer to Drawing 2 of Appendix A (DP, 2015a).

The three on-site bores, confirmed as intact and operational in DP (2015a), are summarised in Table 5. The Auditor notes, however, that some details are contradicted by DP (2015b), which indicates that RN009500 has been “abandoned” (refer to Table 5). The same DP (2015b) Drawing 2 also indicates that a bore, indicated as RN026874, is “no longer operational”; this bore has been misnamed, and is confirmed as RN007082³ (Table 5).

GHD notes that, while bore reference numbers and indicated locations are not consistent across the assessor’s reports, the reference numbers and locations presented in Table 5 have been confirmed by the Auditor.

³ Confirmed online at <http://nmaps.nt.gov.au/>; accessed 18/01/2017

Table 5 On-site bore information (after DP, 2016a)

Bore ID	Location	Use	Installation Date	Indicative SWL / Total Depth
RN007082	Northwest part of site	Production - Farming purposes Not operational	1970	14 mbgl / 85 mbgl
RN009550	Central part of site	Production - Farming purposes Operational	1979	3 mbgl / 55 mbgl
RN009500	Southeast part of site*	Production - Farming purposes Not operational	1979	4.5 mbgl / 60 mbgl

Units as mbgl (metres below ground level).

3.7 Surface water

There are no surface water bodies or feature at, or adjacent to the site. Edwins Creek is located approximately 1 km east of the site, with Horns Creek is located approximately 2.5 km south-west of the site (DP, 2015a).

4. Site investigation activities

4.1 Field investigation summary

4.1.1 On-site investigation

Field investigations were generally carried out in three phases of work. These works, and the sequence of site activities relevant to the environmental audit, are presented in Table 6.

Table 6 Sequence of site activities

Date	Conducted By	Site Activity	Report
23 Feb, 2015	DP	DP site walkover	DP, 2015a
11 Jun – 12 Jun, 2015	DP	Intrusive investigation within SD zone: 21 test pits (TP01 to TP21)	DP, 2015b
12 Jun, 2015	DP	Intrusive investigation within MD zone: 12 test pits (TP22 to TP28, TP30 to TP34)	DP, 2015b
12 Jun, 2015	DP	Background Sampling: One test pit (TP29) and surface-soil samples (S1 and S2)	DP, 2015b
16 Sep. 2016	DP	Borehole installation (GW/TP28) adjacent to a contaminant hotspot, TP28	DP, 2016c
31 Aug – 3 Oct, 2016	DP	<ul style="list-style-type: none"> • Removal of hotspots at TP01, TP20 in SD Zone • Vertical delineation of impacted soil at TP01, TP10, TP17, TP18 and TP20 • Vertical mixing of the upper soil profile to a depth of between 0.3 m and 0.5 m 	DP, 2016b
14 Sep – 5 Nov, 2016	DP	<ul style="list-style-type: none"> • Removal of hotspots at TP26, TP27, TP28 and TP30 in MD Zone • Vertical delineation of impacted soil at TP27 • Vertical mixing of the upper soil profile to a depth of between 0.3 m and 0.5 m 	DP, 2016c
2 Feb – 4 Feb, 2017	Faith	Off-site disposal of contaminated soil	This Report
20 Apr 2017	GHD	Audit team site inspection	This Report

4.1.2 Off-site investigation

One test pit (TP29) soil sample, and two surface soil samples (S1 and S2), were excavated from an off-site location for the assessment of background conditions. Test pit TP29 is shown on Drawing 3 of Appendix A in DP 2015c). The surface samples, S1 and S2, are not indicated on any figure provided.

4.1.3 Auditor verification activities

Auditor's assistant Brendan Selley (Senior Environmental Scientist - Contaminated Sites, GHD Darwin) conducted a site visit on 20 April 2017, with the objective of verifying that the site was clear of all stockpiles and windrows (refer to Section 6.4).

4.2 Field sampling and laboratory testing program

The field sampling and laboratory testing program was designed by the assessor to characterise the natural soils and any fill materials on site. The testing was undertaken by the following laboratories:

- Primary Laboratory: Australian Laboratory Services (ALS), Sydney and Newcastle, NSW
- Secondary (split sample) testing: Envirolab Services (ELS), Sydney, NSW

These laboratories are NATA accredited for the testing undertaken.

The sampling and testing program undertaken by the assessor can be summarised as follows:

4.2.1 Soil

Soil sampling was undertaken at 36 locations, with testing generally conducted between depths of 0.0 (surface sample) and 0.5 m in the various test pits. One or two samples were generally analysed per sampling location, with a total number of 57 soil samples, including inter and intra-laboratory samples, being analysed for the identified potential contaminants of concern (CoPC).

Soil analysis was generally limited to the following:

- Total Recoverable Hydrocarbon (TRH) fractions C₆ - C₁₀ (F1), TRH C₁₀ - C₁₆ (F2), TRH C₁₆ - C₃₄ (F3) and TRH C₃₄ - C₄₀ (F4)
- Organochlorine pesticides (OCPs)
- Organophosphate pesticides (OPPs)
- Phenoxy herbicides
- Asbestos

4.2.2 Groundwater

A groundwater bore GW/TP28 was installed to a depth of 5.5 mbgl at the location of the former insecticide and fungicide disposal location, and also the area of an existing septic system. No water has been found in groundwater bore GW/TP28 since the time of installation (16 September, 2016).

4.3 Adequacy of the assessor's investigation program - soils

The site area is approximately 81,100 m² (8.11 ha). For an area this size, the Australian Standard (AS 4482.1) indicates that such sites usually require sub-dividing into smaller areas for more effective sampling. This has been done by splitting the site in the SD and MD zones; however, the Auditor notes that the area of the SD zone, 6.11 ha, remains greater than the recommended 5 ha limit for the most effective sampling.

4.3.1 SD Zone

A reduced sampling density was undertaken by the assessor, comprising a total of 21 test pits for the 6.11 ha site area, representing about 30% of the minimum number of sample locations outlined in Table E1 of AS-4482.1. This was justified by the assessor on the basis that the SD zone was historically used for the growing of fruit trees and vegetables, and the assumption that the use of agricultural chemicals would have been relatively uniform across the whole of the SD area. Further, no structures occupied the zone, and no other activities other than 'growing' occurring in that area (i.e. limited potential for point sources of contamination). As such, soil conditions would likely be similar across the area.

The Auditor notes that to detect hot spots of contamination of approximately 37 m diameter (refer to Table E1 of AS 4482.1) with a confidence of 95%, 60 sample points arranged in a grid over the site are required. However, given the detail provided in the site history (over time and area), and that the site history did not indicate a high potential for significant contamination, and together with the targeted sampling program, the sampling density was considered appropriate for the purposes of the audit.

Details of the assessment undertaken by DP are included in their reports, which is contained in Appendices A to E of this Report.

4.3.2 MD Zone

DP (2015b) use a similar rationale, to that used in the SD Zone, for selecting the sampling density across the 20,000 m² (2 ha) of the MD Zone. Where Table E1 of AS 4482.1 indicates that 30 samples would allow for 95% confidence in detecting a hotspot of approximately 30 m, DP (2015b) sampled in nine grid locations, or approximately 30% minimum number of sample locations. Two grid locations, TP24 and TP25, also corresponded to areas identified for targeted sampling, assessing a former dwelling and the former septic tank system, respectively.

In addition to the nine grid location, three targeted locations were investigated:

- TP26 and TP27 – former dwelling
- TP28 – former OPP and fungicide disposal location, and also the area of an existing septic system (refer to Section 3.2)

Test pits TP24 to TP28 were excavated on the MD Zone in June 2015. The balance, seven grid-based test pits (TP22, TP23 and TP30 to TP34), were also excavated on the MD Zone in June 2015.

As previously discussed, with the site history not indicating a high potential for significant contamination, and with consideration of the targeted sampling program, the sampling density was considered to be appropriate for the purposes of the audit.

The following Table 7 outlines the relevant information and sections in the Assessor's report.

Table 7 Assessor's site assessment information

Assessment Details	Section in Assessor's Report
Site History	Section 5, DP (2015a) - Appendix B of this Report
Details of Sampling and Analysis	Section 9, DP (2015b) - Appendix C of this Report Section 4, DP (2016b) - Appendix E of this Report Section 4, DP (2016c) - Appendix F of this Report
Field Observations	Section 10, DP (2015b) - Appendix C of this Report Section 5, DP (2016b) - Appendix E of this Report Section 5, DP (2016c) - Appendix F of this Report
Bore-logs	Appendix B, DP (2015b) - Appendix C of this Report Appendix B, DP (2016b) - Appendix E of this Report Appendix B, DP (2016c) - Appendix F of this Report
Site Plans	Appendix A, DP (2015b) - Appendix C of this Report: <ul style="list-style-type: none"> • Drawing 1: Proposed Zones • Drawing 2: Location of Test Pits – SD Zone • Drawing 3: Location of Test Pits – MD Zone • Drawing 4: Site Features (MD Zone) • Drawing 5: Hotspot Locations and Earthworks Plan Overlay
Analytical Results (Summary Tables)	Appendix C, DP (2015b) - Appendix C of this Report Appendix C, DP (2016b) - Appendix E of this Report Appendix C, DP (2016c) - Appendix F of this Report

4.3.3 Summary of assessor's investigation program

The adequacy of the assessor's sampling program can be summarised as follows:

- The range of analytes tested was consistent with the identified 'potential for contamination' (refer Section 6, DP (2015a), the 'conceptual site model', or CSM (Section 8, DP 2015b)), and the considered 'contamination status' of the site (Section 3, DP, 2016a).
- The Auditor notes that, with an adopted sampling density equal to approximately six test pits per hectare, the minimum sized circular hotspot that would be detected at a 95% confidence level would have a diameter of around 48 m. If the sampling density outlined in AS 4482.1 had been adopted (i.e. 15 test pits per hectare) the minimum sized circular hotspot that would be detected at a 95% confidence level would have a diameter of around 30 m. The sampling density adopted by the assessor was equivalent to approximately 30% of the recommended minimum number of sample locations (Table E1 of AS 4482.1), but considered as acceptable in view of the potential risks to identified receptors and given the site history.
- Sample depths, generally between 0.0 (surface sample) and 0.5 m, were considered to be appropriate, with the application of contaminants (pesticides, etc.) likely to be concentrated at the soil surface, to a depth corresponding to the root bundle of orchard trees at the time of planting.⁴

⁴ Anecdotal evidence indicates that pesticides were originally applied to the root-balls of the fruit trees (planting hole drench), in addition to being applied at the surface. All trees (including roots) were removed, and the site surface was partially stripped, between 2012 and 2015 (DP, 2016b).

- The major contaminants of concern, OCP and OPP, are considered to be of relatively low solubility, and therefore low mobility.

In summary, the sampling and analysis program was considered appropriate to identify contamination, as identified in the site history review.

4.4 Adequacy of the assessor's investigation program - groundwater

Prior to undertaking any groundwater investigations, the approach and scope of the groundwater investigation program was discussed with the Auditor. On the basis that:

- there was no shallow aquifer at the site
- the nature of the superficial formations underlying the site
- the low mobility of the identified CoPC
- the absence of any significant point sources of potential groundwater impact

it was agreed that a single groundwater bore GW/TP28 would be advanced to a depth of 5.5 mbgl at the location of the former chemical disposal pit. During drilling, Douglas Partners did not encounter the phreatic zone, noting mostly well- or variably-cemented clayey gravel (laterite) or weathered siltstone (DP, 2016c).

In summary therefore, the absence of groundwater data is not considered to impact site characterisation in respect to any contamination identified in the site history review as

5. Quality review of the site assessment and auditor verification

5.1 QA/QC review

The Auditor has undertaken a review of the Quality Assurance and Quality Control documentation presented by the assessor, and reviewed their procedures to verify the integrity of the data presented. A summary of this review is provided in Table 8 below.

Table 8 Review of QA/QC of the assessment

QA/QC check	Information provided	Auditor's comment
Work Plan	<p>Remediation Action Plan (DP, 2016a), comprising:</p> <ul style="list-style-type: none"> • Description of the site and of the 'contamination status' • Identification of assessment and remediation criteria • Outline of the remediation strategy and work methods • Remediation Environmental Management Plan 	<p>The work plan was adequate for the purposes of the audit. Deviations to the Remediation Action Plan (RAP) were discussed by the assessor in Section of the Remediation and Validation Assessment. The auditor considers the changes to the work plan to be acceptable and meets the overall objectives of the remediation.</p>
Field Procedures	<p>The assessor's standard field procedures were provided in the following appendices:</p> <ul style="list-style-type: none"> • Appendix C (DP, 2015b) • Appendix D (DP, 2016a) • Appendix D (DP, 2016b) 	<p>Sampling methodologies and protocols were reviewed reports and found to be consistent with current industry practice.</p>
NATA accreditation	<p>Laboratory Reports are provided in the appendices of the assessor's reports, as follows:</p> <ul style="list-style-type: none"> • Appendix C (DP, 2015b) • Appendix C (DP, 2016a) • Appendix C (DP, 2016b) 	<p>All reports contain the NATA certification stamp.</p>
QC testing – blind duplicates	<ul style="list-style-type: none"> • TP01 / 0.1 and D1 (DP, 2015b) • TP02 / 0.3 and D2 (DP, 2015b) • TP22 / 0.1 and D4 (DP, 2015b) • TP23 / 0.3 and D5 (DP, 2015b) • TP29 / 0.3 and D8 (DP, 2015b) 	<p>Analysis was undertaken for TRH. All results were less than the recommended range of the calculated RPDs.</p>
	<ul style="list-style-type: none"> • VD/TP10/1.0 and Replicate 3 / 31082016 (DP, 2016a) • VD/TP18/0.5 and Replicate 5 / 31082016 (DP, 2016a) • HSR/TP20/B and Replicate 1 / 31082016 (DP, 2016a) • VM/S6 and 230916Rep1 (DP, 2016a) • VM/S21 and 270916Rep1 (DP, 2016a) • VM/S23 and 270916Rep2 (DP, 2016a) 	<p>Analysis was undertaken for OCPs and OPPs. All results were less than the recommended range of the calculated RPDs.</p>

QA/QC check	Information provided	Auditor's comment
	<ul style="list-style-type: none"> • VM/S25 and 270916Rep3 (DP, 2016a) • VM/S29 and 031016Rep3 (DP, 2016a) • VM/S32 and 031016Rep1 (DP, 2016a) 	
	<ul style="list-style-type: none"> • HSR/TP26/S2 and Replicate 5 / 14092016 (DP, 2016b) • HSR/TP27/B and Replicate 4 / 14092016 (DP, 2016b) • HSR/TP28/S2 and Replicate 1 / 15092016 (DP, 2016b) • HSR/TP28/S3 and Replicate 2 / 15092016 (DP, 2016b) • HSR/TP30/B and Replicate 1 / 14092016 (DP, 2016b) • VM/S40 and Replicate 2 / 28102016 (DP, 2016b) 	<p>Analysis was undertaken for OCPs and OPPs. All results were less than the recommended range of the calculated RPDs.</p>
QC testing – field triplicate (split)	<ul style="list-style-type: none"> • TP03 / 0.3 and D3 (DP, 2015b) • TP29 / 0.1 and D7 (DP, 2015b) 	<p>Analysis was undertaken for TRH. All results were less than the recommended range of the calculated RPDs.</p>
	<ul style="list-style-type: none"> • VM/S29 and 031016Rep4 (DP, 2016a) • VM/S32 and 031016Rep2 (DP, 2016a) 	<p>Analysis was undertaken for OCPs and OPPs. All results were less than the recommended range of the calculated RPDs.</p>
QC – Testing	DSI (DP, 2015b)	<p>Five duplicates and two triplicates were taken for 52 primary samples. Duplicate tests (5/52 or 9.6%) exceed the recommended 5%. Triplicate tests (2/52 or 3.8%) is less than the recommended 5%. In light of the relative homogeneity of the analysed soils, and despite the non-conformance in triplicates submitted for analysis, the number of replicates is adequate for data precision to be evaluated.</p>
	Validation of SD Zone (DP, 2016b)	<p>Nine duplicates and two triplicates were taken for 80 primary samples. Duplicate tests (9/80 or 11.2%) exceed the recommended 5%. Triplicate tests (2/80 or 2.5%) is less than the recommended 5%. In light of the relative homogeneity of the analysed soils, and despite the non-conformance in triplicates submitted for analysis, the number of replicates is adequate for data precision to be evaluated.</p>

QA/QC check	Information provided	Auditor's comment
	Validation of MD Zone (DP, 2016c)	<p>Nine duplicates and two triplicates were taken for 73 primary samples. Duplicate tests (9/73 or 12.3%) exceed the recommended 5%. Triplicate tests (0/73 or 0.0%) is less than the recommended 5%.</p> <p>The assessor elected not to take split replicates during validation on the basis that previous sampling had indicated a good degree of soil heterogeneity, with RPDs within the acceptable limits.</p> <p>While the Auditor does consider the absence of a measure of data accuracy (as opposed to precision) to be a non-conformance, the low concentrations of CoPC, the number of replicates is adequate for data precision to be evaluated.</p>
Laboratory Internal QC	Laboratory reports are provided in the appendices of the assessor's reports.	ALS and ELS performed internal QC with adequate testing and satisfactory results for method blanks, laboratory duplicates and matrix spikes.
Trip and Rinsate Blanks	<p>No trip blanks were taken during the site investigation.</p> <p>No rinsate blanks were taken during the site investigation.</p>	The assessor acknowledges that QA/QC samples were not collected in accordance with the AS4482.1-2005. However, considering the field methods employed, and that the primary CoPC are not volatile, the Auditor agrees that analysis of trip and rinsate samples was not necessary.
Holding times	<p>Certificates of Analysis are provided in the appendices of the assessor's reports.</p> <p>No laboratory Quality Assurance reports were provided by the assessor which indicate compliance with holding time requirements.</p>	No evidence has been presented by the assessor with which to evaluate holding time compliance. However, considering that the primary CoPC are not volatile, no substantial negative bias is expected in the even that holding times were breached.
Sample tracking	<p>No chain of custody record, or COC, was provided for the DSI samples (DP, 2015b).</p> <p>COC records are provided in the appendices of the assessor's reports for both the SD Zone and the MD Zone remediation validation reports.</p>	Where provided, COCs are correctly completed.
Sample preservation and storage	The assessor's standard field procedures were provided.	The standard field procedures specified appropriate sample preservation and storage methods.
Calibration of Field Instruments	No calibrated equipment was used by the assessor, including use of a photo ionisation detector (PID), and therefore no calibration certificates have been provided.	

QA/QC check	Information provided	Auditor's comment
Composite sampling method	Samples were not tested as composites.	
Volatile losses	The assessor's standard field procedures were provided.	The Auditor notes that the primary CoPC are not volatile, and that the assessor's field procedures specify sampling methodologies to minimise the loss of volatiles.
Laboratory detection limits	Laboratory reports are provided in the appendices of the assessor's reports.	The limits of reporting adopted by both the primary and secondary laboratories were suitably low, so as to facilitate comparison of the reported concentrations with the appropriate guideline values.

5.2 Conclusions on QA/QC

Based on current industry practice and relevant guidelines and standards, the Auditor is satisfied that the quality of test results is adequate and therefore the results reported are representative of the composition of the soil on the site.

6. Final condition of the site – soil

6.1 Contamination status of the site prior to remediation

The site has been vacant since December 2015, with the exception of the following structures, all of which were located in the north western corner of the site:

- Above ground water tank
- Underground septic system
- Double garage
- Concrete slab, shipping containers and demountable shed (refer to Drawing 1, Appendix A of DP, 2016a)

The RAP (DP, 2016a) identified the CoPC as including pesticides, herbicides, insecticides, petroleum hydrocarbons (as herbicides and pesticides solvent) and asbestos (demolition of a former on-site dwelling). These contaminants were assessed during the site investigation, with the assessor drawing the following conclusions:

- Asbestos fibres were identified in surface soils from TP28 (refer to Drawing 4, DP (2016c)), located the vicinity of former site dwelling in the MD Zone. An asbestos clearance certificate exists (Appendix B of DP, 2016c) and it is considered likely that the impact is a localised surficial impact arising through the demolition of the former site dwelling.

The potential for asbestos impact at the site was considered to be low following the licensed removal of asbestos prior to demolition of the dwelling.

- Application and disposal of the horticultural chemicals (CoPC) had not taken place for a period of about ten years (i.e. not used during the last period of orchard operation). However, legacy OCP contaminant concentrations were identified exceeding the health investigation levels for residential land use.
- Pesticide (OCP) concentrations at six locations (TP01, TP20, TP26, TP27, TP28 and TP30; refer to Drawing 3 of DP, 2016a) were reported as being greater than 2.5 times the adopted guideline values for human health. Three of the locations (TP01, TP20 and TP30) were indicated to represent statistical outliers in a grid based sampling program. Test pits TP26, TP27 and TP28 comprised targeted location (TP26 and TP27 at the former dwelling, TP28 at the former waste chemical disposal location and existing septic system), and therefore considered contamination “hotspots”.
- Elevated OCPs concentrations (dieldrin and/or heptachlor) were restricted to shallow depths within the soil profile, found generally shallower than 0.5 mbgl, and most commonly in surface or near surface samples (0.0 to 0.1 mbgl).

6.2 Remediation and validation works

The following sub-sections detail the works to action the remedial recommendations of the DSI (DP, 2015b). The specific objectives of the remedial program, as presented in the RAP (DP, 2016a) were to remove shallow soil impacted by OCPs across much of the site, and remove any potential residual asbestos around the location of TP28. Works to remove the remaining septic system were to be conducted in conjunction asbestos remediation.

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6.2.1 Remedial works – asbestos and septic system

During the clearance of trees and structures from the site, between 2012 and 2015, a licensed asbestos removalist removed an asbestos-containing residential dwelling from the MD Zone. During testing of the soils in the MD area of the site, asbestos fibres were identified in a single surface soil sample from test pit TP28. The test pit was a targeted sampling location, situated to investigate an area indicated as a former OPP and fungicide disposal location, and also the area of an existing septic system.

DP (2016a) proposed to remove and validate potentially asbestos-impacted soil at the surface near TP28, during the septic system excavation. The volume of soil to be appraised for the presence of asbestos was indicated as 7.5 m³ (0.3 mbgl by 5 m by 5 m).

The septic system and associated pipework, plus the soil surrounding the pipework, was excavated over an area with approximate dimensions of 2.8 m by 3.2 m (tank) and 6 m by 0.6 m (pipework), both excavations to a depth of 1.2 m (DP, 2016c).

All excavated soils were stockpiled for waste classification. The assessor indicates (DP, 2016c) that both stockpiles, designated ASB and SS, were placed directly on the ground surface with no barrier between the stockpile and underlying soils. The Auditor has noted this as a departure from the management controls outlined in the RAP (DP, 2016a), i.e. placing potentially contaminated stockpiles on an impermeable surface to prevent leaching. Justification for the change in stockpile management protocol, in this instance, was that the underlying soils were yet to be remediated (refer Section 6.2.5), and the principal contaminant of concern was bound asbestos sheeting. Subsequent surface scraping of the area around TP28 and the stockpile footprint (Section 6.2.5) is considered likely to have removed any residual fibre risk.

6.2.2 Validation works – asbestos and septic system

Asbestos validation

Nine validation samples were collected (ASB series; refer Table C1, Appendix C of DP, 2016c); from the base (designated B), the midsection (S1 to S4) of the walls, and from the surface at 1 m from the edge of each side of the excavation (S5 to S8).

Three samples were collected from the asbestos stockpile for waste classification purposes, and were analysed for the following:

- One sample: EPA Publication IWRG 621 Table 2 Clean Fill Screens
- Two samples: OCPs/OPPs and asbestos (presence/absence)

The remaining six ASB series excavation samples were analysed for presence/absence of asbestos.

Three validation samples were collected from the stockpiled ASB material (SP1, SP2 and SP3) and analysed for asbestos. The location of stockpile sampling points is shown on the sketch (Sketch 1) provided with test pit logs in Appendix B of DP, 2016c.

No asbestos sheeting was reported by DP, either in the ACM validation test pit or the resulting stockpile. No asbestos was detected in any validation sample.

Septic system validation

⁵ IWRG 621 Clean Fill Screen comprises the following: metals / metalloids (As, Cd, Cu, Pb, Hg, Mo, Ni, Sn, Se, Ag, Zn), total Cr(VI), total cyanide, total fluoride, speciated phenols (halogenated plus non-halogenated), benzene, toluene, ethyl benzene, total xylenes (BTEX), total recoverable hydrocarbons (TRH), polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB) chlorinated hydrocarbons (volatile plus semi-volatile) and OCPs/OPPs.

Five validation samples were collected (SS series; refer Table C1, Appendix C of DP, 2016c) from soil potentially impacted by the septic tank and pipework. Two samples (S1 and S2) were taken from the mid-section of two excavation faces, with a further three samples (SP1, SP2 and SP3) taken from the excavated material stockpile. The location of stockpile sampling points is shown on the sketch (Sketch 2) provided with test pit logs in Appendix B of DP, 2016c.

6.2.3 Remedial works – OCP hotspots

DP (2016a) proposed to remove soil from identified hotspot areas TP01 and TP20 (refer DP, 2016a), together with TP26, TP27 and TP30 (refer DP, 2016b) to a depth of 0.4 m to 0.5 m over a 5 m by 5 m area, generating approximately 11 m³ of material at each location (refer to Drawing 1 of DP, 2016a).

The Auditor notes that (as detailed in DP, 2016a) DP proposed to excavate down to approximately 0.4 m to 0.5 m below the depth of impact as defined by vertical delineation works at hot spot test pits. Vertical delineation work (DP, 2016b and 2016c) indicated that OCP was present in the near surface soils and to a maximum depth 0.5 m (TP27).

During remedial excavations, the Auditor notes that 'over-excavation' occurred, with soil being removed from depths in the range of 1.5 mbgl (TP26, TP27, TP28) to 1.8 mbgl (TP20). As a result, an estimated 75% of the excavated material would not have had any OCP impact, and the mixing of these soils with the shallow impacted hotspot material would have led to a dilution of contaminants and potential misrepresentation of waste category.

As previously described (Section 6.2.1), all excavated soils were stockpiled for waste classification with no barrier between the stockpile and underlying soils (DP, 2016b; 2016c). The assessor justified this departure from the RAP on the basis that the underlying footprints were yet to be remediated by stripping of topsoil and vertical mixing (refer Section 6.2.5), and that OCPs have a low mobility.

6.2.4 Validation works – OCP hotspots

Twenty validation samples were collected (HSR series) from the base (designated B) and mid-section (S1 to S4) of the walls of the hotspot excavations. These samples were analysed for OCPs/OPPs concentrations. Two further samples (SP1 and SP2) were collected from the stockpiled material at each excavation. Analysis of the two samples collected from each stockpile was conducted as follows:

- One sample analysed for an EPA Publication IWRG 621 Table 2 Clean Fill Screen
- One sample for OCPs/OPPs only

The location of stockpile sampling points is shown on the following sketches:

- TP01 and TP20 – Sketch 1 and Sketch 2, respectively (Appendix B; DP, 2016b)
- TP26 – TP28 and TP30 – Sketches 3, 4, 5 and 6, respectively (Appendix B; DP, 2016c)

The Auditor notes that OCP contamination, was present at the hot spots, to a maximum depth of 0.3 m (DP 2016b and 2016c), with maximum concentrations in the top 0.1 m of the soil profile (refer to Table 7 of DP 2016c). However, validation of the hot spots was conducted at depths of 0.6 to 1.0 mbgl (refer to Appendix B of both DP 2016b and 2016c).

6.2.5 Remedial works – site-wide shallow OCP impacts

Following the removal and validation of hot-spots, the process known as ‘vertical mixing’ was selected by DP (2016a) as the strategy for the management of the elevated OCP concentrations that were identified in surface and near-surface soils across the former orchard area. Remediation was achieved by taking clean soils from depth and mixing with the shallow, impacted soils, to reduce the overall contaminant concentrations throughout the soil profile.

The vertical mixing technique is described Section 5 of the RAP (DP, 2016a), where the assessor also presents evidence for the efficacy of the technique where it has been applied in New South Wales, and also New Zealand, on former broad-acre agricultural land sites proposed for residential development.

The first stage of the mixing process is the stripping of all vegetation and topsoil from the site surface; DP indicated that the ‘stripping’ was undertaken to a maximum depth of approximately 50 mm (DP, 2016c). Material generated through this stripping process was arranged in windrows (refer to Site Photographs: Appendix B, DP 2016c).

In another departure from the RAP (refer to Section 6.2.1 of DP 2016a), the topsoil windrows generated from the stripping of the MD Zone were moved to the already remediated SD Zone, again, with no barrier between the stockpile and underlying soils (DP, 2016b; 2016c). This is considered by the Auditor to represent a poor management of contaminated material, and a potentially contaminating activity. However, on the basis that OCPs have a low mobility, leaching of significant concentrations to the remediated SD Zone surface was not considered likely.

6.2.6 Validation works – site-wide shallow OCP impacts

Following vertical mixing, 32 surface samples plus eight replicates were collected across the SD Zone (DP, 2016a). Twelve surface samples (VMS33 to VMS44) were collected from the MD Zone. All vertical mixing validation samples were analysed for OCP and OPP concentrations.

Stockpile sampling of the scraped soil from the SD Zone was not conducted in strict accordance with the Vic EPA Soil Sampling Guideline (as part of IWRG 702, June 2009) in terms of the location of samples in the stockpiles (refer to Appendix B of DP 2016b for HSR stockpile sampling locations). However, the Auditor considers that the stockpiles are likely to be homogeneous due to the mixing that occurred during the process of grading, windrowing, loading onto side-tippers and unloading into stockpiles.

6.2.7 Re-use of soil and off-site disposal

It was the Auditor’s understanding that the total volume of soil earmarked for removal from the site, including material from both remediated hot-spots and surface-scraping, was estimated to be between 1,840 and 2,940 m³, as follows (DP, 2016b and 2016c):

- SD zone – 80 m³ from hotspots, and between 1,200 to 2,000 m³ from surface scraping (DP, 2016b)
- MD zone – 160 m³ from hotspots, and between 400 to 700 m³ from surface scraping (DP, 2016c)

Twenty stockpile assessment samples were collected from the four hotspot locations following excavation. These were tested for OCPs. The sampling density is noted to be marginally below 'best practise' for volumes in excess of 200 m³. As noted in Section 6.2.3, the Auditor has identified that the over-excavation at the hot spot material has potentially diluted OCPs within the 240 m³ of material excavated from the hotspots, and therefore impacted the classification of soils for off-site disposal. However, while dilution may have occurred, the testing of the material indicated it was suitable for use as landfill capping material at the Shoal Bay Waste Disposal Facility (SBWDF), by the City of Darwin (operators of the facility).

Following testing samples from the surface-scraping of the SD Zone, the assessor indicated a wish to re-use the soil for landscaping in the areas adjacent to Freds Pass Road and Beaumont Road, as shown on the attached marked Earthworks Plans (Appendix I). This was done on the basis that all measured OCP concentrations were below the HIL(A) value and below the waste categorisation criteria for Fill Material, and that the proposed re-use of the shallow SD Zone soil was to be conducted in areas without potential to impact on watercourses. Redistribution of the SD Zone surface soil was conducted in early 2017.

City of Darwin tip receipts indicate that soil removal occurred between 2 and 4 February 2017. The receipts for the disposal of contaminated soil are provided in Appendix J of this report. The Auditor notes that the volume removed, approximately 450 m³, is less than the minimum estimated for the volume of hot spot material and scraped surface soils from the MD Zone (80 m³, 160 m³ and 400 m³; a total of 640 m³).

6.2.8 Importation of fill

Approximately 400 m³ of fill material was imported on to the site to backfill the hotspot excavations. Approximately 100 m³ was required for the SD Zone (TP01 and TP20) and approximately 300 m³ for backfilling in the MD Zone (at TP26, TP27, TP28, TP30 and the septic system excavation).

The material was imported by Earthworks NT Pty Ltd (Earthworks) from virgin ground at its approved Sunday Creek extractive lease (refer to statement in Appendix B, DP 2016c).

Four samples from the imported material were tested, with all samples reporting analyte concentrations below the EPA IWRG 621 Guidelines for 'Fill Material'. The Auditor notes that the number of samples tested was equivalent to 40% of the number of tests recommended in EPA IWRG 702. However, the Auditor concurs with the assessment of the assessor such that reduced sampling did not overly reduce confidence in the suitability of the fill, considering the material was demonstrably from virgin ground.

The Auditor understands that the last stage of the bulk earthworks will include placement of the capping layer upon the MD Zone. It is understood that this final capping procedure is considered by the NT EPA to represent 'site works', rather than 'remediation works'. As a result, and with the current development approval, it is understood that 'site works' cannot take place until remediation works are complete to the satisfaction of said NT EPA.

All imported fill material proposed for use as the capping layer must also be assessed by DP (sampled and tested) to confirm its suitability. It is noted, at this juncture, that the source of fill material is expected to again comprise virgin ground from Earthworks' Sunday Creek extractive lease (see statement in Appendix B, DP 2016c).

6.2.9 Consistency of clean up with regulations

The Auditor finds that the remediation program has been consistent with the intent of the SEPP.

The remediation program has had regard to the waste management hierarchy, with contaminated soil reused on site where possible without unacceptable risks to human health and the environment, and the management of pollution to protect beneficial uses.

The volume (m³) of material reported in City of Darwin tip receipts provided by DP accounts for approximately 70% (450 m³ of 640 m³) of the volume of soil that the auditor understands to have been exported from the site.

6.3 Aesthetics of the site

During the stripping of the topsoil, and the mixing of the upper 0.5 m, no rubble, waste, or aesthetically unacceptable/deleterious materials were evident on the site. In addition, with no volatile/odorous CoPC noted for the site, the Auditor considers that there are no aesthetic issues associated with soil remaining the site.

6.4 Summary of final condition of the site

No contamination remains on-site with concentrations above any adopted guideline.

The Auditor finds that the conditions on the site are suitable for the proposed medium density residential use.

Full summaries of the results of sampling and analysis of soils from the site are contained in the following reports:

- Table C1, Appendix C, DP (2015b) - Appendix C of this Report
- Table C1, Appendix C, DP (2016b) - Appendix E of this Report
- Table C1, Appendix C, DP (2016c) - Appendix F of this Report.

Removal of soil stockpiles was verified by Auditor's assistant Brendan Selley (Senior Environmental Scientist - Contaminated Sites, GHD Darwin) a site visit on 20 April 2017. The site was noted to be level and clear of all stockpiles and windrows. There was some minor surface water pooling within transport corridors. The site surface either remained bare following surface scraping or supported some low regrowth (in the south eastern and central portions of the SD Zone). Photographs from the site visit are presented in Appendix H of this Report.

6.5 Summary of site contamination and protected beneficial uses of the land

On the basis of the final condition of the site, the Auditor considers that there are no beneficial uses precluded by the final condition of the site. As such, the Auditor considers the following beneficial uses to be protected:

- Human health protection
- Maintenance of ecosystems
- Aesthetics
- Buildings and structures
- Production of food, flora and fibre

The beneficial uses of the groundwater and receiving water that are considered by the Auditor to be protected include:

- Maintenance of aquatic ecosystems of receiving water
- Human consumers of food associated with receiving water
- Secondary contact recreation and aesthetics
- Buildings and structures

6.6 Off-site soil contamination

There are no identified contaminant sources or activities undertaken on the site that are likely to have resulted in pollution of the surrounding sites.

7. Groundwater investigation

7.1 Groundwater occurrence

Based on the desk top assessment presented in DP's 2015a report, groundwater characteristics are indicated as follows:

- Flow direction – The direction of groundwater flow was not established by the assessor. Groundwater movement is likely to be broadly northwards, towards the Howard River and tributaries (after Radke *et alia*, 1998)
- Flow rate – The groundwater flow rate was not established by the assessor. Groundwater flow rate
- Depth – The lateritised upper aquifer extends to approximately 30 m in depth, with the highest permeability zone less than 12 m depth (DP, 2015b). Seasonal variations in SWL are likely to be in the order of ± 10 m (DP, 2015b)

A review of the site's history and regional groundwater mapping indicates that no shallow groundwater table is present beneath the site. Three on-site groundwater bores were installed between 1970 and 1979, and their locations are shown on Drawings 2 and 3 of DP's DSI (2015b). These bores are installed to depths of between 55 m and 85 mbgl, with records indicating that the groundwater was encountered at depths greater than 50 m during drilling. Standing water levels have been recorded between 3 mbgl and 14.6 mbgl. These water levels are considered by the assessor to represent a pressurised semi-confined aquifer system at depth. The Auditor concurs with this interpretation.

The absence of a viable shallow aquifer was confirmed by the installation of GW/TP28 in September 2016, to a depth of 5.5 mbgl (refer to DP 2016c, Appendix B for log), and the subsequent failure to detect water in that bore during site visits in late September and early October 2016.

7.2 Groundwater contamination and pollution potential

The former use of the site as an orchard and market garden indicates a potential for groundwater to be polluted from the either applied (production-boosting substances, or pest control) chemicals, and/or polluting agricultural practices, i.e. disposal or storage of those same chemicals.

With the absence of a shallow aquifer, and the relatively low mobility of the indicated CoPC, the Auditor considers that risk to groundwater is negligible.

7.3 Summary of groundwater uses

7.3.1 Beneficial uses

The beneficial uses to be protected for groundwater are dependent upon groundwater quality (level of salinity). Salinity ranges, or Segments are defined in Table 2 of the SEPP (refer to Section 2). With no groundwater recovered from the installed bore GW/TP28, the Auditor has nominated the likely Segment based on the only salinity (measured as concentration of total dissolved solids, TDS) data which is available; that from the 1970s and 1980s. During this period the TDS range across all three bores is in the range of 18 mg/L (bore RN009550 – 01/09/1981) to 93 mg/L (bore RN009500 – 05/01/1979). These data suggest the relevant groundwater Segment is A1 (TDS 0 – 500 mg/L). Table 9 summarises the relevance of protected beneficial uses at the site as Segment A1.

7.3.2 Likely future use

The site is located within the Department of Land Resource Management (DLRM) Darwin Rural Water Control District and, as such, water use is subject to licensing controls. The installation of bores for extractive use requires approval from DLRM and it is understood that applications are reviewed on a case by case basis. Applications are considered on the basis of land use, the availability of reticulated water, and proximity to other groundwater bores. The assessor considers that approval for groundwater use in a medium density residential area is unlikely (DP, 2015c), given possible drawdown effects and flow restrictions from bores located in close pumping proximity to each other, and, the availability of alternative water supplies (i.e. reticulated water).

7.4 Off-site migration of groundwater contamination

The Auditor considers that there no groundwater contamination is likely to be migrating off-site.

7.5 Conclusion on groundwater quality

While the groundwater beneath the site was not directly assessed, groundwater quality is not considered likely to have been impacted by the use of the land for food production.

Table 9 Summary of relevant beneficial uses, pollution and likelihood of being realised

Protected Segment A1 Beneficial Uses	Beneficial Use precluded by pollution?	Pollutants	Likelihood of being realised		Comment
			On site	Off site	
Maintenance of ecosystems	No	None	Unlikely	Unlikely	There are no surface water features on the site. Local streams do not intersect the water table. It is understood that the area is prone to localised flooding which may ultimately discharge to either Edwins Creek, located approximately 1 km east of the site, and Horns Creek, located approximately 2.5 km south-west of the site.
Potable water (Desirable)	No	None	Unlikely	Unlikely	Area has a reticulated urban water supply.
Potable water (Acceptable)	No	None	Unlikely	Possible	There may be some uses for raw water supply in the vicinity of the site, however all identified uses were irrigation based. However, the area has a reticulated water supply.
Mineral water	No	None	Unlikely	Unlikely	Site not located in a mineral water area.
Agriculture, Parks and Gardens	No	None	Existing	Existing	Gardens and other orchards in the vicinity of the site may utilise the groundwater.
Stock watering	No	None	Unlikely	Unlikely	Not consistent with local land use
Industrial use	No	None	Unlikely	Possible	Potable supply available, no known groundwater use beyond agricultural applications.
Primary contact recreation	No	None	Possible	Possible	Groundwater bores may be used to fill or top up swimming pools in this setting, although the use of scheme water or tinkered water is more likely for this purpose.
Buildings and structures	No	None	Unlikely	Unlikely	The depth of the water table makes it unlikely that buildings and structures will be affected by any groundwater pollution.

8. Auditor's assessment of risks at the site

8.1 Beneficial uses potentially impacted by the condition of the site

In its final condition, no soil or groundwater issues are impacting on beneficial uses of the land, as summarised in previous Sections 6.7 and 7.5.

8.2 Evaluation of soil contamination

8.2.1 Health risk to occupiers of the site - soils

The Auditor considers that there are no contamination issues in the context of the proposed use for the site.

8.2.2 Health risk to workers at the site

The Auditor considers that there are no contamination issues in relation to site development, and no specific precautions are required for workers at the site.

8.2.3 Ecological risk of soil contamination

The Auditor considers that there are no contamination issues in the context of terrestrial ecosystems.

8.2.4 Aesthetic risks from soil contamination

The Auditor considers that there are no issues relating to undesirable odour or visual impact at the site.

8.2.5 Risks to buildings and structures

The Auditor considers that there are no contamination issues which impact the use of either steel or concrete in site soils.

8.2.6 Risk in production of food, flora & fibre

In the context of the proposed 'Single Dwelling Residential' and 'Multiple Dwelling Residential' developments, the Auditor considers that there are no contamination issues which impact production of food, flora & fibre.

8.3 Evaluation of groundwater pollution

8.3.1 Use of groundwater

The Auditor considers that there are no contamination issues which impact the use groundwater at the site.

8.4 Health risk to occupiers of the site - groundwater

The Auditor considers that there is no contamination which will impact the proposed use and development plan, or occupiers of the site.

8.5 Health risk to workers at the site

The Auditor considers that there are no groundwater contamination issues requiring specific precautions for workers at the site.

8.6 Aesthetic risks from groundwater contamination

The Auditor considers that there is no risk in respect to odours arising from residual groundwater contamination, nor any visual risk (no hydrocarbon sheen) from hydrocarbon contaminated groundwater at the point of discharge to surface water.

8.7 Risk to site beneficial uses associated with current uses / activities

In the context of the proposed development, the Auditor considers that there is no relevant risk to any ongoing agricultural activity, or risk to future agricultural, commercial or industrial activity.

8.8 Consistency of the proposed development with the condition of the site

The Auditor considers the condition of the site to be consistent with the proposed residential developments.

8.9 Assessment of requirement for further clean up

The Auditor considers that there is no site contamination which requires mitigation or remediation prior to the proposed site use being realised.

8.10 Other information

The Auditor considers that a Certificate of Environmental Audit may be issued, and that a Statement of Environmental Audit (i.e. no statement conditions) is not required.

The following additional information should be noted:

- All soil or fill imported onto the site must be accompanied by quantitative evidence that the material is not detrimental to any beneficial use of the site.

9. Audit conclusions

Following completion of the environmental audit at Lot 3, 110 Freds Pass Rd, Humpty Doo, NT 0836, the following conclusions are provided:

- The QA/QC measures undertaken by the assessor provide confidence that the testing results of the soils and groundwater are representative of the conditions at the site. OK ✓
- There are no beneficial uses of land which are affected by residual contamination in soil and all relevant beneficial uses of land are considered to be protected at the site. OK ✓
- There are no beneficial uses of groundwater which are affected and all relevant beneficial uses of groundwater are considered to be protected at, and hydraulically down-gradient of the site. OK ✓
- The Auditor notes that there were many departures from the agreed RAP, and that poor soil management was a feature of the remediation process which included the dilution of hotspot material, poor selection hot spot validation depths, and inappropriate waste stockpile management (contaminated material placed on a remediated surface). However, despite some of the questionable methodologies employed, the Auditor is satisfied that, in the end, no concentrations of OCP remain on the site that might restrict the land use. INTERESTING
DRI-JR.
- The Auditor is therefore of the opinion that the site is suitable for proposed provision of single dwellings on individual lots, i.e. Sensitive Use (Other), as well as multiple dwelling residences, i.e. Sensitive Use (High Density), and therefore in accordance with the *Environment Protection Act 1970*, and the appropriate policies and guidelines issued by the EPA, a Certificate of Environmental Audit has been issued. OK ✓

These conclusions present a summary of the Auditor's review, to briefly present the basis for conclusions regarding the suitability of the site for the proposed use. The conclusions should be read in the context of the more detailed review and opinions presented in the preceding sections of this Audit Report, and the purpose and limitations of the Report discussion in Section 1. "Lot 3, 110 Freds Pass Rd, Humpty Doo, NT 0836. 53X Environmental Audit Report. January 2017".

DATED: 15 May 2017

SIGNED: _____

MR JOHN THROSSELL

ENVIRONMENTAL AUDITOR

(Appointed pursuant to the Environment Protection Act 1970)

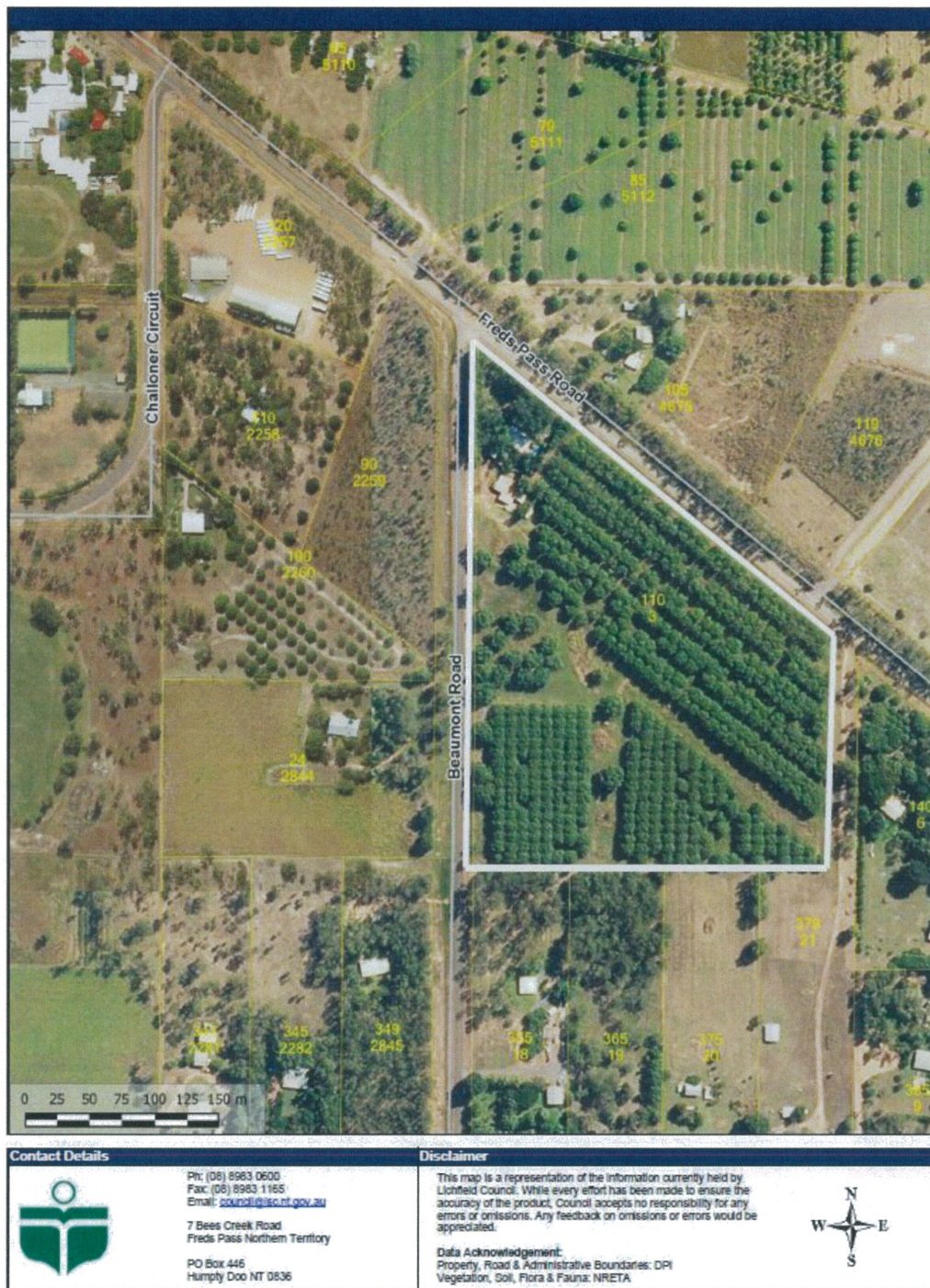
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Figures



Figure 2 Site Location



Visit Council Website: www.litchfield.nt.gov.au

Source: Appendix B, DP 2015a



Appendices



Appendix A - Assessment Guidelines



Appendix B - Report on Preliminary Environmental Site Investigation, Revision 1, Lot 3 Freds Pass Road, Humpty Doo, NT. Apr 2015 (DP Ref: 78156.00, Rev 1)



Appendix C - Report on Detailed Site Investigation,
Lot 3 Fred Pass Road, Humpty Doo, NT. Dec 2015 (DP
Ref: 78156.01.R.001.Rev2)



Appendix D - Report on Remediation Action Plan,
Proposed Residential Subdivision, Lot 3 Freds Pass
Road, Humpty Doo. May 2016 (DP Ref:
78156.01.R.003.Rev0)



Appendix E - Report on Remediation and Validation
Assessment Single Dwelling (SD) Zone Proposed
Residential Subdivision Lot 3 Freds Pass Road, Humpty
Doo, NT. Oct 2016 (DP Ref: 78156.02.R.002.Rev0)



Appendix F - Report on Remediation and Validation
Assessment Multiple Dwelling (MD) Zone Proposed
Residential Subdivision Lot 3 Freds Pass Road, Humpty
Doo, NT. Dec 2016 (DP Ref: 78156.02.R.004)



Appendix G - Permission from the client to conduct audit



Appendix H - Photographs: 20 April 2017, Audit Verification Visit



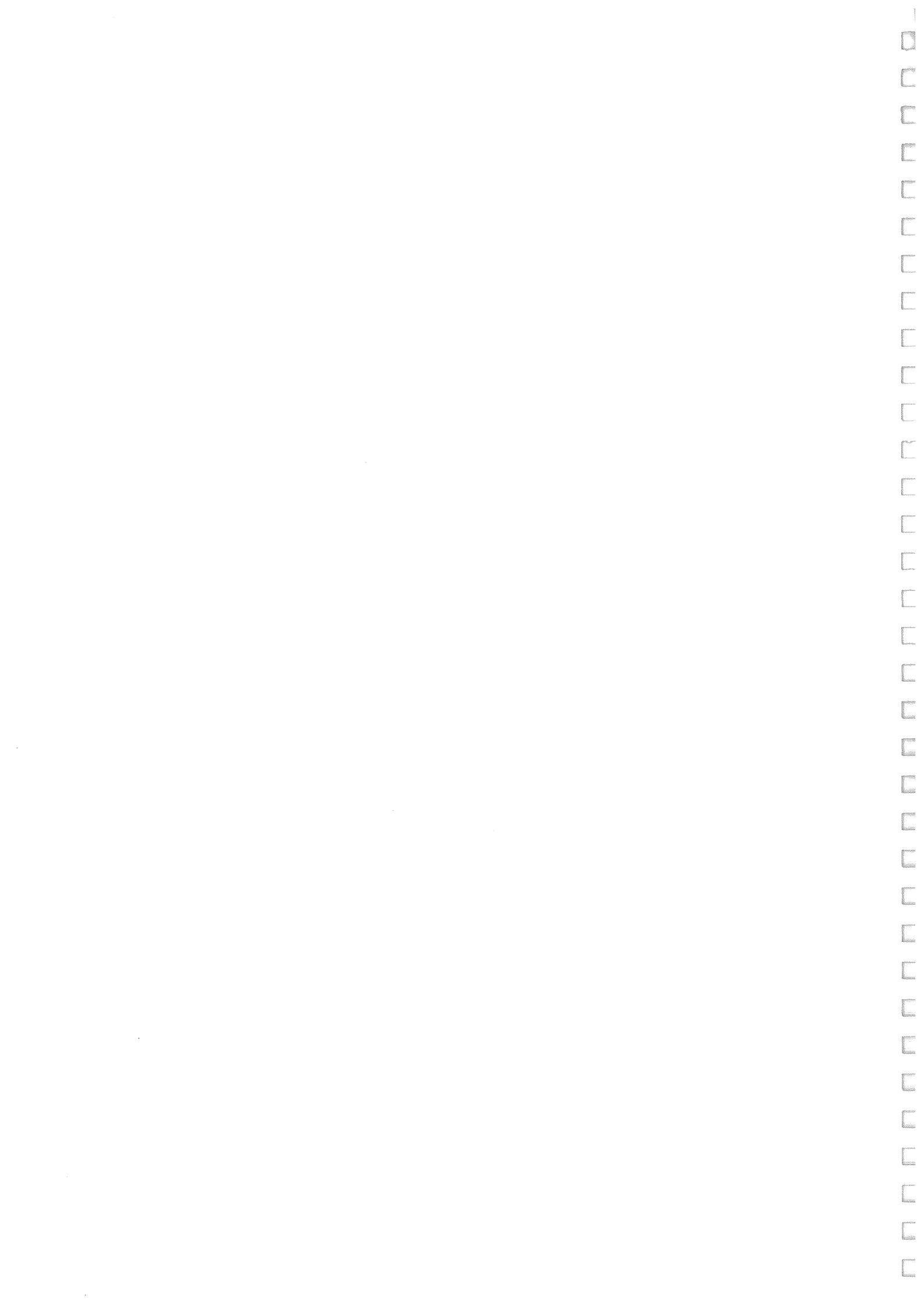
Appendix I - Earthworks Plans



Appendix J - City of Darwin Tip Receipts



Appendix K - Glossary of terms



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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	C Rigby	J Throssell		J Throssell		15/05/17

