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Site Audit

Correctional Facility,
325 Willard Road, Holtze NT

for the Department of Infrastructure,
Northern Territory of Australia

November 2014

J1655.2R-rev0

CMJA

C. M. Jewell & Associates Pty Ltd

Site Audit
Correctional Facility, 325 Willard Road, Holtze NT

November 2014

J1655.2R-rev0

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CHRIS JEWELL
Auditor

NSW Site Auditor Scheme
SITE AUDIT STATEMENT

A site audit statement summarises the findings of a site audit. For full details of the site auditor's findings, evaluations and conclusions, refer to the associated site audit report.

This form was approved under the* Contaminated Land Management Act 1997 *on 31st October 2012. For more information about completing this form, go to Part IV.

PART I: Site audit identification

Site audit statement no. NT01

This site audit has been carried out in accordance with Section 47d of the *Waste Management and Pollution Control Act 1998* (NT) and is a **statutory audit**~~/non-statutory audit~~* within the meaning of the *Contaminated Land Management Act 1997* (NSW).

It has been carried out in accordance with the general principles for undertaking site audits set out in Part 4 of the *Contaminated Land Management Act 1997* (NSW) and the *Guidelines for the NSW Site Auditor Scheme* (2nd Edition) 2006.

This site audit has also had regard to:

- The *National Environment Protection (Assessment of Site Contamination) Measure 1999*, and
- Advice provided by the Northern Territory Environment Protection Authority.

Site auditor details (as accredited under the *Contaminated Land Management Act 1997*)

Name:	Christopher Jewell	Company:	C. M. Jewell & Associates Pty Ltd
Address:	1/13 Kalinda Road		
	BULLABURRA NSW	Postcode:	2784
Phone:	02 4759 3251	Fax:	02 4759 3257

Site details

Address: 325 Willard Road,

HOLTZE NT Postcode: 0829

Property description *(attach a list if several properties are included in the site audit)*

The site is identified as part of Section 6222 in the Hundred of Bagot

Local Government Area: Litchfield Council

Area of site: approximately 126 Hectares

Current zoning: Community Purpose under the Northern Territory (2013) Planning Scheme for the Darwin Region

To the best of my knowledge, the site ~~is/~~**is not*** the subject of a declaration, order, agreement, proposal or notice under the *Contaminated Land Management Act 1997* or the *Environmentally Hazardous Chemicals Act 1985.*

~~**Declaration/Order/Agreement/Proposal/Notice* no(s)** .....~~

.....

Site audit commissioned by

Name: Mr Stephen Hoyne

Company: Department of Infrastructure

Address: PO Box 61, PALMERSTON, NT 0831

Phone: 08 8999 4415 **Fax**: 08 8999 4682

Name and phone number of contact person (if different from above)

Mr David West, Department of Correctional Services – 08 8999 3617

Purpose of site audit

☑ A. To determine land use suitability *(please specify intended use[s])*

Agricultural and horticultural use, including producing food for human consumption, associated with a correctional facility

OR

☐ ~~B(i) To determine the nature and extent of contamination, and/or~~

☐ ~~B(ii) To determine the appropriateness of an **investigation/remedial action/management plan***, and/or~~

☐ ~~B(iii) To determine if the land can be made suitable for a particular use or uses by implementation of a specified **remedial action plan/management plan*** *(please specify intended use[s])*~~

.....

Information sources for site audit

Consultancy(ies) which conducted the site investigation(s) and/or remediation:
Greencap Ltd (formerly AEC Environmental Pty Ltd)

Title(s) of report(s) reviewed:

- Preliminary Site Investigation, Correctional Facility, 325 Willard Road, Holtze, NT, prepared by AEC Environmental Pty Ltd (ref. J125116/01), dated March 2014
- Additional Investigation Works, Department of Correctional Services, Holtze Correctional Facility, prepared by Greencap Ltd (ref. J125116), dated 4 September 2014

Other information reviewed (including previous site audit reports and statements relating to the site):

- Regional geological and topographic mapping
- Regional hydrogeological data

Site audit report

Title: Correctional Facility, 325 Willard Road, Holtze NT
Report no. J1655.2R-rev0 Date: 7 November 2014

PART II: Auditor's findings

Please complete either Section A or Section B, **not** both. *(Strike out the irrelevant section.)*

Use Section A where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land use(s).

Use Section B where the audit is to determine the nature and extent of contamination and/or the appropriateness of an investigation or remedial action or management plan and/or whether the site can be made suitable for a specified land use or uses subject to the successful implementation of a remedial action or management plan.

Section A

☑ **I certify that, in my opinion, the site is SUITABLE for the following use(s)** *(tick all appropriate uses and strike out those not applicable)*:

- ☑ Residential, including substantial vegetable garden and poultry
- ☑ Residential, including substantial vegetable garden, excluding poultry
- ☑ Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry
- ☑ Day care centre, preschool, primary school
- ☑ Residential with minimal opportunity for soil access, including units
- ☑ Secondary school
- ☑ Park, recreational open space, playing field
- ☑ Commercial/industrial
- ☑ Other *Agricultural and Horticultural use, including producing food for human consumption, associated with a correctional facility*

~~**subject to compliance with the following environmental management plan** *(insert title, date and author of plan)* **in light of contamination remaining on the site:**~~

.....

.....

~~**OR**~~

☐ ~~**I certify that, in my opinion, the site is NOT SUITABLE for any use due to the risk of harm from contamination.**~~

Overall comments

The Auditor recommends that:

- Any soil that is removed from the site should first be appropriately classified in accordance with the waste classification guidelines applicable at that time.
- Any soil (including topsoil) that is imported to the site should first be assessed as being suitable for use on the site.
- Groundwater should not be extracted for any purpose without appropriate assessment.

**** Strike out as appropriate***

Section B

Purpose of the plan[1] which is the subject of the audit .....

.....

I certify that, in my opinion:

☐ **the nature and extent of the contamination HAS/HAS NOT* been appropriately determined**

AND/OR

☐ **the investigation/remedial action plan/management plan* IS/IS NOT* appropriate for the purpose stated above**

AND/OR

☐ **the site CAN BE MADE SUITABLE for the following uses** *(tick all appropriate uses and strike out those not applicable):*

- ☐ Residential, including substantial vegetable garden and poultry
- ☐ Residential, including substantial vegetable garden, excluding poultry
- ☐ Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry
- ☐ Day care centre, preschool, primary school
- ☐ Residential with minimal opportunity for soil access, including units
- ☐ Secondary school
- ☐ Park, recreational open space, playing field
- ☐ Commercial/industrial
- ☐ Other *(please specify)* .....

if the site is remediated/managed* in accordance with the following remedial action plan/management plan* *(insert title, date and author of plan)*

.....

.....

.....

.....

subject to compliance with the following condition(s):

.....

.....

.....

[1] For simplicity, this statement uses the term 'plan' to refer to both plans and reports.

**** Strike out as appropriate***

~~**Overall comments**~~

PART III: Auditor's declaration

I have carried out this site audit in accordance with Section 47d of the *Waste Management and Pollution Control Act 1998* (NT).

I am accredited as a site auditor by the NSW Environment Protection Authority under the *Contaminated Land Management Act 1997* (Accreditation No. 9810).

I certify that:

- I have completed the site audit free of any conflicts of interest as defined in the *Contaminated Land Management Act 1997,* and
- with due regard to relevant laws and guidelines, I have examined and am familiar with the reports and information referred to in Part I of this site audit, and
- on the basis of inquiries I have made of those individuals immediately responsible for making those reports and obtaining the information referred to in this statement, those reports and that information are, to the best of my knowledge, true, accurate and complete, and
- I have not included in my audit report information that I know or suspect to be false or misleading and I have not failed to include in my audit report information that I know to be relevant, and
- this statement is, to the best of my knowledge, true, accurate and complete.

I am aware that there are penalties under the *Contaminated Land Management Act 1997* for wilfully making false or misleading statements.

Signed ..... Date 7 November 2014

PART IV: Explanatory notes

To be complete, a site audit statement form must be issued with all four parts.

How to complete this form

Part I identifies the auditor, the site, the purpose of the audit and the information used by the auditor in making the site audit findings.

Part II contains the auditor's opinion of the suitability of the site for specified uses or of the appropriateness of an investigation, or remedial action or management plan which may enable a particular use. It sets out succinct and definitive information to assist decision-making about the use(s) of the site or a plan or proposal to manage or remediate the site.

The auditor is to complete either Section A or Section B of Part II, **not** both.

In **Section A** the auditor may conclude that the land is *suitable* for a specified use(s) OR *not suitable* for any beneficial use due to the risk of harm from contamination.

By certifying that the site is *suitable*, an auditor declares that, at the time of completion of the site audit, no further remediation or investigation of the site was needed to render the site fit for the specified use(s). Any **condition** imposed should be limited to implementation of an environmental management plan to help ensure the site remains safe for the specified use(s). The plan should be legally enforceable: for example a requirement of a notice under the *Contaminated Land Management Act 1997* (CLM Act) or a development consent condition issued by a planning authority. There should also be appropriate public notification of the plan, e.g. on a certificate issued under s.149 of the *Environmental Planning and Assessment Act 1979*.

Auditors may also include **comments** which are key observations in light of the audit which are not directly related to the suitability of the site for the use(s). These observations may cover aspects relating to the broader environmental context to aid decision-making in relation to the site.

In **Section B** the auditor draws conclusions on the nature and extent of contamination, and/or suitability of plans relating to the investigation, remediation or management of the land, and/or whether land can be made suitable for a particular land use or uses upon implementation of a remedial action or management plan.

By certifying that a site *can be made suitable* for a use or uses if remediated or managed in accordance with a specified plan, the auditor declares that, at the time the audit was completed, there was sufficient information satisfying guidelines made or approved under the CLM Act to determine that implementation of the plan was feasible and would enable the specified use(s) of the site in the future.

For a site that *can be made suitable*, any **conditions** specified by the auditor in Section B should be limited to minor modifications or additions to the specified plan. However, if the auditor considers that further audits of the site (e.g. to validate remediation) are required, the auditor must note this as a condition in the site audit statement.

Auditors may also include **comments** which are observations in light of the audit which provide a more complete understanding of the environmental context to aid decision-making in relation to the site.

In **Part III** the auditor certifies his/her standing as an accredited auditor under the CLM Act and makes other relevant declarations.

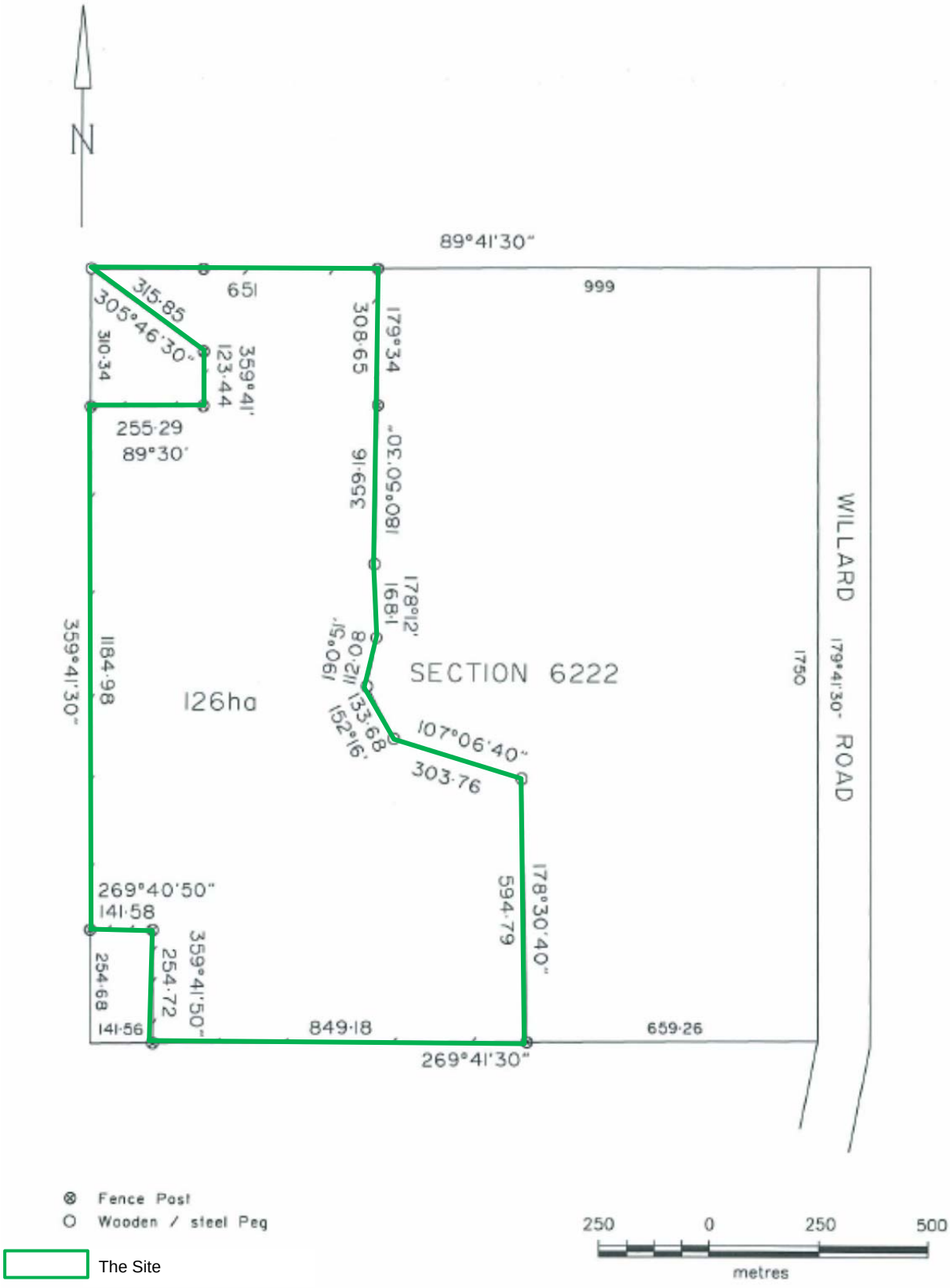
Where to send completed forms

In addition to furnishing a copy of the audit statement to the person(s) who commissioned the site audit, statutory site audit statements must be sent to:

EPA (NT)
Contaminated Sites Section
GPO Box 3675, Darwin NT 0801
eia@ntepa.nt.gov.au

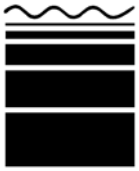
AND

the **local council** for the land which is the subject of the audit.



Source: NT Department of Lands, Planning and Environment

Site Audit Report



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Additional Investigation Works, Department of Correctional Services, Holtze Correctional Facility, prepared by Greencap Ltd (ref. J125116), dated 4 September 2014

List of Abbreviations

Measures

m^2	square metre
mg/kg	milligrams per kilogram
mg/L	milligrams per litre

General

ACM	asbestos containing materials
AEC	AEC Environmental Pty Ltd
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure 1999
CMJA	C. M. Jewell & Associates Pty Ltd
DP	deposited plan
DQI	data quality indicators
DQO	data quality objectives
EIL	ecological investigation levels
EPA	Environment Protection Authority
NTG	Northern Territory Government
PSI	preliminary site investigation
PQL	practical quantitation limit
QA	quality assurance
QC	quality control
SAS	site audit statement
SAR	site audit report
TDS	total dissolved solids

Analytes

BTEX	benzene, toluene, ethylbenzene, xylene
OCP	organochlorine pesticides
PAH	polycyclic aromatic hydrocarbons
TRH	total recoverable hydrocarbons

1.0 INTRODUCTION

1.1 Background

This Site Audit Report relates to part of the land located at 325 Willard Road, Holtze, in the Northern Territory (the property). The location of the property is shown on Figure 1, and its layout is indicated on Figure 2.

As at the date of this report, the property is in the final stages of being developed for use as a Correctional Facility.

This Site Audit relates to a portion of the property that is to be used, once cleared, for agricultural and horticultural activities, including production of food for human consumption. The area of the property that is the subject of this Site Audit is indicated on Figure 3.

As at the date of this report, the description of 'the site' is part of Section 6222 in the Hundred of Bagot, and the owner is the Department of Correctional Services, Northern Territory of Australia.

The Site Audit that this report describes was requested on 15 July 2014 by Mr Stephen Hoyne of the Department of Infrastructure for the purpose of complying with s47 of the *Waste Management and Pollution Control Act* 1998 (NT).

The Site Auditor proposed and undertook the Site Audit in accordance with the requirements of the *Contaminated Land Management Act* 1997 (NSW) (the Act), with the governing legislation being the *Waste Management and Pollution Control Act* 1998 (NT). The Auditor considered the Site Audit to be a statutory Site Audit under the provisions of Section 47 of the Act.

This audit was conducted for the purpose of determining the matters that are listed below (using the terminology and numbering of Section 4 of the Act):

(i) the nature and extent of any contamination of the land,

(ii) the nature and extent of any management of actual or possible contamination of the land,

(iii) whether the land is suitable for any specified use or range of uses,

The Site Audit Report has been prepared in accordance with the guidelines issued by the NSW Environment Protection Authority[1] (EPA), in *Guidelines for the NSW Site Auditor Scheme*, 2nd edition, 2006. It has been prepared by Christopher Jewell, who is a Site Auditor accredited under the NSW *Contaminated Land Management Act* 1997.

The Site Audit relates to the assessment and investigation work completed by AEC Environmental Pty Ltd (AEC)[2].

In order to observe and verify, as far as practicable, the site conditions and the progress of the work being audited, the Site Auditor has visited the site.

[1] Being the NSW statutory body responsible for regulation pursuant to the *Contaminated Land Management Act* 1997.

[2] During the project, AEC changed its name to Greencap.

1.2 Scope and Structure of the Site Audit Report

Section 2 provides:

- Basic identification and location information concerning the site.
- An indication of the layout, topography, drainage, geology and hydrogeological setting of the site, together with an overview of its history.
- A list of any known or potential contaminant sources, and the associated primary contaminant groups of concern.
- An outline of the intended use of the site, and the associated assessment criteria.

Section 3 provides an overview of relevant work completed by AEC and it includes the Auditor's evaluation of the quality of the associated data.

Section 4 presents an assessment of the completeness and adequacy of the information provided and the standard of reporting. The assessment was carried out against the criteria established by the NSW EPA publication, *Guidelines for the NSW Site Auditor Scheme*, 2nd edition 2006, but also incorporates the reviewer's own judgement; reference has been made to other guideline publications issued or endorsed by the NSW EPA, including *Guidelines for Consultants Reporting on Contaminated Sites* 2011 and the *National Environment Protection (Assessment of Site Contamination) Measure* 1999, as appropriate.

Section 5 provides the Auditor's assessment with regard to, in particular, any remaining risks to human health, structures and the environment; regulatory compliance; possible contaminant migration; and any requirement for short or long-term management.

Section 6 presents the Auditor's opinion of the adequacy of the investigation work that has been completed, and it discusses the Site Audit Statement (SAS) that he has issued. A copy of the SAS is attached to this report.

Appendix A provides a list of the individual compounds that make up the primary contaminant groups of concern (that are listed in Section 2).

Appendix B provides, on CD, copies of AEC's associated reports.

Appendix C provides a copy of the Auditor's assessment of AEC's use of data quality objectives (DQO), data quality indicators (DQI) and quality assurance/quality control (QA/QC) procedures.

Notes:

1. Within this Site Audit Report extensive use has been made of the AEC reports. Specifically, sections of those reports have been adopted for use in this report.
2. For a more detailed description of the layout, topography, drainage, geology, hydrogeology and history of the site – and of the associated work that has been completed – reference should be made to the AEC reports.
3. Copies of all other associated documents (e.g. letter reports, supporting documentation, and communications) that were generated by AEC and the Auditor during the course of this audit, are held on file.
4. A compliance checklist has been completed by the Auditor and it is (also) held on file.

1.3 Limitations and Intellectual Property Matters

This report has been prepared by C. M. Jewell & Associates Pty Ltd for the use of the client identified in Section 1.1 and relevant government agencies (the Department of Land Resource Management and the Department of Lands, Planning and the Environment), for the specific purpose described in that section.

The work has been carried out, and this report prepared, utilising the standards of skill and care normally expected of a site auditor practising in New South Wales under the requirements of the *Contaminated Land Management Act* 1997. The level of confidence of the conclusions reached is governed, as in all such work, by the scope of the investigation carried out and by the availability and quality of the data. The Auditor has satisfied himself that the available data are adequate to support the conclusions he has reached, and comply with the minimum requirements indicated in the guideline documents specified for the NSW Site Auditor Scheme. Where limitations or uncertainties in conclusions are known, they are identified in this report. However, no liability can be accepted for failure to identify conditions or issues which arise in the future and which could not reasonably have been assessed or predicted using the site information and analytical data available for review.

Data collected by others have, of necessity, been used to support the conclusions of this report. Those data have been subjected to reasonable scrutiny but have essentially, and necessarily, been used in good faith. Liability cannot be accepted for errors in data collected by others where such errors could not have been detected by reasonable scrutiny of the data and supporting information supplied to or requested by the Auditor.

This report, any original data contained in the report, and its findings and conclusions remain the intellectual property of C. M. Jewell & Associates Pty Ltd. A licence to use the report for the specific purpose identified in Section 1.1 is granted to the persons identified in that section on the condition of receipt of full payment for the services involved in the preparation of the report.

It is recognised that persons other than the client and relevant government agencies may ultimately have access to this report. In this event, it is recommended that this report should not be used by other persons or for other purposes than those identified in this report, without prior reference to the Auditor.

The report must not be reproduced except in full and with the permission of C. M. Jewell & Associates Pty Ltd.

2.0 SITE INFORMATION

This section provides:

- Basic identification and location information concerning the site.
- An indication of the layout, topography, drainage, geology and hydrogeological setting of the site, together with an overview of its history.
- A list of any known or potential contaminant sources, and the associated primary contaminant groups of concern. *Note*: A list of the individual compounds that make up the primary contaminant groups of concern is provided as Appendix A.
- An outline of the intended use of the site, and the associated assessment criteria.

Sections below generally relate to information provided by AEC and incorporate any relevant responses to comments raised by the Auditor during the course of the audit.

For a more detailed description of the layout, topography, drainage, geology, hydrogeology and history of the site, reference should be made to the AEC reports provided as Appendix B.

2.1 Site Identification and Location

This Site Audit Report relates to part of the land located at 325 Willard Road, Holtze, in the Northern Territory (the property). The location of the property is shown on Figure 1, and its layout is indicated on Figure 2.

As at the date of this report, the property is in the final stages of being developed for use as a Correctional Facility.

This Site Audit relates to a portion of the property that is to be used, once cleared, for agricultural and horticultural activities, including production of food for human consumption. The area of the property that is the subject of this Site Audit is indicated on Figure 3.

With regard to 'the site', as at the date of this report:

- It is described as part of Section 6222 in the Hundred of Bagot.
- It is owned by the Department of Correctional Services, Northern Territory Australia.
- It lies within Litchfield Council local government area.
- It is zoned Community Purpose under the Northern Territory (2013) Planning Scheme for the Darwin Region.

Australian Map Grid Zone 52L co-ordinates of the centre of the site are approximately 719864 E and 8623554 N.

2.2 Site Setting

The site is located in a predominantly naturally vegetated rural area containing various dirt roads and tracks, as indicated on Figure 4.

The site is bounded as outlined below.

To the north	naturally vegetated bushland
To the east	the correctional facility / the remainder of the property
To the south	naturally vegetated bushland
To the west	naturally vegetated bushland

2.3 Site Layout, Topography and Drainage

2.3.1 Site Layout

The site is irregular in shape, with an area of approximately 126 hectares (1,260,000 m^2).

At the date of this report, most of the site was naturally vegetated bushland, with the remaining areas being cleared land that had been cleared during the construction of the correctional facility for access and stockpiling of materials. The layout of the site is indicated on Figure 4.

2.3.2 Topography

The site is moderately undulating to flat with low natural relief and some significantly elevated soil stockpiles. The centre of the site is at an elevation of approximately 33 metres above Australian Height Datum.

2.3.3 Drainage

The natural flow of stormwater across the site is through sheetflow. Flow velocities throughout the site are not considered excessive due to gentle slopes through the natural terrain, and erosion is not considered a significant issue where existing vegetation is maintained.

There are no creeks or waterways within the site area, however Kings Creek, a non-perennial stream, runs parallel to the western boundary and the Howard River catchment is located to the east of the site. The Howard River discharges into Darwin Harbour.

The site is not considered flood prone, although parts of the site are subject to waterlogging during and following the wet season.

2.4 Geology and Soil Landscape

A review of the Koolpinyah 1:100 000 Geological Series Sheet 5173 indicates that the site is underlain by Tertiary soils comprising unconsolidated sand, clayey sand and ferruginous clayey sand, which commonly contain limonite pisolites. These are underlain by nodular concretionary, pisolitic and vermicular mottled laterite: in-situ and reworked remnants of an older laterite profile. The Tertiary soils are further underlain by outliers of Cretaceous sedimentary rock, typically sandstone and siltstone, overlying the Proterozoic sedimentary rock basement.

The map indicates that quaternary sand, silt and clay colluvial sediments deposited by unconcentrated surface runoff exist in the western corners of the site, associated with the proximity to Kings Creek.

No faults or other structural features have been mapped within or projecting towards the site.

Information provided by the Northern Territory Government (NTG) indicates that soils within and surrounding the site consist mostly of tenosols, with kandosols located in the north-western corner.

2.5 Hydrogeology

A review of the NTG Department of Planning and Infrastructure's Hydrogeological Map of Darwin (Scale 1:250 000, Map Sheet SD52-4, Edition 2, April 2004) indicates that groundwater underlying the site is suitable for human consumption with salinity levels less than 1000 milligrams per litre (mg/L) total dissolved solids (TDS).

Information obtained from the NTG Department of Land Resource Management bore records indicates that nine groundwater wells are located within a 2.5 kilometre radius of the site.

2.6 Site History

AEC indicated the following:

- It was apparent from aerial photography that between 1985 and 2010 the site remained relatively unchanged, with most of it being covered with bushland and crossed with various meandering tracks. However, a cleared area of land located across the north-western portion of the site appeared to have increased in size during this period.
- Over time, the surrounding area has been subdivided.
- Land title records indicated that the registered proprietor of the property has changed a few times since 1927, and that several mineral leases (sand and gravel extraction) were issued for parts of the land between 1945 and 1963.

Auditor's Comments

The Auditor has reviewed the associated information provided by AEC and he has visited the site.

The Auditor noted that most of the site was covered with bushland and that apart from some evidence of sand and gravel extraction and some illegal dumping of waste materials, it was mostly undisturbed.

2.7 Potential Contaminant Sources

During the course of its involvement, AEC identified the following potential contaminant sources / contaminating activities that required assessing:

- The storage and use of oils, fuels, chemicals and additives by the builder during the construction of the adjacent correctional facility.
- Illegal dumping of waste / scrap materials.
- The use of pest control chemicals.
- Unexploded ordinance as a result of WWII activities.

Auditor's Comments

The Auditor has reviewed the associated information provided by AEC and he has visited the site.

The Auditor considers the above to be an appropriate summary of the potential contaminant sources / contaminating activities that required assessing by AEC.

2.8 Primary Contaminant Groups of Concern

AEC indicated the primary contaminant groups of concern within soils across the site to be:

- heavy metals
- organochlorine pesticides (OCP)
- polycyclic aromatic hydrocarbons (PAH)

- total recoverable hydrocarbons (TRH)
- monocyclic aromatic hydrocarbons – specifically, benzene, toluene, ethylbenzene and xylenes (BTEX)
- asbestos

Excluding asbestos, the individual compounds that make up these contaminant groups are listed in Appendix A.

Auditor's Comments

The Auditor considers AEC's assessment of the primary contaminant groups of concern to be appropriate, given the potential contaminant sources / contaminating activities listed in Section 2.7.

2.9 Intended Development

The Correctional Facility intends to use the site for agricultural and horticultural activities, including producing food for human consumption.

2.10 Assessment Criteria

With regard to the protection of Human Health, following discussion with the Auditor, rather than generating, upfront, site-specific soil health investigation levels (HIL) for the consumption of produce grown within the site, in the first instance, AEC proposed to utilise the practical quantification limits (PQL) as an initial screening criteria, with any exceedances being initially compared with the HIL A criteria provided or referenced within the *National Environment Protection (Assessment of Contamination) Measure 1999* (ASC NEPM 1999).

With regard to the protection of the Environment, where possible, AEC determined site-specific ecological investigation levels (EIL) in accordance with the ASC NEPM 1999.

The Auditor considered the approach proposed by AEC to be appropriate and he adds that generally, the laboratory reported concentrations less than the PQL. See Section 3.2 for further discussion.

3.0 INVESTIGATIONS

3.1 Preliminary Site Investigation (March 2014)

3.1.1 Scope of Work

AEC carried out a preliminary site investigation to identify any potential contamination issues associated with past and present land use across the site, which included the following scope of works:

- A review of previous associated environmental assessment reports.
- A search for and review of historical site ownership and site usage.
- A review of the local geology and hydrogeology.
- Drilling and sampling of twenty soil bores within the site and an adjacent area.

3.1.2 Results

Review of Previous Environmental Assessment Reports

Following are the summaries of AEC's review of previous associated environmental assessment reports. (*Note:* These reports relate to the entire property).

Notice of Intent Northern Territory Secure Facilities & Associated Headworks (AEC 2011a)

Most of the property was found to be vacant land and that past and current sand and gravel extraction had resulted in structural and floristic degradation of areas within and surrounding the property. Also, numerous waste and fly-tipped materials were present across the property.

The overall topography, geology, hydrology and hydrogeology of the property were considered appropriate for the proposed development. A flora and fauna survey assessment identified no significant issues.

No nominated, proposed or declared heritage places, including any previously recorded prescribed archaeological sites, were located within the property. The Aboriginal Areas Protection Authority had issued an Authority Certificate for the property and the location of the associated headworks.

Asbestos Containing Materials Survey (AEC 2011b)

Nine areas of disturbance were identified during the survey. Six of these were located wholly or partly within the site, as described below.

Area 1	Asbestos containing material (ACM) was identified over an area of approximately 10 m^2.
Area 2	Fly tipped materials including white goods, cooking oil containers and sheet metal were observed. *Note*: No ACM debris was identified.
Area 3	A probable former borrow pit. *Note*: No dumped material was present.
Area 4	A probable former borrow pit. *Note*: No dumped material was present.
Area 5	Fly tipped materials including white goods, vehicle parts and miscellaneous household products were observed. *Note*: No ACM debris was identified.
Area 6	An area of cleared land. *Note*: No dumped material was present.

Note: AEC was subsequently informed by the Department of Infrastructure that the ACM and fly tipped materials had been removed. See Section 3.2 for further discussion.

Vegetation Community Assessment (AEC 2011c)
Whilst sensitive areas were identified, they were not considered to be at significant risk from the proposed development.

Most of the impact was likely to be limited to Eucalypt woodland located in the centre and south-east corner of the property, which was noted to have already been impacted by sand / gravel extraction and numerous tracks and paths.

Furthermore, Eucalypt woodland and forest is common in the region and it was considered that removal of the specified habitat was not likely to significantly affect the local fauna, as similar habitat was readily available nearby.

Soil Investigation
AEC drilled twenty soil bores on a broad grid within the site and an adjacent area using hand auger equipment.

Samples were collected from the surface and sub-surface (up to 0.5 metre below ground level - mbgl) and submitted to a NATA-accredited laboratory for analysis of heavy metals, OCP, and asbestos.

AEC documented the work that it had completed within the following report:

> Preliminary Site Investigation, Correctional Facility, 325 Willard Road, Holtze, NT, prepared by AEC Environmental Pty Ltd (ref. J125116/01), dated March 2014

A copy of the report is provided within Appendix B of this report.

3.1.3 Auditor's Comments

The Auditor was engaged on 15 July 2014, being after AEC conducted and reported its Preliminary Site Investigation (PSI). Following his appointment, the Auditor reviewed the PSI report and the three associated documents and also, he discussed the PSI report and the project with AEC.

The Auditor concluded that the site had not been adequately investigated and he recommended that:

- A comprehensive follow-up walkover of the site, including a newly-added area in the north-western corner, be carried out to inspect for any further evidence of contamination or illegal dumping, record the presence of any ACM, and to confirm that the six areas of disturbance identified during the ACM Survey (AEC 2011b) had been cleared.
- Judgmental samples should be obtained for, at least, metals and OCP analyses and any other analysis considered warranted by AEC, and that sampling locations should be logged with the use of a GPS.

See Section 3.2 for further discussion.

3.2 Additional Investigation Works (September 2014)

3.2.1 Scope of Work

In response to Auditor comments with regard to its PSI, AEC conducted an additional investigation of the site. (*Note:* AEC was now known as Greencap Ltd.)

The investigation included:

- A comprehensive site walkover.
- Confirming that the six previously identified areas of disturbance were no longer of concern.
- A surface soil investigation.

3.2.2 Results

Walkover

The site walkover was undertaken in an east to west transect pattern, incorporating 36 transects covering approximately 20 kilometres across the site.

During the walkover, AEC:

- Observed five areas of potential contamination which included the following waste materials: burnt car parts and car bodies (2), an oil drum, sheets of corrugated iron and, at one location, potential ACM (cement sheeting).
- Confirmed that the six previously identified areas of disturbance were no longer of concern. In particular, AEC confirmed that the ACM and waste materials had been removed.

Soil Sampling

During the walkover, AEC collected a total of 85 surface soils samples, from depths between 0 and 5 cm, consisting of:

- 80 grid-based surface soil samples collected along the transects, including previously identified disturbed Areas 1, 2 and 5.
- 5 opportunistic samples collected from where areas of potential contamination were identified.

All samples were submitted for OCP and metals analyses, 19 samples were submitted for TRH / BTEX analyses, 8 samples were submitted for PAH analysis, and 2 samples were submitted for asbestos analysis. Additionally, a piece of the cement sheeting was submitted for asbestos analysis.

For OCP, TRH, BTEX, PAH and asbestos, the laboratory reported concentrations less than the PQL.

For metals, with the exception of one sample (identified as SSWASTE) the laboratory reported concentrations (significantly) less than the EILs.

With regard to SSWASTE, the laboratory reported a concentration of 1200 milligrams per kilogram (mg/kg) of zinc, being above the EIL of 180 mg/kg but (significantly) less than the HIL A of 7400 mg/kg. AEC considered the concentration not to be of concern.

SSWASTE was obtained from one of the areas of potential contamination (i.e. due to the presence of car parts, an oil drum and approximately 10 m^2 of corrugated iron).

AEC documented the work that it had completed within the following report:

> Additional Investigation Works, Department of Correctional Services, Holtze Correctional Facility, prepared by Greencap Ltd (ref. J125116), dated 4 September 2014

A copy of the report is provided within Appendix B of this report.

Note: The Auditor had first reviewed a draft of the report and discussed it with AEC.

3.3 Auditor's Comments

The Auditor considers that the additional investigation was carried out in accordance with his recommendations and was adequate in scope to establish site conditions for the purpose of this site audit.

The additional investigation did not identify any issues of concern, and the results of laboratory analysis of soil samples obtained during the investigation indicated that concentrations were generally below the guidelines adopted for the proposed site use, the sole exception being an elevated concentration of zinc.

With regard to the five areas where waste materials (burnt car parts and car bodies (2), an oil drum, sheets of corrugated iron and cement sheeting) were observed, the Auditor has been provided with documentation and photographs demonstrating that these materials have been removed from the site.

3.4 Auditor's Evaluation of Adherence to NSW EPA Guidelines

3.4.1 Data Quality Objectives

AEC appropriately adopted the DQO process endorsed by NSW EPA.

A copy of the Auditor's assessment of AEC's use of DQO is provided in Appendix C of this Site Audit Report.

3.4.2 QA/QC Evaluation

The field and laboratory QA/QC measures described by AEC in its associated reports have been reviewed and, overall, are considered to substantially comply with the relevant guidelines and to be adequate to ensure the integrity of the data set that has been used to assess the site.

The QA/QC criteria list examined in this review included:

- Precision
- Accuracy
- Sensitivity
- Representativeness
- Comparability
- Completeness
- Holding times
- Blanks

Data Quality Indicators

The DQI presented by AEC have also been reviewed.

The Auditor considers that appropriate DQI were used adequately to assess field procedures and analytical results. The DQI are considered to substantially comply with the relevant guidelines and to be adequate to ensure the integrity of the data set that has been used to assess the site.

A copy of the Auditor's assessment of QA/QC measures presented by AEC, including AEC's use of DQI, is (also) provided within Appendix C of this Site Audit Report.

3.4.3 Summary

The Auditor considers that the overall quality of AEC's data and their presentation are of an adequate standard to support the conclusions he has reached.

4.0 AUDITOR'S ASSESSMENT OF THE ADEQUACY OF PROVIDED INFORMATION AND REPORTING STANDARDS

The Auditor has assessed the completeness and adequacy of the information provided by AEC within its associated reports and he as assessed the adequacy of the reporting standard.

The following information was provided, either in the original reports or in response to questions from the Auditor, and is considered by the Auditor to be adequate for the purposes of his audit:

1. site identification, location and description
2. review of site history, including potential contaminant sources / contaminating activities
3. outline of actual or potential contamination
4. identification of primary contaminant groups of concern
5. description of soil stratigraphy and hydrogeology
6. discussion of investigation works
7. quality assurance and quality control plan
8. discussion of analytical results
9. discussion of environmental quality criteria
10. assessment of risks to human health and structures
11. discussion of evidence of migration of chemical contaminants
12. discussion of groundwater issues
13. assessment of aesthetic issues
14. recommendation for short-term management
15. recommendation for long-term management
16. recommendations and conclusions

The following information was not provided, but its omission was not considered significant by the Auditor given the reported historical uses of the site and the findings of the investigations undertaken:

17. assessment of chemical mixtures

Summary

Overall, the information provided and the standard of reporting are considered to be adequate for the purposes of this audit and satisfy the requirements of the NSW EPA's *Guidelines for Consultants Reporting on Contaminated Sites* 2011 and the NSW EPA's *Guidelines for the NSW Site Auditor Scheme*, 2nd edition 2006.

5.0 AUDITOR'S ASSESSMENT OF SITE CONDITION

5.1 Short-Term and Long-Term Management

The site does not require any form of short-term or long-term management.

5.2 Risks to Human Health

It is the Auditor's opinion that there are no remaining identifiable contamination risks to human health at the site.

5.3 Risk to Structures

It is the Auditor's opinion that there are no identifiable contamination risks to structures at the site.

5.4 Risk to the Environment

It is the Auditor's opinion that there are no identifiable contamination risks to the environment at the site.

5.5 Groundwater Issues

It is the Auditor's opinion that groundwater issues are no longer of concern at this site.

5.6 Regulatory Compliance

The Auditor considers that the requirements of Condition 12 of Development Permit No. DP11/0764 dated 21 October 2011 and a Variation dated 2 December 2011 granted by the Department of Lands, Planning and Environment under Sections 54 and 55 of the Planning Act, has been fulfilled.

5.7 Visual Aesthetic Issues and Odour

It is the Auditor's opinion that visual aesthetic issues and odours are no longer issues of concern on this site.

5.8 Chemical Mixtures

It is the Auditor's opinion that the potential for chemical mixtures to be present is not an issue of concern on this site.

5.9 Potential Contaminant Migration

It is the Auditor's opinion that the potential for off-site migration of contaminants originating from the site is not an issue of concern.

6.0 AUDITOR'S CONCLUSIONS AND RECOMMENDATIONS

6.1 Adequacy of Investigation

The Auditor considers that:

- The site has been investigated to the required standard.
- The investigation was carried out in an adequate and appropriate manner, and generally in accordance with relevant guidelines.
- All significant issues identified by the Auditor have been adequately addressed.

See below for further discussion.

6.2 Suitability of Site for Intended Use

The Auditor considers that the site has been adequately investigated and that identified issues have been appropriately addressed, and that this has been suitably demonstrated.

Accordingly, the Auditor considers that it is appropriate to issue a Site Audit Statement certifying that in his opinion, the site is suitable for horticultural and agricultural uses.

6.3 General Recommendations

The Auditor recommends that:

- Any soil that is removed from the site should first be appropriately classified in accordance with the waste classification guidelines applicable at that time.
- Any soil (including topsoil) that is imported to the site should first be assessed as being suitable for use on the site.
- Groundwater should not be extracted for any purpose without appropriate assessment.

REFERENCES

AEC 2011a, *Notice of Intent Northern Territory Secure Facilities & Associated Headworks, Howard Peninsula*, prepared by AEC Environmental Pty Ltd (ref. 5053/08), dated January 2011

AEC 2011b, *Asbestos Containing Materials Survey Report*, prepared by AEC Environmental Pty Ltd (ref. 5053/ACM/01), dated 30 June 2011

AEC 2011c, *Vegetation Community Assessment*, prepared by AEC Environmental Pty Ltd (ref. 5053/ACM/01), dated 3 August 2011

ASC NEPM 1999, *National Environment Protection (Assessment of Contamination) Measure 1999*, as amended 16 May 2013

NSW EPA 2011, *Guidelines for Consultants Reporting on Contaminated Sites,* NSW Office of Environment and Heritage, Sydney NSW

NSW EPA 2006, *Guidelines for the NSW Site Auditor Scheme*, 2nd edition, NSW Department of Environment and Conservation, Sydney NSW

Important Information About Your Site Audit Report

These notes will help you to interpret your Site Audit report. They are based on guidelines prepared by the NSW Environment Protection Authority (EPA).

Introduction to the NSW Site Auditor Scheme

Objectives

The objectives of the NSW Site Auditor Scheme are to:

- ensure that public health and the environment are protected through proper management of contaminated sites, particularly during changes of land use
- improve access to technical advice on contaminated sites for planning authorities and the community by establishing a pool of accredited site auditors
- provide greater certainty for planning authorities and the community through the independent review by those auditors of contaminated site assessment and remediation reports, and reports that validate the successful completion of the assessment of remediation.

Background

In Australia, the use of accredited auditors to review work conducted by contaminated site consultants was first introduced in Victoria in 1989 through the Victorian EPA's Environmental Auditor (Contaminated Land) Scheme.

In 1998, NSW commenced its own Site Auditor Scheme under the *Contaminated Land Management Act 1997* (CLM Act). The scheme is administered by the Department of Environment and Conservation (DEC).

The CLM Act empowers EPA to accredit individuals as site auditors and to establish guidelines for them.

The Contaminated Land Management Regulation 1998 (CLM Regulation) specifies some of the procedural requirements of the scheme.

Site Audits in Relation to Contaminated Sites

Site auditors review the work of contaminated site consultants. The CLM Act calls these reviews 'site audits' and defines a site audit as an independent review:

a) that relates to investigation or remediation carried out (whether under the CLM Act or otherwise) in respect of the actual or possible contamination of land, and

b) that is conducted for the purpose of determining any one or more of the following matters:

   i) the nature and extent of any contamination of the land

   ii) the nature and extent of the investigation or remediation

   iii) whether the land is suitable for any specified use or range of uses

   iv) what investigation or remediation remains necessary before land is suitable for any specified use or range of uses

   v) the suitability and appropriateness of a plan of remediation, a long-term management plan, a voluntary investigation proposal or a remediation proposal.

The main products of a site audit are a 'site audit statement' and a 'site audit report'.

A **site audit statement** is the written opinion by a site auditor, on an EPA-approved form, of the essential findings of a site audit. It includes, where relevant, the auditor's conclusions regarding the suitability of the site for its current or proposed use.

Before issuing a site audit statement, the site auditor must prepare and finalise a detailed **site audit report**. The report must be clearly expressed and presented and contain the information, discussion and rationale that support the conclusions in the site audit statement.

In some circumstances a site audit is required by law. These audits are known as '**statutory site audits**' and may be carried out only by site auditors accredited under the CLM Act. A statutory site audit is one that is required by:

- a regulatory instrument issued under the CLM Act, including EPA agreements issued by EPA to voluntary proposals.
- the *Environmental Planning and Assessment Act 1979*, including an environmental planning instrument or development consent condition
- any other Act.

Role of Site Auditors

The services of a site auditor can be used by anyone who needs an independent and authoritative review of information relating to possible or actual contamination of a site. The review may involve independent expert technical advice or 'sign-off' of contaminated site assessment, remediation or

validation work conducted by a contaminated site consultant.

Site Assessment and Audit Process

The usual stages in the assessment, remediation and validation of a contaminated site, and in the audit of those activities, are as follows:

Consultant is Commissioned to Assess Contamination

In most cases, a site owner or developer engages a contaminated site consultant to assess a site for contamination and, where required, to develop a remediation plan, implement the plan and validate the remediation.

The contaminated site consultant designs and undertakes the site assessment and, where required, all remediation and validation activities to achieve the objectives specified by the owner or developer.

Site Auditor Reviews the Consultant's Work

The site owner or developer commissions the site auditor to review the consultant's work. The auditor prepares a site audit report and a site audit statement at the conclusion of the review, which are given to the owner or developer.

Where the local planning authority or EPA uses its legal powers to require the carrying out of a site audit, the site owner or developer must commission a site auditor accredited under the CLM Act to perform this task. This is known as a 'statutory' audit. The CLM Act requires that an auditor must notify EPA when he or she has been commissioned by anyone other than EPA to perform a statutory site audit. The auditor is also required to furnish the local authority and EPA with a copy of the completed site audit statement.

In some cases, the site owner or developer may wish to have a site audit undertaken although it is not a legal requirement. The audit is termed 'non-statutory'. If their intention is to obtain a site audit statement, they must commission a site auditor accredited under the CLM Act to perform this task. This is because only a site auditor so accredited can issue a site audit statement and they are obliged to issue one at the end of any site audit. For non-statutory audits, the site auditor must give a copy of the site audit report to the local authority or DEC, or both, on request.

As required by the CLM Act, EPA maintains a record of all statutory site audit statements issued in relation to land that is the subject of a regulatory instrument under the CLM Act. Copies are available for public inspection through EPA's website at www.environment.nsw.gov.au. If the local council receives a copy of a site audit statement, it must list the statement on any certificate it issues under section 149 of the *Environmental Planning and Assessment Act 1979* in relation to the land concerned.

Limitations of Your Site Audit Report

The following notes have been added by the Auditor who prepared this report, to highlight some important limitations on the use of this report.

This report has been prepared by C. M. Jewell & Associates Pty Ltd for the use of the client who commissioned it, and relevant government agencies, for the specific purpose described in the report.

Consistently with the objectives of the NSW Site Auditor Scheme, it may be appropriate for others to rely upon this report in some circumstances.

However, the original purpose of this report and the site conditions prevailing at the time the report was prepared – as described in the report – should be considered first.

If you are not the person for whom the report was prepared, or you wish to use it for a different purpose to that for which it was prepared, or site conditions appear to differ from those described in this report, or a significant period of time has elapsed since the report was prepared, then PLEASE CONSULT THE SITE AUDITOR BEFORE RELYING UPON THE REPORT.

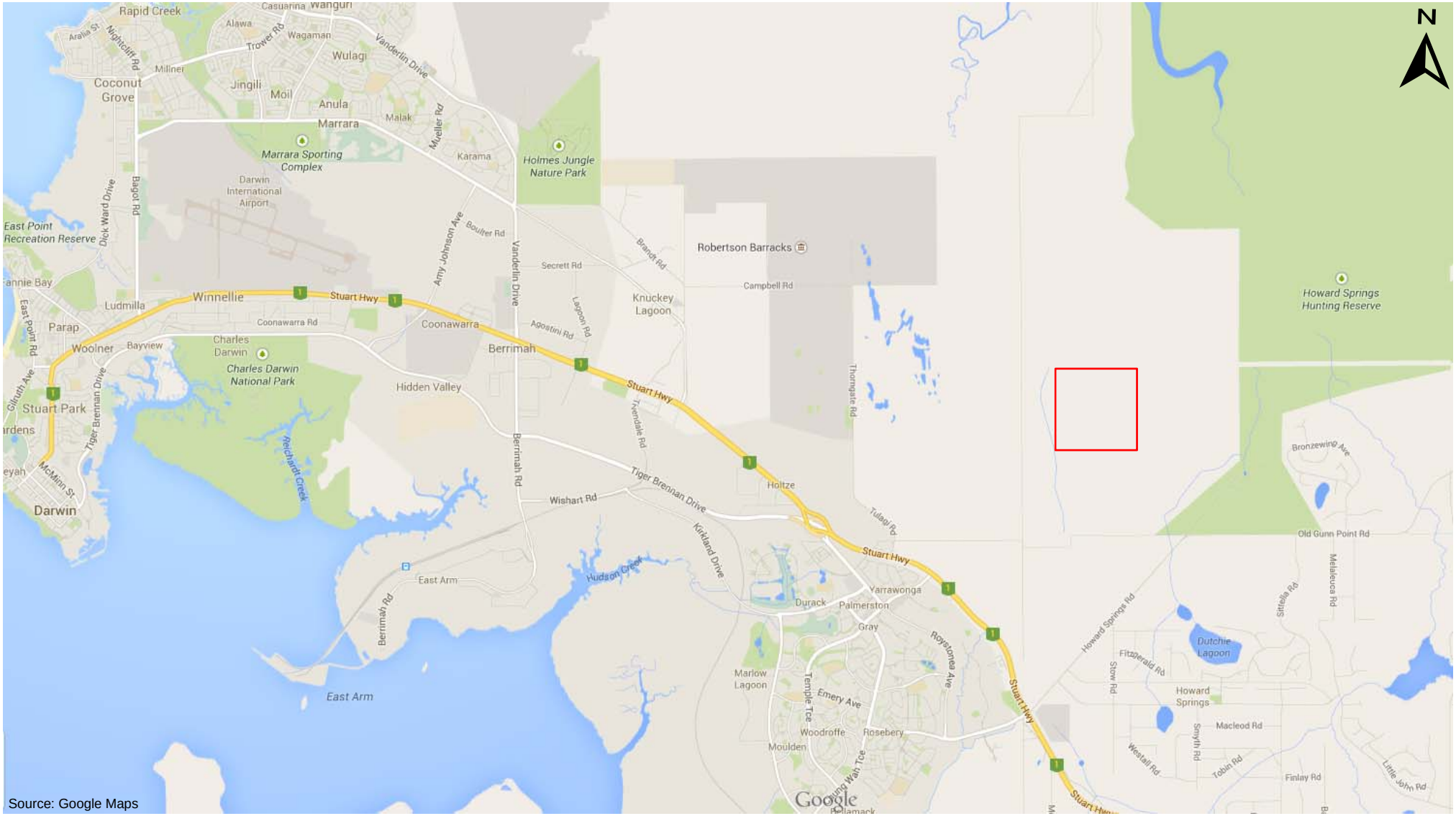
It is also important to recognise that a site audit is primarily a review of work carried out by other companies and individuals.

The site auditor has checked data and interpretations, ascertained whether or not appropriate guidelines have been followed, and satisfied himself that the available data are adequate to support the conclusions he has reached.

However, all environmental sampling programs have an inherent degree of uncertainty. Even when sampling fully complies with guidelines, it is possible for areas of contamination to remain undetected, but be revealed by more extensive excavations during site redevelopment. This risk is usually quantified using statistical confidence limits.

The site audit report identifies data limitations and uncertainties where these are recognised, but users must accept the finite and unavoidable risk that some contamination may remain undetected during even a diligent site assessment and audit process.

If there is a need to copy this report, it must be reproduced in full. No reliance whatsoever should be placed upon partial copies of a site audit report.

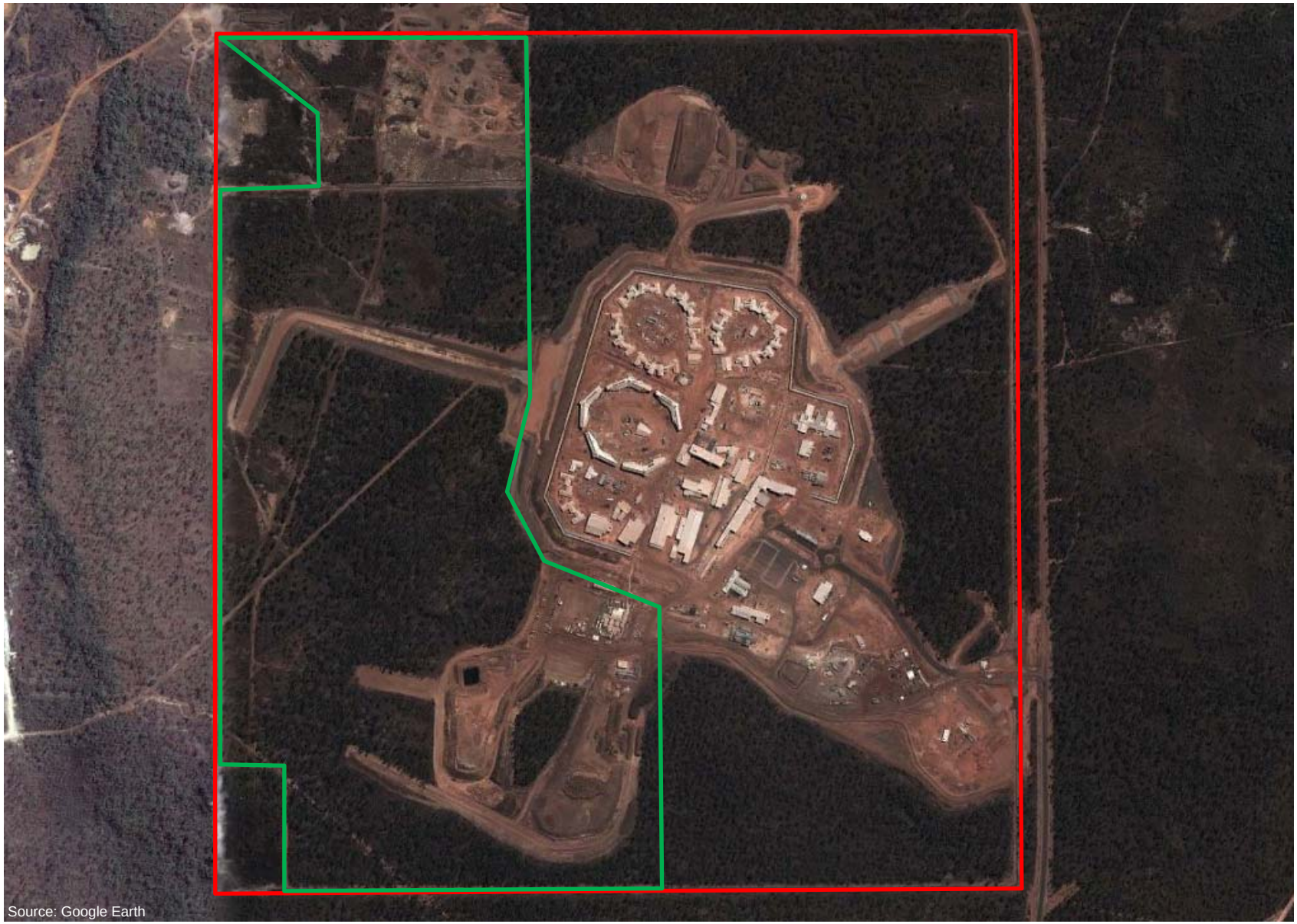


C. M. Jewell & Associates Pty Ltd

Report Ref: J1655.2R
Rev: 0
Rev Date: 3-Sep-2014
Author: NAA

Figure 1

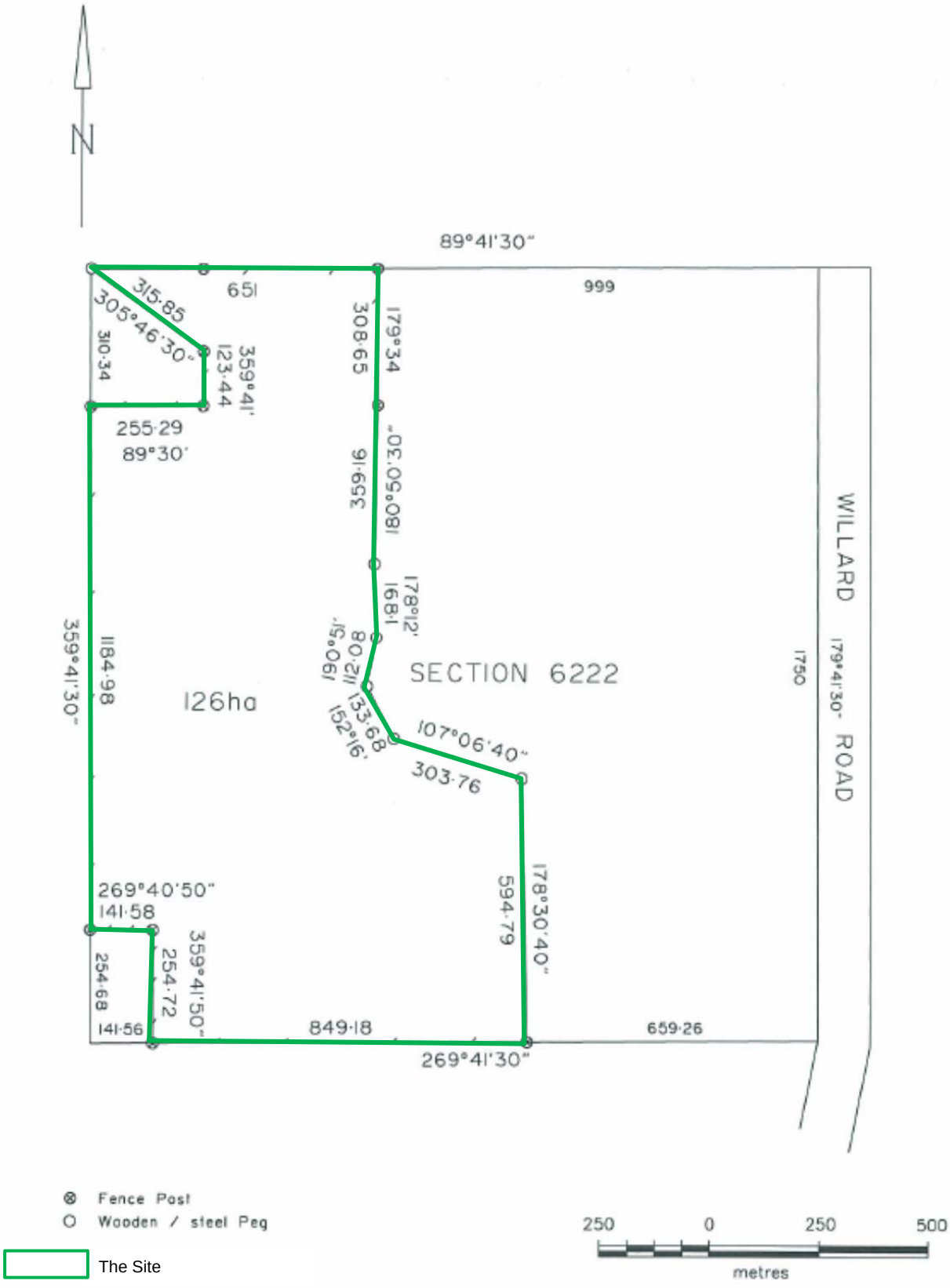
Property Location



Report Ref: J1655.2R
Rev: 0
Rev Date: 3-Sep-2014
Author: NAA

Figure 2

Property Layout



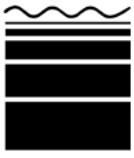
Source: NT Department of Lands, Planning and Environment

Report Ref: J1655.2R
Rev: 0
Rev Date: 3-Sep-2014
Author: NAA

Figure 4

Site Setting

C. M. Jewell & Associates Pty Ltd



APPENDIX A

Individual Compounds Making up the Primary Contaminant Groups of Concern - Soils

Individual Species Making up Primary Contaminant Groups (soil)
AEC Environmental Pty Ltd
Additional Investigation, September 2014

HEAVY METALS

Arsenic (As)
Cadmium (Cd)
Chromium (Cr)
Copper (Cu)
Lead (Pb)
Mercury (Hg)
Nickel (Ni)
Zinc (Zn)

POLYCYCLIC AROMATIC HYDROCARBONS (PAH)

Naphthalene
Acenaphthylene
Acenaphthene
Fluorene
Phenanthrene
Anthracene
Fluoranthene
Pyrene
Benz(a)anthracene
Chrysene
Benzo(b&j)fluoranthene
Benzo(k)fluoranthene
Benzo(a)pyrene
Indeno(1,2,3-c,d)pyrene
Dibenz(a,h)anthracene
Benzo(g,h,i)perylene

ORGANOCHLORINE PESTICIDES (OCP)

Hexachlorobenzene (HCB)
α-Benzene hexachloride (α-BHC)
β-Benzene hexachloride (β-BHC)
δ-Benzene hexachloride (δ-BHC)
γ-BHC (Lindane)
Heptachlor
Heptachlor epoxide
Aldrin
Dieldrin
Endrin
Chlordanes - total
DDD
DDE
DDT
α-Endosulfan/Endosulfan-1
β-Endosulfan/Endosulfan-2
Endosulfan sulfate
Methoxychlor
Endrin aldehyde
Endrin ketone
Toxaphene

TOTAL RECOVERABLE HYDROCARBONS (TRH)

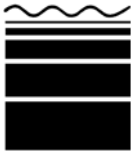
C_6-C_{10} fraction
C_6-C_{10} fraction less BTEX (F1)
>C_{10}-C_{16}
>C_{10}-C_{16} fraction less Naphthalene (F2)
>C_{16}-C_{34} fraction
>C_{34}-C_{40} fraction

MONOCYCLIC AROMATIC HYDROCARBONS (BTEX) – subgroup of VOC

Benzene
Toluene
Ethylbenzene
m+p-xylene
o-xylene

APPENDIX B

Copies of the Consultant's Reports (on CD)



APPENDIX C

Auditor's Assessment of the Use of Data Quality Objectives, Data Quality Indicators and Quality Assurance / Quality Control

7.0 DATA QUALITY OBJECTIVES CHECKLIST

CMJA

The Guidelines for the NSW Site Auditor Scheme (2nd edition, April 2006) state that site auditors must check that a consultant has properly addressed and adopted Data Quality Objectives (DQO) for the investigation or validation program (as outlined in the checklist below), and that the consultant's report includes the following:

- *a statement of pre-determined DQO for field and laboratory procedures, including quantitative DQO;*
- *a plan to achieve pre-determined DQO; and*
- *procedures to be undertaken if the data do not meet the expected DQO.*

Generally, the DQO should include, or address, the following:

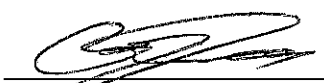
DQO Steps and Outputs		Comments
Note: The timing for the various stages of the project must be clearly understood by all parties prior to commencing any work on the project. The DQO process must be commenced before any investigative work begins on the project.		
A concise description of the problem.	✓	
A list of the planning team members and a decision maker.	✓	
A summary of available resources and relevant deadlines for the study.	✓	
A conceptual model of the site based on information prior to the commencement of the investigation/validation.	✓	
A decision statement that links the principal study question to actions that will solve the problem.	✓	
A list of informational inputs needed to resolve the decision statement.	✓	
A list of environmental variables or characteristics to be measured.	✓	
Information required to allow informed decisions to be made to address the decision statements.	✓	
Identification of the media (fill, soil, groundwater) to be investigated/ validated.	✓	
Identification of the criteria for each medium.	✓	
Identification of the analytical methods required for chemicals of concern relative to the site criteria.	✓	
Identification of defined concentrations for field screening (and a response if reached).	✓	
Any other information required to make decisions.	✓	
A detailed description of the spatial and temporal boundaries of the problem.	✓	
Identification of any practical constraints that may interfere with the study.	✓	
Definition of acceptable limits for: chemicals of concern detected in field blanks; recoveries of laboratory spike additions; and RPDs of matrix spike and matrix spike duplicates.	✓	
Identification of the statistical parameters of interest that characterise the population (e.g. 95% UCL).	✓	
A statement that the criteria exceed the laboratory reporting limits.	✓	
Any contingency measures.	✓	
Justification of decision error rates based on a consideration of the consequences of making an incorrect decision.	✓	
Was data collection optimised?	✓	
Was a sampling analytical and quality plan (SAQP) developed and provided?	✓	

Adequacy

Are the DQO, as outlined above, provided by the consultant a for the purpose of this audit?

Yes	No
✓	

If no, provide comments above as appropriate.



Auditor

6 November 2014

Date

8.0 REPORTING OF FIELD AND LABORATORY QUALITY ASSURANCE AND QUALITY CONTROL

*This section is based on Appendix V of the Guidelines for the NSW Site Auditor Scheme (2006). It contains the essential issues '**which must be included in the quality assurance program**' conducted by a contaminated site consultant during site assessment and remediation processes.*

Item		Comments
Does the consultant's site assessment report include a quality assurance / quality control (QA/QC) narrative describing all information relevant to the site assessment?	✓	
Does the consultant's sampling program include assessment of all relevant environmental media, including:		
Soil	✓	
Dust	X	Not relevant
Surface water	X	Not relevant
Groundwater	X	Not relevant
Air	X	Not relevant
Sediments	X	Not relevant
Biota	X	Not relevant
Is the sampling strategy clearly defined and justified on the basis of project objectives, site conditions and history?	✓	
Sampling strategy is: ☐ Systematic ☐ Random ☐ Stratified ☐ Judgemental ☑ Combination		
Was the sampling strategy appropriate for the conditions at the site and the nature of the contamination?	✓	
Is the rationale for the strategy described in the consultant's report?	✓	
Does the rationale include:		
Sampling pattern	✓	
Sampling density		
Estimated size of residual hotspots that may remain undetected		
Sampling depths		
Analytes		
Analytical methods		
Were all samples analysed for all analytes of concern?		
Justification of decisions concerning samples to be analysed and samples not to be analysed	✓	
Does the number of sample locations comply with EPA sampling design guidelines?	✓	
Are divergences from guidelines adequately justified?	✓	
Is overall coverage of site adequate?	✓	
Are the sampling locations shown on a scaled site sampling plan?	✓	
Are sample depths stated?	✓	
Are borehole/test pit logs provided?	X	Not relevant
Was sampling investigation depth sufficient?	✓	
Was fill material adequately investigated?	X	Not relevant
Was number of depth samples sufficient to give adequate coverage of profile?	✓	
Are sample collection, handling and transportation procedures documented and appropriate to meet the project DQO?	✓	
Was sampling representative of site conditions, based on the selection of appropriate number of sampling points and of samples from each relevant strata and material types stated in a site sampling plan to meet the project DQO?	✓	
Are sampling procedures adequately described?	✓	
Are sampling procedures adequate and appropriate for the site?	✓	
Was composite sampling used?	NO	
Were composite samples laterally adjacent?	NA	
Were composites from the same depth interval?	NA	
Were samples for analysis for volatile analytes composited?	NA	

8.0 REPORTING OF FIELD AND LABORATORY QUALITY ASSURANCE AND QUALITY CONTROL

Adequate description of investigation methods?	✓	
Sampling equipment description (including drilling plant)	✓	
Has an assessment of the reliability of field procedures been undertaken by the consultant by using the Data Quality Indicators (DQI) (precision, accuracy, representativeness, completeness and comparability)?	✓	
Were the appropriate media sampled according to SAQP?	✓	
Have all media identified in SAQP been sampled?	✓	
Are SOPs appropriate and complied with?	✓	
Have all critical locations been sampled?	✓	
Have all required samples been collected (from grid and at depth)?	✓	
Was an experienced sampler used on each occasion?	✓	
Is the documentation correct?	✓	
Have the same SOPs been used on each occasion?	✓	
Have comparisons been made regarding climatic conditions (temperature, rainfall, wind, etc.)?	X	Not relevant
Were the applicability and limitations of field methodology discussed appropriately in the consultant's report?	✓	
Has the consultant ensured adequate calibration of instruments?	X	Not relevant
[EPA] Has the consultant's report adequately assessed the significance of the results of field screening methods compared with the results of laboratory analyses, for example that the results reported for field screening using a photo-ionisation detector are compatible with the results reported by the laboratory for volatile organic compounds?	X	Not relevant
[CMJ] Have the results of screening methods and laboratory analyses been compared and discussed (including an explanation of non-compatibility)?	X	Not relevant
[CMJ] Where not compatible, has the consultant's report adequately explained this?	X	Not relevant
Are the applicability and limitations of any screening methodology used by the laboratory appropriately discussed in the consultant's report?	✓	
Is screening method performance known and expressed as a multiple of specific analytical method performance?	✓	
Has a field QA/QC plan been included in the consultant's report?	✓	
Does the report include details of the sampling team?	✓	
Does the report include details of sampling method(s), including the actual methods employed for obtaining samples, sample devices and equipment, type(s) of sample containers and seal used, order and degree of filling, preservation, labelling, logging, custody?	✓	
Does the report include details of evidence of appropriate decontamination procedures carried out between sampling events?	✓	
Does the report include details of logs for each sample collected showing time, location, initials of sampler, duplicate locations, duplicate type, chemical analyses to be performed, site observations and weather conditions?	✓	
Does the report include details of chain-of-custody documentation fully identifying for each sample:	✓	
Name of sampler		
Nature of sample		
Collection date		
Analyses to be performed		
Sample preservation method		
Departure time from the site		
Dispatch courier(s)		
Condition of samples at dispatch		
Does the report include details of sample splitting techniques?	✓	
Does the report include details of a statement of duplicate frequency for intra-laboratory and inter-laboratory duplicate samples and duplicate sample results?	✓	
Does the report include details of background sample results	✓	
Does the plan include details of rinsate sample results?	✓	

8.0 REPORTING OF FIELD AND LABORATORY QUALITY ASSURANCE AND QUALITY CONTROL

Does the report include details of laboratory-prepared trip spike results for volatile analytes?	X	Not relevant
Does the report include details of trip blank results?	✓	
Does the report include details of field instrument calibrations on-site (when used)?	X	Not relevant
Does the consultant's field QA/QC program include replicate samples split in the field and submitted to two separate laboratories in accordance with the requirements of the National Environment Protection (Assessment of Site Contamination) Measure 1999 (ASC NEPM)?	✓	
Has an assessment of the reliability of analytical results has been undertaken by the consultant by using the DQI (precision, accuracy, representativeness, completeness and comparability)?	✓	
Have all samples been analysed according to SAQP?	✓	
Analysis of: Intra-laboratory and inter-laboratory duplicates with relative percentage differences (RPD) Field duplicates with RPD Laboratory-prepared volatile trip spikes	✓	
Analysis of: Field blanks Rinsate blanks Reagent blanks Method blanks Matrix spikes Lab duplicates Matrix spike duplicates Surrogate spikes Certified reference materials (CRM) Laboratory control samples Laboratory-prepared spikes	✓	
Have all critical samples been analysed according to the SAQP?	✓	
Have all analytes been analysed according to the SAQP?	✓	
Have appropriate methods and practical quantitation limits (PQL) been used?	✓	
Is sample documentation complete?	✓	
Have sample holding times been complied with?	✓	
Have the same analytical methods been used (including extraction and clean-up)?	✓	
Sample PQL (justify/quantify if different)	✓	
Same laboratories (justify/quantify if different)	✓	
Same units (justify/quantify if different)	✓	
Are the analytical methods used for site validation of appropriate precision and accuracy?	✓	
Are the sensitivity and selectivity of the analytical methods appropriate for the assessment of the risk?	✓	
Do the precision and accuracy criteria set out in the consultant's QA/QC plan, for a given method and matrix, meet the performance expected of the reference method?	✓	
Has the consultant included in their reports written documentation on quality of data supplied by the analytical laboratory which meets the objectives of the testing laboratory's quality plan for at least 95% of test results?	✓	
Names of the accredited laboratories used and relevant details of their accreditation for each analytical method.	✓	
A statement that laboratories were accredited for all analyses by the National Association of Testing Authorities (NATA) or an equivalent (government-endorsed provider of accreditation for laboratories).	✓	
A statement that sample analyses use appropriate methodologies for each potential contaminant in the matrix.	✓	
A statement that PQL are appropriate for the chemicals of concern for use in the assessment of risk.	✓	

8.0 REPORTING OF FIELD AND LABORATORY QUALITY ASSURANCE AND QUALITY CONTROL

A copy of signed chain-of-custody forms acknowledging receipt date and time, conditions of samples on receipt and identity of samples included in shipments.	✓	
Record of holding times and a comparison with method specifications.	✓	
Analytical methods used.	✓	
Laboratory accreditation for analytical methods used.	✓	
Laboratory performance in inter-laboratory trials for the analytical methods used, where available.	✓	
Acceptance limit(s) for each QC test, such as duplicate RPD and recoveries for laboratory quality control analyses.	✓	
Where used, the origin of CRM, its batch number and the concentrations of the chemicals of potential concern.	✓	
Results for blind duplicate samples collected from the field.	✓	
Description of surrogates and spikes used	✓	
Per cent recoveries of spikes and surrogates	✓	
Instrument detection limit	✓	
Method detection limits	✓	
Matrix or practical quantification limits	✓	
Standard solution results	✓	
CRM sample results	✓	
Daily check sample results	✓	
Laboratory (reagent/method) blank results	✓	
Laboratory standard charts	✓	
The laboratory specifying compliance with the requirements of the ASC NEPM and equivalence with the reference method or non-standard methods.	✓	
Does the consultant's site assessment report address all QA/QC checklist items in the *Guidelines for Consultants Reporting on Contaminated Sites* (EPA 1997) related to field quality assurance and quality control, laboratory QA/QC and data evaluation QA/QC reporting?	✓	
QC results relevant to the sample analysis.	✓	
For each sample, the highest measurement result wherever replicate measurements are taken (or all measurement results for each sample).	✓	
Results for all data tabulated separately according to each type of soil, fill materials, groundwaters, surface waters and sediments, with appropriate statistical analysis according to ASC NEPM requirements.	✓	
Is a QA/QC narrative that substantially complies with EPA (2006) and (1997) guidelines included in the report?	✓	

9.0 AUDITOR'S REVIEW OF FIELD AND LABORATORY QUALITY ASSURANCE AND QUALITY CONTROL

Adequacy

Is the QA/QC information, as outlined above, provided by the consultant, adequate for the purpose of this audit?

Yes	No
✓	

If no, provide comments as appropriate.

Adequacy of Fieldwork and Methods

In addition to the QA/QC information provided by the consultant, are the QA/QC samples obtained by the consultant and their associated laboratory results, adequate for the purpose of this audit?

Yes	No
✓	

If no, provide comments as appropriate.

Adequacy of Laboratory

In addition to the QA/QC information provided by the consultant, are the laboratory QA/QC procedures sufficient to ensure that the laboratory results are adequate for the purpose of this audit?

Yes	No
✓	

If no, provide comments as appropriate.

Data Usability

In summary, are the field and laboratory analytical data provided of adequate quality for the purpose of this audit?

Yes	No
✓	

Comment further as necessary.

Auditor

6 November 2014
Date