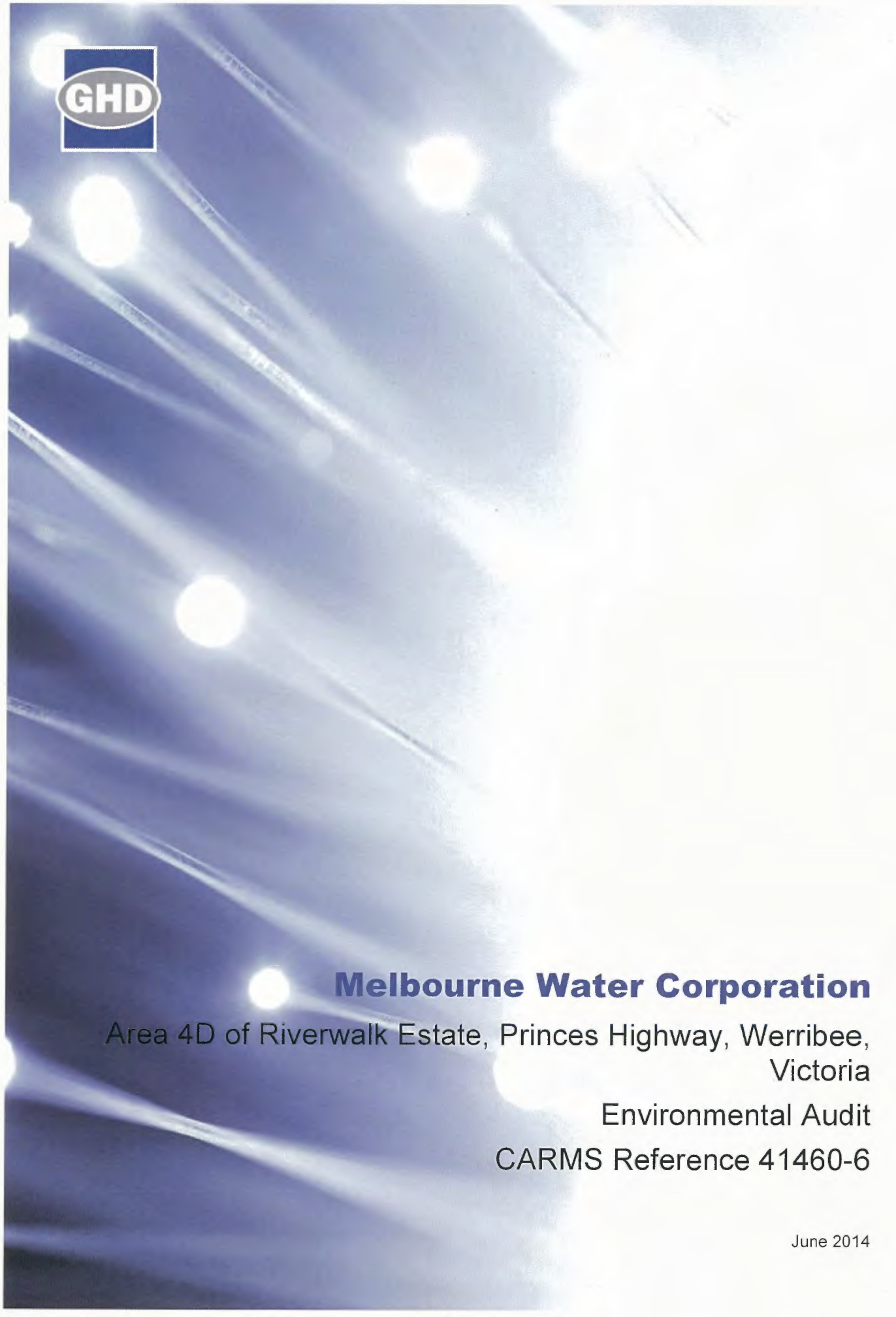

Melbourne Water Corporation

Area 4D of Riverwalk Estate, Princes Highway, Werribee, Victoria

Environmental Audit

CARMS Reference 41460-6

June 2014

ENVIRONMENT PROTECTION ACT 1970

Statement of Environmental Audit

I, Dr Fouad Abo 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 Timm Kurth of Melbourne Water Corporation to issue a certificate of environmental audit in relation to the site (referred to in this audit report as Area 4D) located at Riverwalk Estate, Princes Highway, Werribee, located in the Wyndham City Council, comprising the land defined by part of Lot B on Plan of Subdivision 636839Q, derived from Certificate of Title Volume 11367, Folio 778 (the surveyed site boundary and the relevant boundary coordinates are defined on the attached Figure 4), owned/occupied by Melbourne Water Corporation.
2. had regard to, amongst other things,
   i. guidelines issued by the Authority for the purposes of Part IXD of the Act,
   ii. the beneficial uses that may be made of the site, and
   iii. 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 State environment protection policy (Air Quality Management) 2001.

   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
3. 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 STATE that I am of the opinion that:

The site is suitable for the beneficial uses associated with:

- Parks and Reserves; Agricultural; Sensitive use (i.e. high density, medium and single dwelling/low density residential use, child care centre, pre-school or primary school); Recreation/Open space; Commercial; and Industrial.

subject to the following conditions attached thereto:

1. The gravel track, which extends 60 m from the existing gate located at the south west of Area 4D as shown in Figure 4 must be removed and disposed of as part of the site development work. Such removal and disposal must be conducted in accordance with relevant regulations and guidelines.
2. The concrete slab located on the east part of Area 4D, opposite Hangar 1 (shown in Figure 4) must be removed and disposed of as part of the site development work. Such removal and disposal must be conducted in accordance with relevant regulations and guidelines.
3. Any fill or soil brought to the site must be chemically tested and classified as "fill material" in accordance with relevant EPA guidelines.

The condition of the site is detrimental or potentially detrimental to any (one or more) beneficial uses of the site. Accordingly, I have not issued a Certificate of Environmental Audit for the site in its current condition, the reasons for which are presented in the environmental audit report. The terms and conditions that need to be complied with before a Certificate of Environmental Audit may be issued are set out as follows:

- Any unsuitable material located on site (i.e. as stated in Conditions 1 and 2 above) must be removed in accordance with relevant EPA guidelines.

Other related information:

- Waste generated in the future as a result of the future development works should be dealt with in accordance with relevant EPA guidelines.
- ACM fragments were found on the site and have been removed as far as practicable. Small quantities of bonded ACM fragments may remain on or within the soil and be uncovered during excavation works. These AC fragments were not anticipated to represent a health risk to occupiers of the completed development. If encountered during future development or use of the site, any fragments should be handled and disposed in accordance with the relevant regulations.
- Scattered pieces of metallic debris were removed as far as practicable, but minor occurrences may remain within the soil and be uncovered during excavation works. This material was not considered to pose a risk to human health.
- The two groundwater monitoring wells (MW-2 and MW-5 as listed in the attached Figure 4) present at the site should be decommissioned in accordance with the requirement of the most recent version of "Minimum Construction Requirements for Water Bores in Australia", published by National Uniform Drillers Licensing Committee.
- Asbestos in Hangar 1, which is located in the adjacent area 4H needs to be monitored for possible ongoing asbestos fragments falling from it and spreading into area 4D.

This Statement forms part of the Environmental Audit report: *Melbourne Water Corporation, Area 4D of Riverwalk Estate, Princes Highway, Werribee, Victoria, 05 June 2014* (ref. 31/11575/00/220960 – CARMS Reference 41460-6). Further details regarding the condition of the site may be found in the Environmental Audit Report.

DATED: 05 June 2014

SIGNED: .....

DR FOUAD ABO

ENVIRONMENTAL AUDITOR

(Appointed Pursuant to the Environment Protection Act 1970)

REGISTER SEARCH STATEMENT (Title Search) Transfer of Land Act 1958

VOLUME 11367 FOLIO 778 Security no : 124043522685M
Produced 17/10/2012 04:20 pm

LAND DESCRIPTION

Lot B on Plan of Subdivision 636839Q.
PARENT TITLE Volume 11309 Folio 105
Created by instrument PS636839Q 02/08/2012

REGISTERED PROPRIETOR

Estate Fee Simple
Sole Proprietor
MELBOURNE WATER CORPORATION of 990 LA TROBE STREET DOCKLANDS VIC 3008
PS636839Q 02/08/2012

ENCUMBRANCES, CAVEATS AND NOTICES

Any encumbrances created by Section 98 Transfer of Land Act 1958 or Section 24 Subdivision Act 1988 and any other encumbrances shown or entered on the plan set out under DIAGRAM LOCATION below.

NOTICE as to part Section 47(2) Heritage Act 1995
REGISTER NO. 1884
X234908X 29/12/2000

AGREEMENT Section 173 Planning and Environment Act 1987
AG017913K 08/08/2008

DIAGRAM LOCATION

SEE PS636839Q FOR FURTHER DETAILS AND BOUNDARIES

ACTIVITY IN THE LAST 125 DAYS

NUMBER		STATUS	DATE
PS636839Q (S)	PLAN OF SUBDIVISION	Registered	02/08/2012

DOCUMENT END

Delivered from the LANDATA® System by InfoTrack Pty Ltd.

Signed by Council: Wyndham City Council, Council Ref: WYP4474/10, WYS1815/11, Original Certification: 30/06/2011, Recertification: 04/06/2012, S.O.C.: 20/07/2012

PLAN OF SUBDIVISION

STAGE NO	LRS USE ONLY	PLAN NUMBER
———	EDITION 1	PS 636839Q

LOCATION OF LAND

PARISH: MAMBOURIN
TOWNSHIP: WERRIBEE
CROWN ALLOTMENTS: 22A (PART) & 10A (PART)

PARISH: MAMBOURIN
CROWN ALLOTMENTS: 4A, 5A, 6A, 7A, 8A & 9A
CROWN ALLOTMENTS: G (PT) & H (PT) SECTION 7
CROWN ALLOTMENT: 7 (PT) & 8 (PT) SECTION 8

LAST PLAN REF: PS 641301K LOT A
TITLE REFERENCE: VOL 11309 FOL 105

POSTAL ADDRESS: CNR PRINCES HIGHWAY & MALTBY BYPASS WERRIBEE 3030

MGA CO-ORDINATES: E 292 680
OF APPROX. CENTRE N 5 800 580
OF LAND IN PLAN ZONE 55

VESTING OF ROADS OR RESERVES

IDENTIFIER	COUNCIL/BODY/PERSON
R1 (ROAD)	WYNDHAM CITY COUNCIL
RESERVE No.1	POWERCOR AUSTRALIA LTD

COUNCIL CERTIFICATION AND ENDORSEMENT

COUNCIL NAME: WYNDHAM CITY COUNCIL REF:

(1) THIS PLAN IS CERTIFIED UNDER SECTION 6 OF THE SUBDIVISION ACT 1988.

(2) THIS PLAN IS CERTIFIED UNDER SEC. 11(7) OF THE SUBDIVISION ACT 1988.
DATE OF ORIGINAL CERTIFICATION UNDER SECTION 6 / /

(3) THIS IS A STATEMENT OF COMPLIANCE ISSUED UNDER SECTION 21 OF THE SUBDIVISION ACT 1988

OPEN SPACE:

(A) A REQUIREMENT FOR PUBLIC OPEN SPACE UNDER SECTION 18 OF THE SUBDIVISION ACT 1988 HAS NOT BEEN MADE.

(B) THE REQUIREMENT HAS BEEN SATISFIED.

(C) THE REQUIREMENT IS TO BE SATISFIED IN STAGE:

COUNCIL DELEGATE
COUNCIL SEAL
SURVEYOR'S PLAN VERSION
DATE / /

RE-CERTIFIED UNDER SECTION 11(7) OF THE SUBDIVISION ACT 1988
COUNCIL DELEGATE
COUNCIL SEAL
SURVEYOR'S PLAN VERSION
DATE / /

NOTATIONS

DEPTH LIMITATION:
DOES NOT APPLY

THIS IS A SPEAR PLAN

STAGING:
THIS IS NOT A STAGED SUBDIVISION
PLANNING PERMIT NO: WYP4474/10

SURVEY:
THIS PLAN IS BASED ON SURVEY (PS 636838S)
THIS SURVEY HAS BEEN CONNECTED TO PERMANENT MARKS:
IN PROCLAIMED SURVEY AREA NUMBER:

OTHER PURPOSE OF PLAN:
TO REMOVE PART OF EASEMENT E-6 ON PS 641301K AND CREATED IN PS 636838S AND AFFECTING ROAD R1 ON THIS PLAN.

GROUNDS FOR EASEMENT REMOVAL:
WYNDHAM CITY COUNCIL
PLANNING PERMIT No. WYP4613/10

LOTS 1 TO 117 (BOTH INCLUSIVE) & LOT A HAVE BEEN OMITTED FROM THIS PLAN

RIVERWALK RELEASE 2

EASEMENT INFORMATION

LEGEND: A - APPURTENANT EASEMENT E - ENCUMBERING EASEMENT R - ENCUMBERING EASEMENT (ROAD)

EASEMENT REFERENCE	PURPOSE	WIDTH (METRES)	ORIGIN	LAND BENEFITED/IN FAVOUR OF
			SEE SHEET 2	

LRS USE ONLY

STATEMENT OF COMPLIANCE
EXEMPTION STATEMENT
RECEIVED ☑
DATE 23/07/12

LRS USE ONLY

PLAN REGISTERED
TIME 11:17am
DATE 2/08/12
G Venn
ASSISTANT REGISTRAR OF TITLES

SHEET 1 OF 12 SHEETS

CHRIS RUNTING & ASSOCIATES PTY LTD
LAND SURVEYORS
TOWN PLANNERS
DEVELOPMENT CONSULTANTS
20 Hamilton Street
Mont Albert Vic 3127
Tel: 9890 0933
Fax: 9898 2543

LICENSED SURVEYOR: P.J.S. TYNKKYNEN

SIGNATURE: DIGITALLY SIGNED

REF: 3936PS2 VERSION: 23 (4.05.12)

DATE / /

COUNCIL DELEGATE SIGNATURE

ORIGINAL SHEET SIZE A3

Signed by: Paavo Jukka Tynkkynen (Chris Runting & Associates Pty Ltd) Surveyor's Plan Version (23 (4.05.12)) SPEAR Ref S011384A 07/05/2012

Signed by Council: Wyndham City Council, Council Ref: WYP4474/10, WYS1815/11, Original Certification: 30/06/2011, Recertification: 04/06/2012, S.O.C.: 20/07/2012

PLAN OF SUBDIVISION

STAGE NO ——

PLAN NUMBER **PS 636839Q**

EASEMENT INFORMATION

LEGEND: A - APPURTENANT EASEMENT E - ENCUMBERING EASEMENT R - ENCUMBERING EASEMENT (ROAD)

EASEMENT REFERENCE	PURPOSE	WIDTH (METRES)	ORIGIN	LAND BENEFITED/IN FAVOUR OF
E-1	SEWERAGE	3	PS412756U	CITY WEST WATER LIMITED
E-2	SEWERAGE	2.50	PS636838S	CITY WEST WATER LIMITED
E-3	DRAINAGE	3	PS641301K	WYNDHAM CITY COUNCIL
	SEWERAGE	3	PS641301K	CITY WEST WATER LIMITED
E-4	SEWERAGE	2	PS641301K	CITY WEST WATER LIMITED
E-5	DRAINAGE	2	PS641301K	WYNDHAM CITY COUNCIL
E-6	DRAINAGE	SEE PLAN	PS636838S	WYNDHAM CITY COUNCIL
	SEWERAGE	SEE PLAN	PS636838S	CITY WEST WATER LIMITED
E-7	DRAINAGE	SEE PLAN	PS636838S	WYNDHAM CITY COUNCIL
E-8	SEWERAGE	2	PS636838S	CITY WEST WATER LIMITED
E-9	DRAINAGE	2	PS636838S	WYNDHAM CITY COUNCIL
E-10	POWERLINE	SEE PLAN	PS636838S - SEC 88 ELECTRICITY INDUSTRY ACT 2000	POWERCOR AUSTRALIA LTD
E-11	DRAINAGE	2	THIS PLAN	WYNDHAM CITY COUNCIL
E-12	SEWERAGE	2	THIS PLAN	CITY WEST WATER LIMITED
E-13	DRAINAGE	3	THIS PLAN	WYNDHAM CITY COUNCIL
	SEWERAGE	3	THIS PLAN	CITY WEST WATER LIMITED
E-14	DRAINAGE	SEE PLAN	PS636838S	MELBOURNE WATER CORPORATION
E-15	SEWERAGE	2.50	PS636838S	CITY WEST WATER LIMITED
	DRAINAGE	2.50	PS636838S	MELBOURNE WATER CORPORATION
E-16	DRAINAGE	4	THIS PLAN	WYNDHAM CITY COUNCIL
E-17	SEWERAGE	2	THIS PLAN	CITY WEST WATER LIMITED
E-18	DRAINAGE	SEE PLAN	THIS PLAN	WYNDHAM CITY COUNCIL
	SEWERAGE	SEE PLAN	THIS PLAN	CITY WEST WATER LIMITED
E-19	DRAINAGE	SEE PLAN	PS636838S	MELBOURNE WATER CORPORATION
	SEWERAGE	SEE PLAN	THIS PLAN	CITY WEST WATER LIMITED
E-20	POWERLINE	1.50	THIS PLAN - SEC 88 ELECTRICITY INDUSTRY ACT 2000	POWERCOR AUSTRALIA LTD

RIVERWALK RELEASE 2

No of Lots: 51 (excluding Lot B) Release 2 Land Area: 3.248ha

SHEET 2

CHRIS RUNTING & ASSOCIATES PTY LTD
LAND SURVEYORS
TOWN PLANNERS
DEVELOPMENT CONSULTANTS
20 Hamilton Street
Mont Albert Vic 3127
Tel: 9890 0933
Fax: 9898 2543

LICENSED SURVEYOR: P.J.S. TYNKKYNEN

SIGNATURE ..... DATE / /

REF: 3936PS2 VERSION: 23 (4.05.12)

DATE / /

..... COUNCIL DELEGATE SIGNATURE

ORIGINAL SHEET SIZE A3

Signed by: Paavo Jukka Tynkkynen (Chris Runting & Associates Pty Ltd) Surveyor's Plan Version (23 (4.05.12)) SPEAR Ref S011384A 07/05/2012

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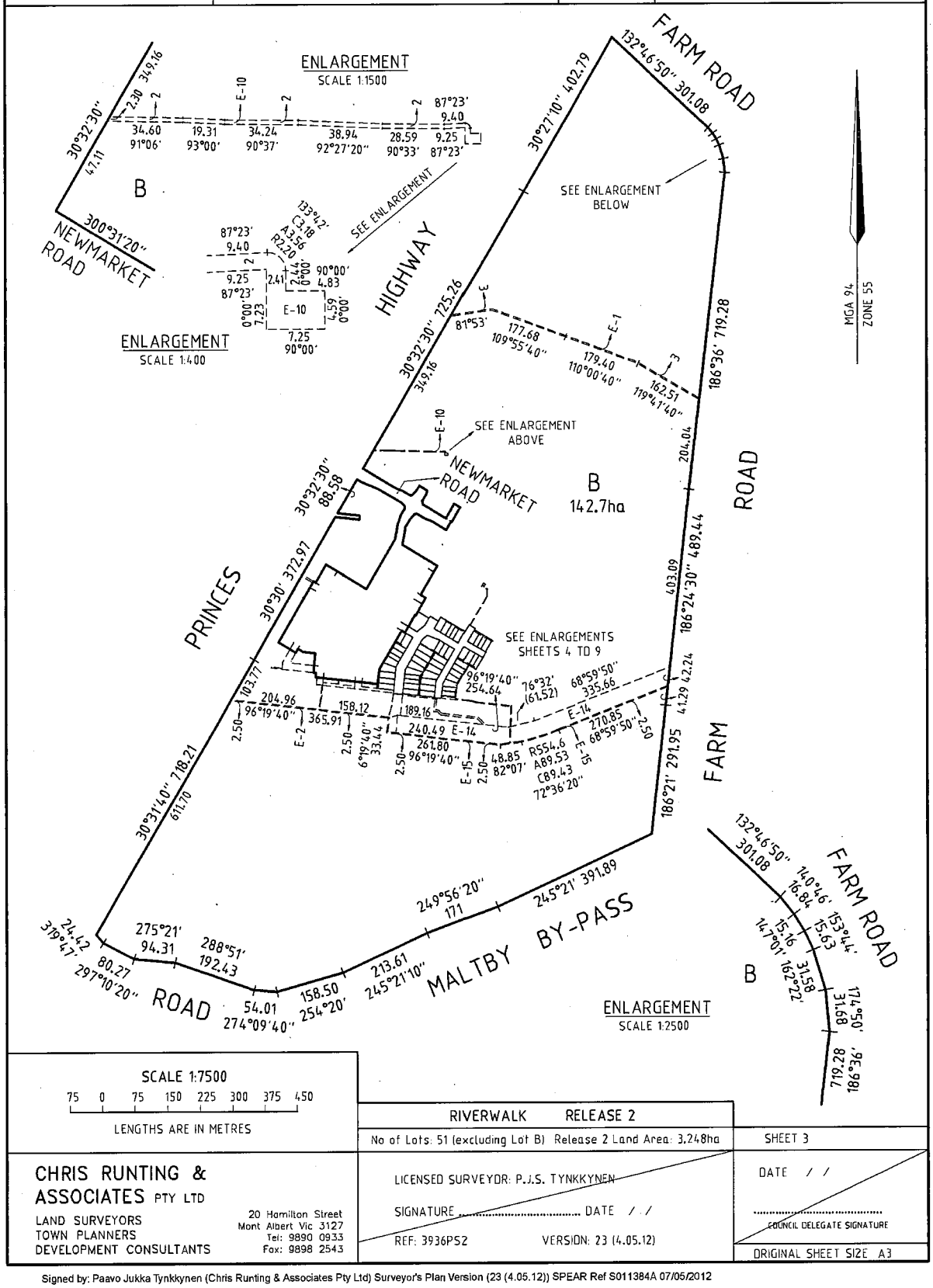
PLAN OF SUBDIVISION

STAGE NO ——

PLAN NUMBER PS 636839Q



SCALE 1:7500

75 0 75 150 225 300 375 450

LENGTHS ARE IN METRES

RIVERWALK RELEASE 2

No of Lots: 51 (excluding Lot B) Release 2 Land Area: 3.248ha

SHEET 3

CHRIS RUNTING & ASSOCIATES PTY LTD
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Tel: 9890 0933
Fax: 9898 2543

LICENSED SURVEYOR: P.J.S. TYNKKYNEN

SIGNATURE ..... DATE / /

REF: 3936PS2 VERSION: 23 (4.05.12)

DATE / /

COUNCIL DELEGATE SIGNATURE

ORIGINAL SHEET SIZE A3

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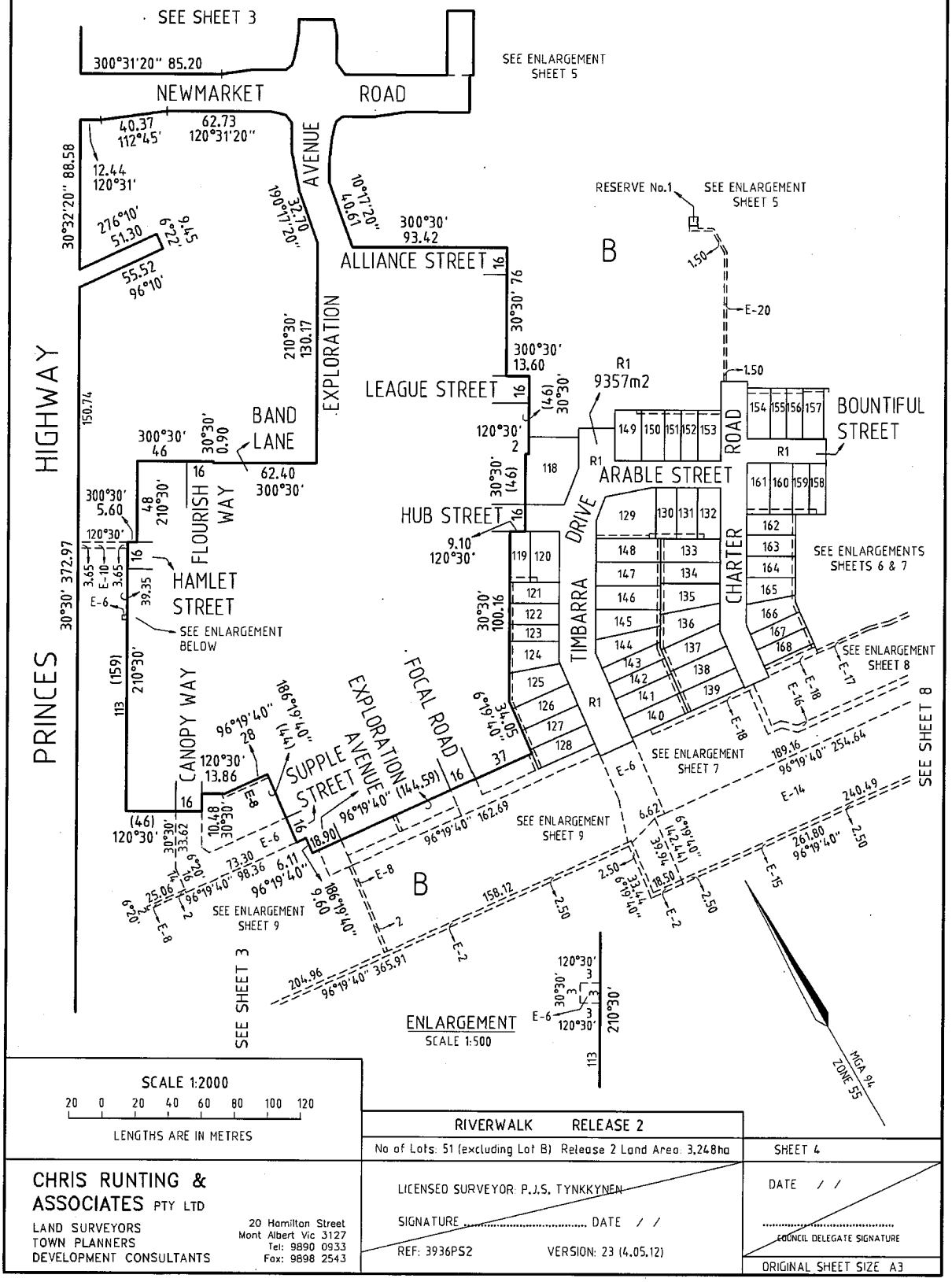
PLAN OF SUBDIVISION

STAGE NO	PLAN NUMBER
——	PS 636839Q



SCALE 1:2000

20 0 20 40 60 80 100 120

LENGTHS ARE IN METRES

RIVERWALK RELEASE 2

No of Lots: 51 (excluding Lot B) Release 2 Land Area: 3.248ha

SHEET 4

CHRIS RUNTING & ASSOCIATES PTY LTD
LAND SURVEYORS
TOWN PLANNERS
DEVELOPMENT CONSULTANTS
20 Hamilton Street
Mont Albert Vic 3127
Tel: 9890 0933
Fax: 9898 2543

LICENSED SURVEYOR P.J.S. TYNKKYNEN

SIGNATURE ..... DATE / /

REF: 3936PS2 VERSION: 23 (4.05.12)

DATE / /

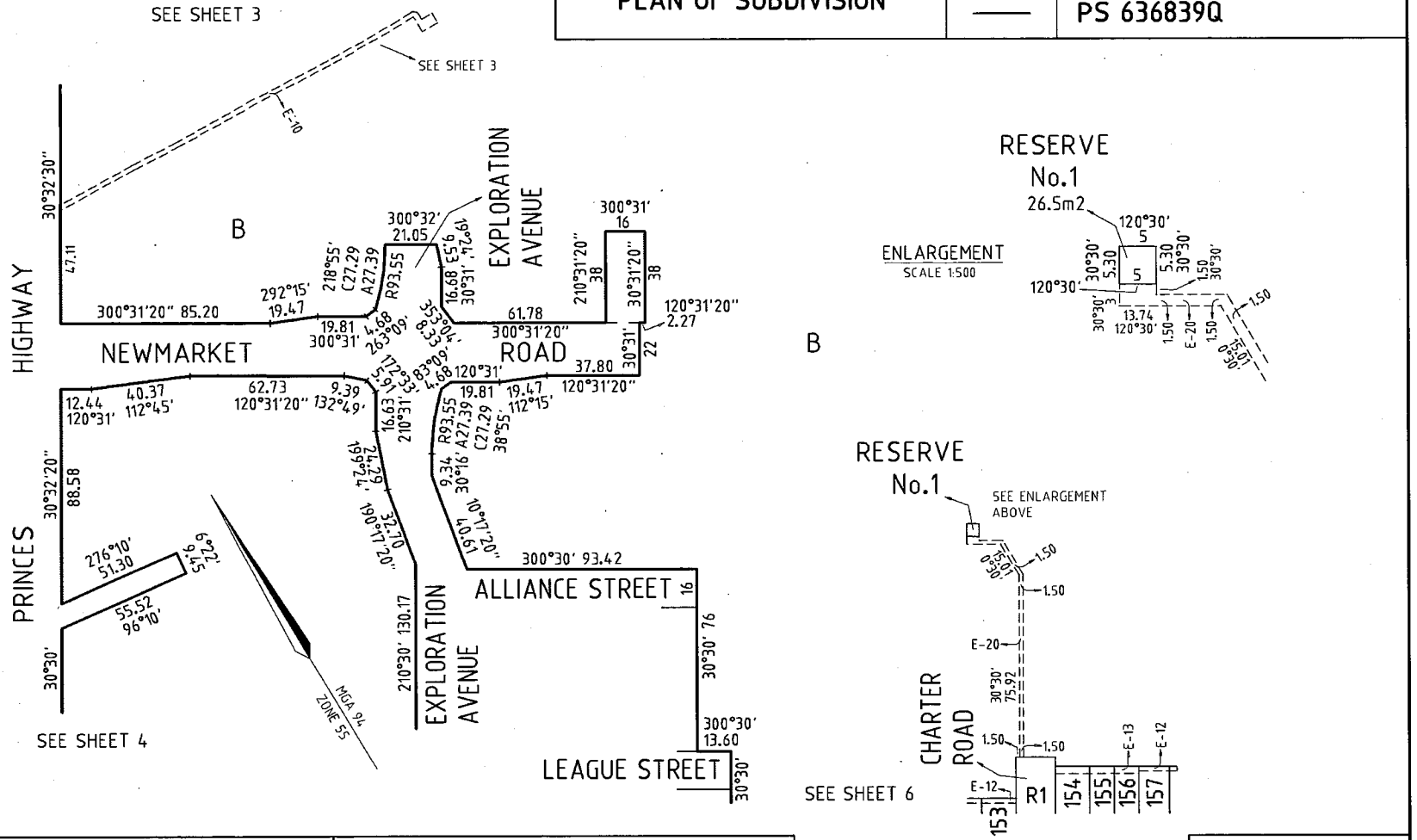
COUNCIL DELEGATE SIGNATURE

ORIGINAL SHEET SIZE A3

Signed by: Paavo Jukka Tynkkynen (Chris Runting & Associates Pty Ltd) Surveyor's Plan Version (23 (4.05.12)) SPEAR Ref S011384A 07/05/2012

PLAN OF SUBDIVISION

STAGE NO	PLAN NUMBER
——	PS 636839Q



RIVERWALK RELEASE 2	No of Lots: 51 (excluding Lot B) Release 2 Land Area: 3.248ha	SHEET 5

CHRIS RUNTING & ASSOCIATES PTY LTD
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TOWN PLANNERS
DEVELOPMENT CONSULTANTS
20 Hamilton Street
Mont Albert Vic 3127
Tel: 9890 0933
Fax: 9898 2543

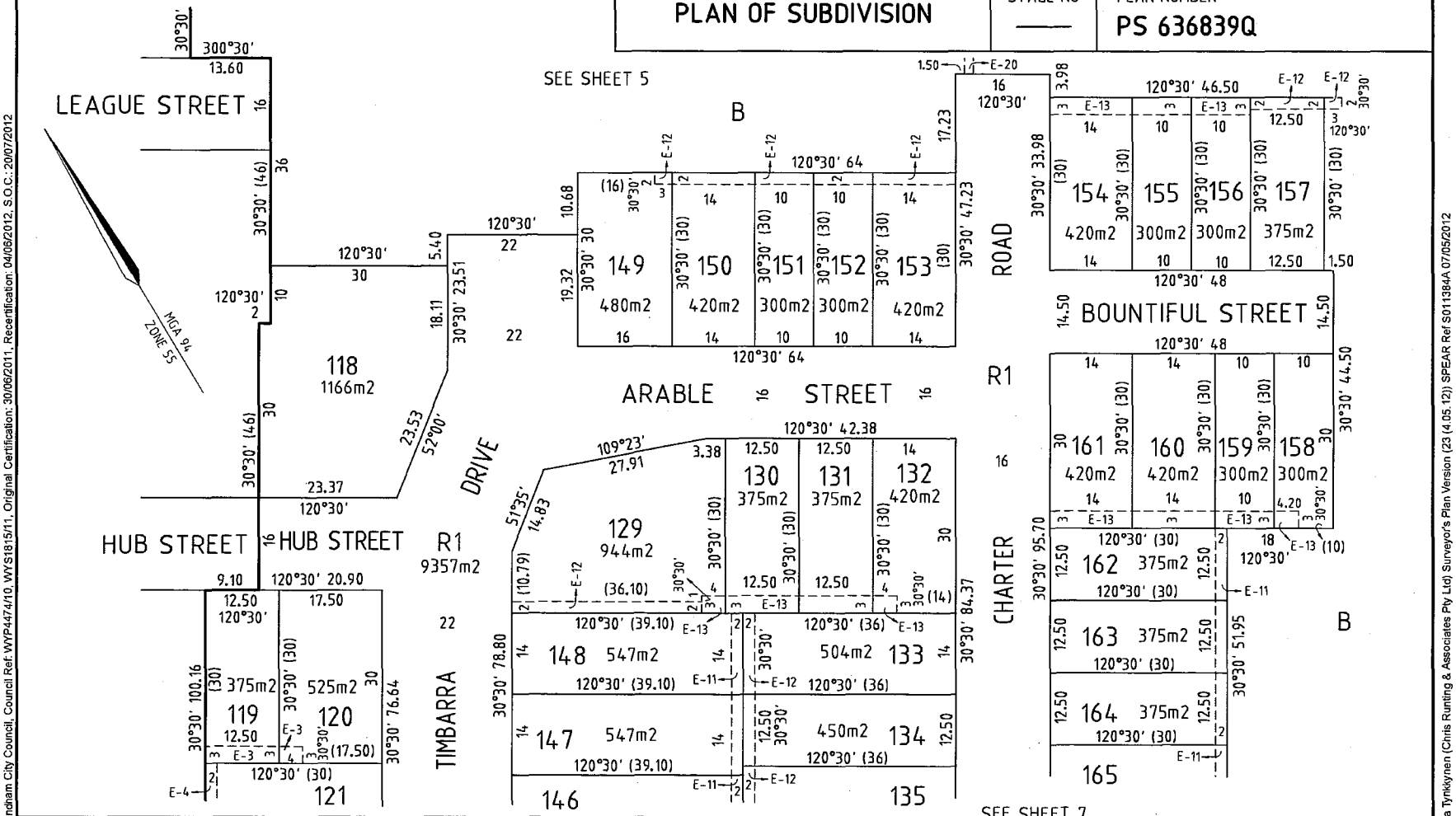
SCALE 1:1500
15 0 15 30 45 60 75 90
LENGTHS ARE IN METRES

LICENSED SURVEYOR: P.J.S. TYNKKYNEN
SIGNATURE ..... DATE / /
REF: 3936PS2 VERSION: 23 (4.05.12)

DATE / /
COUNCIL DELEGATE SIGNATURE
ORIGINAL SHEET SIZE A3

PLAN OF SUBDIVISION

STAGE NO	PLAN NUMBER
——	PS 636839Q



RIVERWALK RELEASE 2

No of Lots: 51 (excluding Lot B) Release 2 Land Area: 3.248ha

SHEET 6

CHRIS RUNTING & ASSOCIATES PTY LTD
LAND SURVEYORS
TOWN PLANNERS
DEVELOPMENT CONSULTANTS
20 Hamilton Street
Mont Albert Vic 3127
Tel: 9890 0933
Fax: 9898 2543

SCALE 1:600

6 0 6 12 18 24 30 36

LENGTHS ARE IN METRES

LICENSED SURVEYOR: P.J.S. TYNKKYNEN

SIGNATURE ..... DATE / /

REF: 3936PS2 VERSION: 23 (4.05.12)

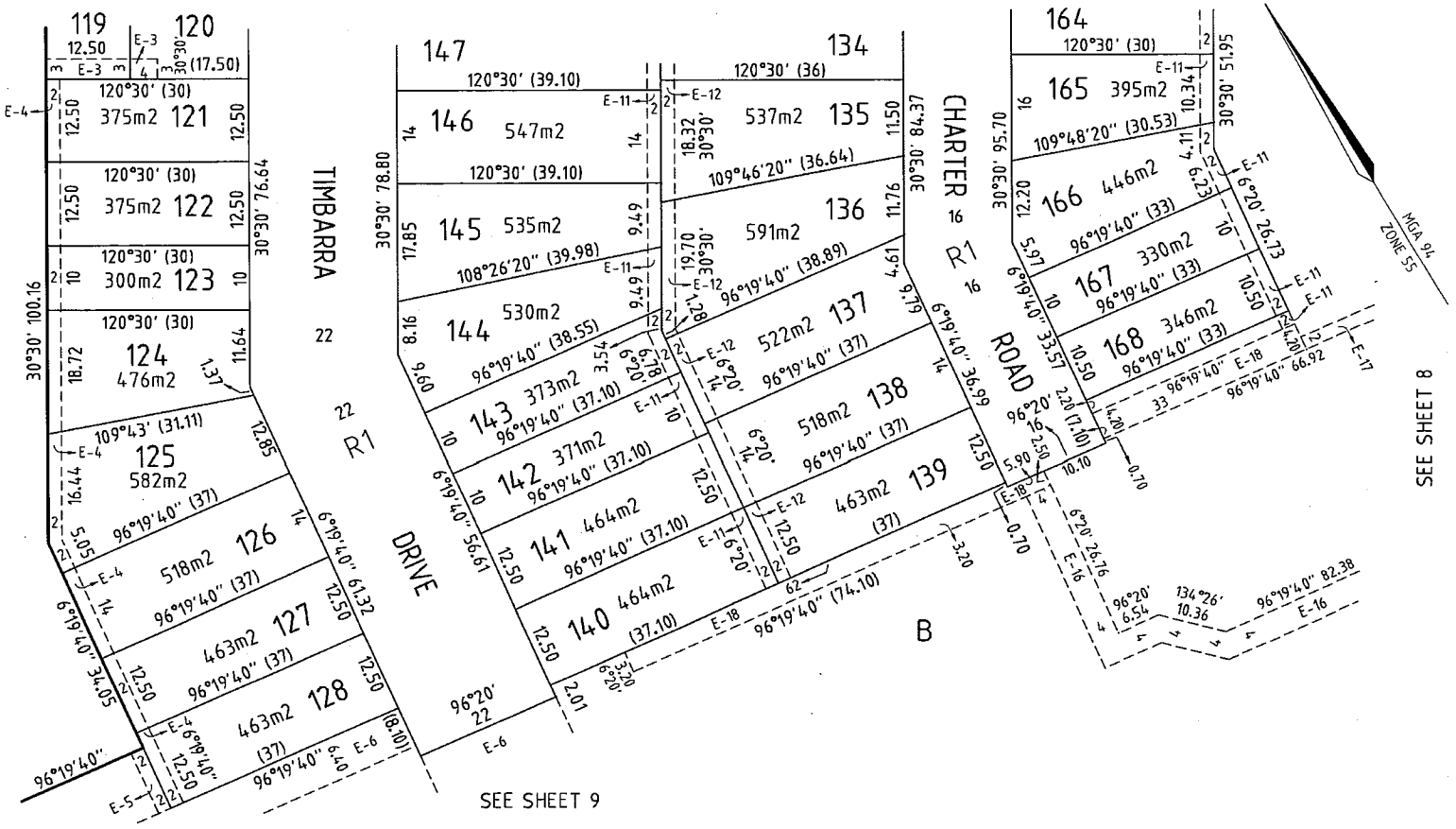
DATE / /

COUNCIL DELEGATE SIGNATURE

ORIGINAL SHEET SIZE A3

PLAN OF SUBDIVISION

STAGE NO	PLAN NUMBER
——	PS 636839Q



RIVERWALK RELEASE 2

No of Lots: 51 (excluding Lot B) Release 2 Land Area: 3.248ha

SHEET 7

CHRIS RUNTING & ASSOCIATES PTY LTD
LAND SURVEYORS
TOWN PLANNERS
DEVELOPMENT CONSULTANTS
20 Hamilton Street
Mont Albert Vic 3127
Tel: 9890 0933
Fax: 9898 2543

SCALE 1:600

6 0 6 12 18 24 30 36

LENGTHS ARE IN METRES

LICENSED SURVEYOR: P.J.S. TYNKKYNEN

SIGNATURE ..... DATE / /

REF: 3936PS2 VERSION: 23 (4.05.12)

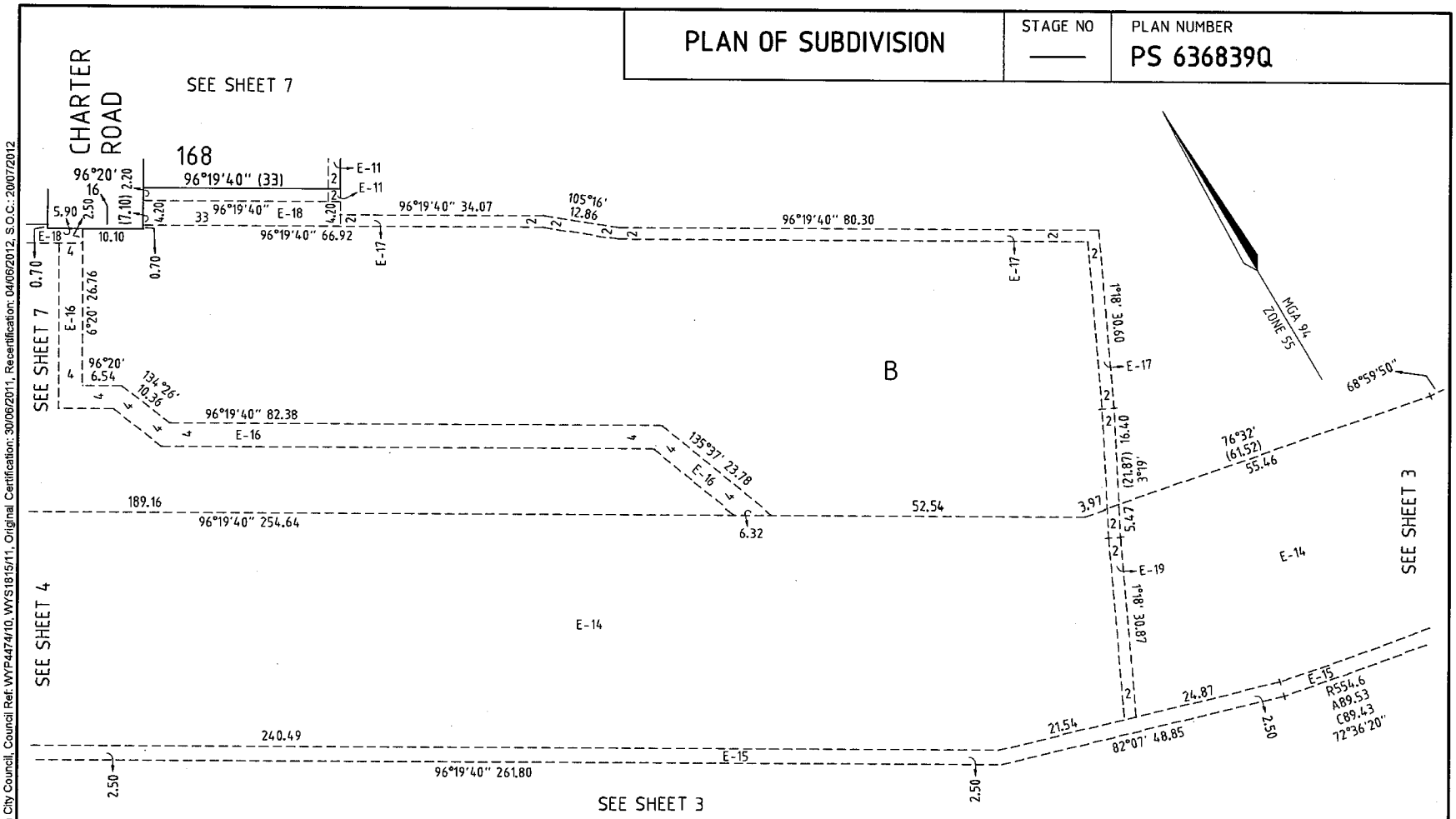
DATE / /

..... COUNCIL DELEGATE SIGNATURE

ORIGINAL SHEET SIZE A3

PLAN OF SUBDIVISION

STAGE NO	PLAN NUMBER
——	PS 636839Q



RIVERWALK RELEASE 2

No of Lots: 51 (excluding Lot B) Release 2 Land Area: 3.248ha

SHEET 8

CHRIS RUNTING & ASSOCIATES PTY LTD
LAND SURVEYORS
TOWN PLANNERS
DEVELOPMENT CONSULTANTS
20 Hamilton Street
Mont Albert Vic 3127
Tel: 9890 0933
Fax: 9898 2543

SCALE 1:600

6 0 6 12 18 24 30 36

LENGTHS ARE IN METRES

LICENSED SURVEYOR: P.J.S. TYNKKYNEN

SIGNATURE ..... DATE / /

REF: 3936PS2 VERSION: 23 (4.05.12)

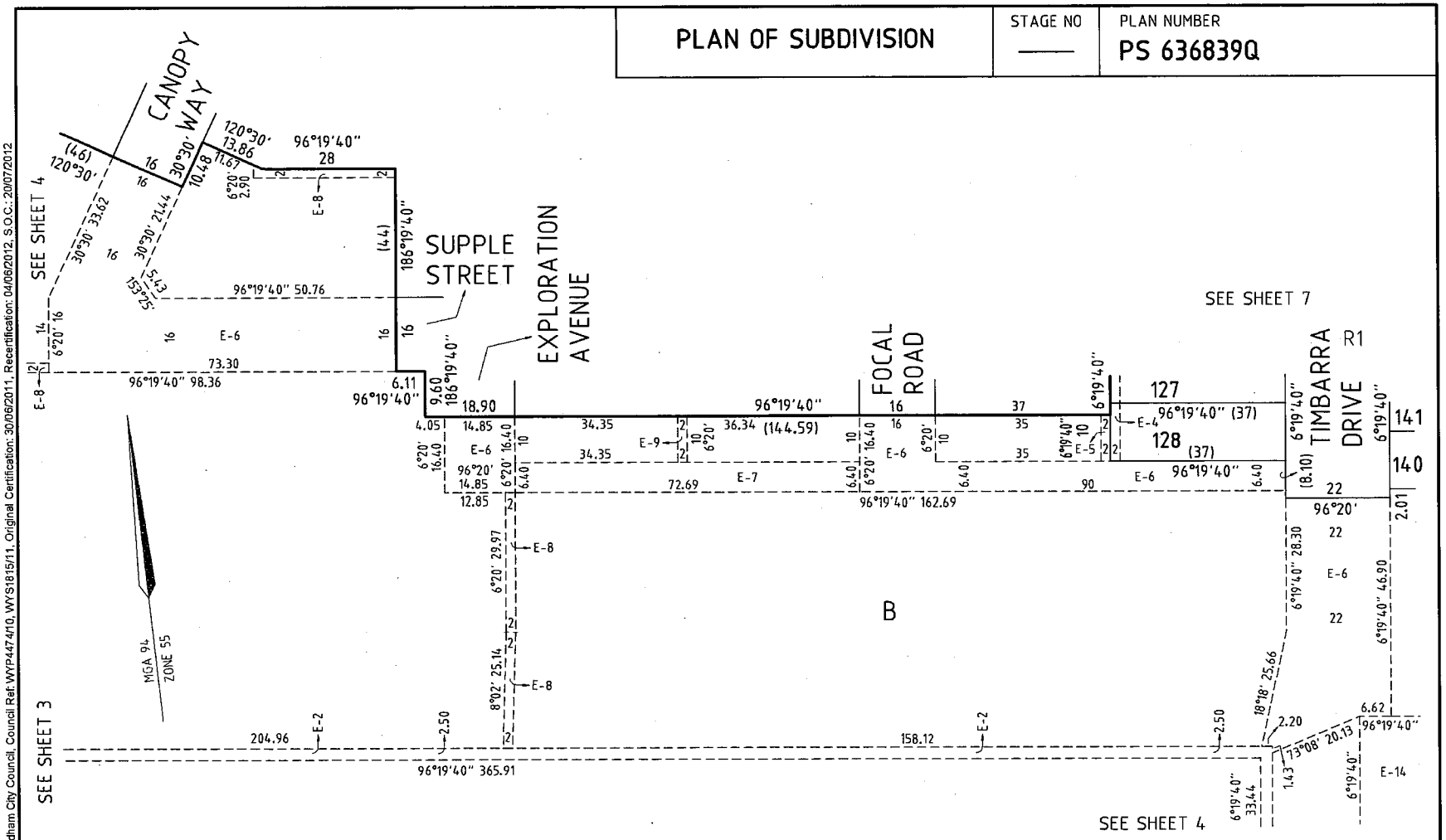
DATE / /

COUNCIL DELEGATE SIGNATURE

ORIGINAL SHEET SIZE A3

PLAN OF SUBDIVISION

STAGE NO	PLAN NUMBER
———	PS 636839Q



RIVERWALK RELEASE 2	No of Lots: 51 (excluding Lot B) Release 2 Land Area: 3.248ha	SHEET 9

CHRIS RUNTING & ASSOCIATES PTY LTD
LAND SURVEYORS
TOWN PLANNERS
DEVELOPMENT CONSULTANTS
20 Hamilton Street
Mont Albert Vic 3127
Tel: 9890 0933
Fax: 9898 2543

SCALE 1:750

7.5 0 7.5 15 22.5 30 37.5 45

LENGTHS ARE IN METRES

LICENSED SURVEYOR: P.J.S. TYNKKYNEN

SIGNATURE ..... DATE / /

REF: 3936PS2 VERSION: 23 (4.05.12)

DATE / /

COUNCIL DELEGATE SIGNATURE

ORIGINAL SHEET SIZE A3

Signed by Council: Wyndham City Council, Council Ref: WYP4474/10, WYS1815/11, Original Certification: 30/06/2011, Recertification: 04/06/2012, S.O.C.: 20/07/2012

	PLAN OF SUBDIVISION	STAGE NO	PLAN NUMBER
		——	PS 636839Q

CREATION OF RESTRICTION "A"

LAND BURDENED AND LAND BENEFITED: REFER TO TABLE 1

DESCRIPTION OF RESTRICTION

The registered proprietor or proprietors for the time being of any burdened lot on this plan to which this restriction applies shall not build or permit to be built or remain on the lot any building other than a building which has been constructed in accordance with endorsed memorandum of common provisions registered in dealing no AA2033 which memorandum of common provisions is incorporated into this plan.

This restriction shall cease to have affect 10 years after the date of registration of this plan.

CREATION OF RESTRICTION "B"

LAND BURDENED AND LAND BENEFITED: REFER TO TABLE 1

DESCRIPTION OF RESTRICTION

The registered proprietor or proprietors for the time being of any burdened lot must not:

B1 build or erect or permit to be built or erected or remain on the burdened lot or any part of it, any building or structure other than a building or structure which has been constructed in accordance with plans, drawings, designs and specifications which have first been approved in writing by Places Victoria ABN 61 868 774 623 in accordance with Places Victoria's Riverwalk Design Requirements and Controls as amended from time to time;

B2 erect or allow any signs to remain on the burdened lot other than the following:

- B2.1 where a dwelling constructed on the burdened lot has been completed and is offered for sale (but not if the burdened lot remains vacant or the dwelling is partly completed and is offered for sale) any real estate agent's "for sale" sign not exceeding 2.4 metres x 1.8 metres; or
- B2.2 during the period of construction of a dwelling on the burdened lot signs of builders and tradespersons who are carrying out construction work on the burdened lot;

B3 use the burdened lot or any part of it as a display home except with Places Victoria's prior written consent.

Restriction B shall cease to have affect 10 years after the date of registration of this plan.

RIVERWALK RELEASE 2 No of Lots: 51 (excluding Lot B) Release 2 Land Area: 3.248ha		SHEET 10
CHRIS RUNTING & ASSOCIATES PTY LTD LAND SURVEYORS TOWN PLANNERS DEVELOPMENT CONSULTANTS 20 Hamilton Street Mont Albert Vic 3127 Tel: 9890 0933 Fax: 9898 2543	LICENSED SURVEYOR: P.J.S. TYNKKYNEN SIGNATURE ..... DATE / / REF: 3936PS2 VERSION: 23 (4.05.12)	DATE / / COUNCIL DELEGATE SIGNATURE ORIGINAL SHEET SIZE A3

Signed by: Paavo Jukka Tynkkynen (Chris Runting & Associates Pty Ltd) Surveyor's Plan Version (23 (4.05.12)) SPEAR Ref S011384A 07/05/2012

Signed by Council: Wyndham City Council, Council Ref: WYP4474/10, WYS1815/11, Original Certification: 30/06/2011, Recertification: 04/06/2012, S.O.C.: 20/07/2012

	PLAN OF SUBDIVISION	STAGE NO ——	PLAN NUMBER PS 636839Q

CREATION OF RESTRICTION "C"

UPON REGISTRATION OF THIS PLAN OF SUBDIVISION THE FOLLOWING RESTRICTION IS CREATED

LAND BURDENED AND LAND BENEFITED:

LAND TO BE BURDENED:
Lots 118 to 168 (inclusive)

LAND TO BENEFIT:
Lot F on Plan of Subdivision number PS636838S

DESCRIPTION OF RESTRICTION
The registered proprietor or proprietors for the time being of a burdened lot:

1. shall not develop a burdened lot, permit a burdened lot to be developed or permit a burdened lot to remain developed, other than in accordance with the Places Victoria Fibre To The Home Building Guidelines; and
2. must not occupy a dwelling on a burdened lot and must not obtain or procure an Occupancy Permit under the Building Act 1993 (Vic) for a dwelling on a burdened lot, prior to Places Victoria issuing a Fibre To The Home compliance certificate in respect of the dwelling on the burdened lot.

This restriction applies for the period from the date of registration of this Plan of Subdivision until the date that is 10 years after the issuing of an Occupancy Permit under the Building Act 1993 (Vic) in respect of the dwelling on the burdened lot.

RIVERWALK RELEASE 2

No of Lots: 51 (excluding Lot B)
Release 2 Land Area: 3.248ha

SHEET 11

CHRIS RUNTING & ASSOCIATES PTY LTD
LAND SURVEYORS
TOWN PLANNERS
DEVELOPMENT CONSULTANTS
20 Hamilton Street
Mont Albert Vic 3127
Tel: 9890 0933
Fax: 9898 2543

LICENSED SURVEYOR: P.J.S. TYNKKYNEN

SIGNATURE ..... DATE / /

REF: 3936PS2 VERSION: 23 (4.05.12)

DATE / /

..... COUNCIL DELEGATE SIGNATURE

ORIGINAL SHEET SIZE A3

Signed by: Paavo Jukka Tynkkynen (Chris Runting & Associates Pty Ltd) Surveyor's Plan Version (23 (4.05.12)) SPEAR Ref S011384A 07/05/2012

Signed by Council: Wyndham City Council, Council Ref: WYP4474/10, WYS1815/11, Original Certification: 30/06/2011, Recertification: 04/06/2012, S.O.C.: 20/07/2012

	PLAN OF SUBDIVISION	STAGE NO	PLAN NUMBER
		——	PS 636839Q

TABLE 1

LAND BURDENED AND LAND BENEFITED – REFER RESTRICTIONS "A" AND "B"

CREATION OF RESTRICTION

BURDENED LOT No	BENEFITING LOTS
118	120, 129, 149
119	120, 121
120	119, 121
121	119, 120, 122
122	121, 123
123	122, 124
124	123, 125
125	124, 126
126	125, 127
127	126, 128
128	127
129	130, 148
130	129, 131, 133, 148
131	130, 132, 133
132	131, 133
133	130, 131, 132, 134, 148
134	133, 135, 147
135	134, 136, 145, 146, 147
136	135, 137, 143, 144, 145
137	136, 138, 142, 143
138	137, 139, 141, 142
139	138, 140
140	139, 141
141	138, 140, 142
142	137, 138, 141, 143
143	136, 137, 142, 144

BURDENED LOT No	BENEFITING LOTS
144	136, 143, 145
145	135, 136, 144, 146
146	135, 145, 147
147	134, 135, 146, 148
148	129, 130, 133, 147
149	150
150	149, 151
151	150, 152
152	151, 153
153	152
154	155
155	154, 156
156	155, 157
157	156
158	159
159	158, 160, 162
160	159, 161, 162
161	160, 162
162	159, 160, 161, 163
163	162, 164
164	163, 165
165	164, 166
166	165, 167
167	166, 168
168	167

RIVERWALK RELEASE 2

No of Lots: 51 (excluding Lot B)

Release 2 Land Area: 3.248ha

SHEET 12.

CHRIS RUNTING & ASSOCIATES PTY LTD

LAND SURVEYORS
TOWN PLANNERS
DEVELOPMENT CONSULTANTS

20 Hamilton Street
Mont Albert Vic 3127
Tel: 9890 0933
Fax: 9898 2543

LICENSED SURVEYOR: P.J.S. TYNKKYNEN

SIGNATURE ..... DATE / /

REF: 3936PS2 VERSION: 23 (4.05.12)

DATE / /

.....
COUNCIL DELEGATE SIGNATURE

ORIGINAL SHEET SIZE A3

Signed by: Paavo Jukka Tynkkynen (Chris Runting & Associates Pty Ltd) Surveyor's Plan Version (23 (4.05.12)) SPEAR Ref S011384A 07/05/2012

wyndham
city coast country

Plan of Subdivision PS636839Q
Certifying a New Version of an Existing Plan (Form 21)

SUBDIVISION (PROCEDURES) REGULATIONS 2000

SPEAR Reference Number: S011384A
Plan Number: PS636839Q
Responsible Authority Name: Wyndham City Council
Responsible Authority Reference Number 1: WYP4474/10
Responsible Authority Reference Number 2: WYS1815/11
Surveyor's Plan Version: 23 (4.05.12)

Certification

This plan is certified under section 11 (7) of the Subdivision Act 1988
Date of original certification under section 6: 30/06/2011
Date of previous recertifications under Section 11(7): 16/04/2012

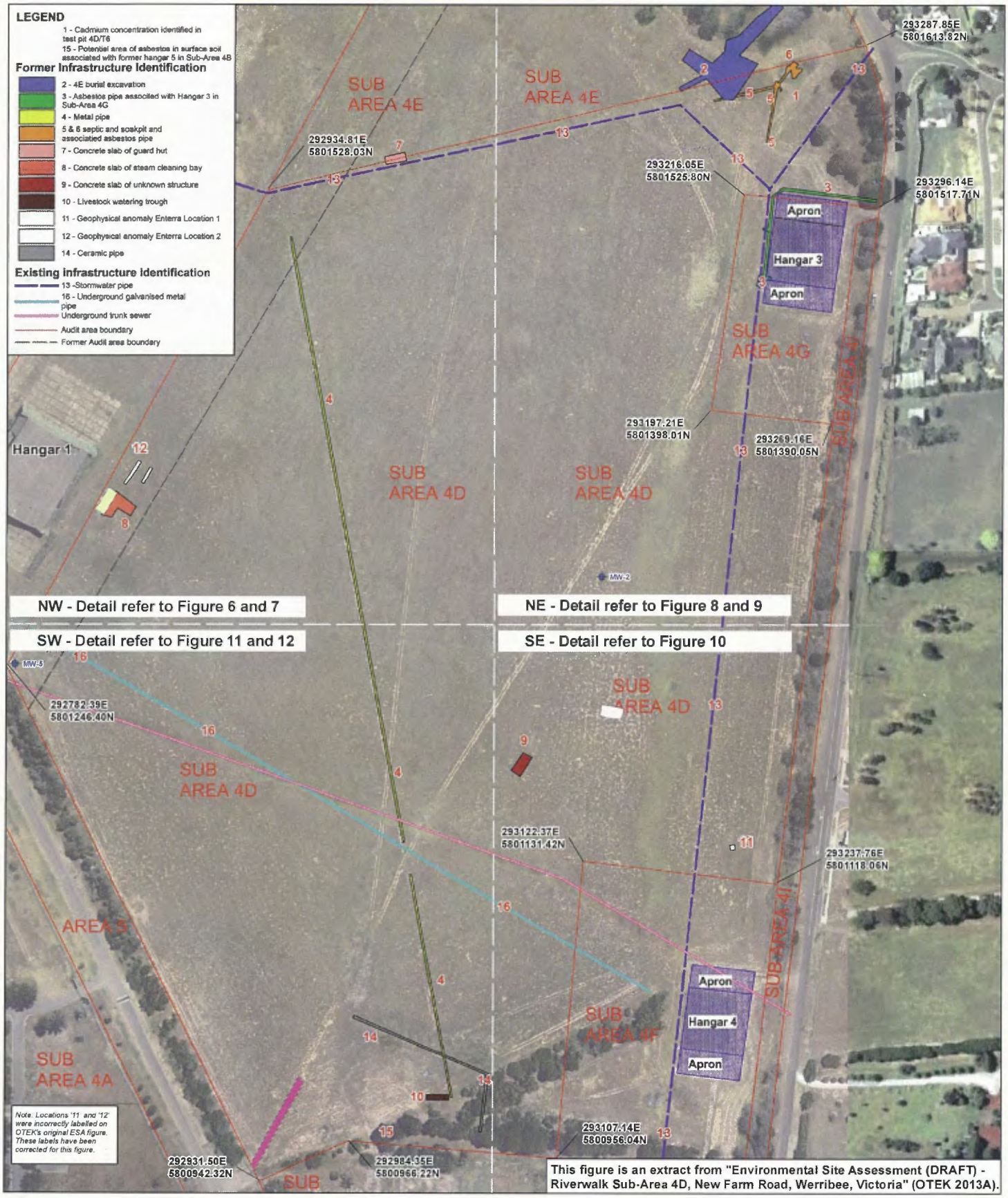
Public Open Space

A requirement for public open space under section 18 of the Subdivision Act 1988

Has not been made

Digitally signed by Council Delegate: Peter Van Til
Organisation: Wyndham City Council
Date: 04/06/2012

Signed by: Peter William Van Til (Wyndham City Council) 04/06/2012



LEGEND

- Groundwtater Monitoring Well (Area 4D)
- Section of Steam Cleaning Bay Concrete Slab Remaining On-Site - Identified During Final Auditor Inspection (292840E , 5801344N)
- Section of Road Remaining On-Site - Identified During Final Auditor Inspection

The image was prepared by OTEK (2013A).

Note: The image displayed in this figure has been extracted from Figure 3 (Existing and Former Infrastructure and Sampling Locations (as at Jan 2013)), of OTEK (2013A) *Environmental Site Assessment (Draft) - Riverwalk Sub-Area 4D, New Farm Road, Werribee, Victoria*. GHD have not had access to the raw data used to produce this figure. Therefore GHD cannot guarantee the accuracy of this data. **This figure should only be viewed as a point of reference.**

Paper Size A3

0 21 42 63 84

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Melbourne Water
Environmental Audit of Area 4D,
Riverwalk Estate Princes Highway Werribee VIC

Job Number 31 / 1157500
Revision 5
Date 04 Jun 2014

Site Layout

Figure 4

180 Lonsdale Street Melbourne VIC 3000 Australia T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com W www.ghd.com

Executive summary

Table 1 Summary of audit information

Summary Information Required	
EPA file reference no.	41460-6
Auditor	Dr Fouad Abo of GHD Pty Ltd
Auditor term of appointment	7 January 1997 to 26 July 2016
Name of person requesting audit	Mr Timm Kurth of Melbourne Water Corporation (Melbourne Water)
Relationship to premises / location	Property Sales Manager
Date of request	Melbourne Water first requested an audit of the Riverwalk Estate (Overall Audit Area), including Area 4D on 15 March 2000. Due to the development timing requirements, Melbourne Water requested a separate audit for the site (Area 4D) on 8 July 2009.
Date EPA notified of audit	The Riverwalk Estate was originally to be audited as one audit, hence the auditor notified EPA as such on 15 March 2000. As explained in Section 1.1 of this report, for ease of audit and to meet the development schedule, Melbourne Water later decided to divide the site into a number of "sub"-Areas and requested and audit for each of these Areas separately. Accordingly, the auditor notified EPA of the request to undertake an audit of Area 4D specifically on 13 July 2009.
Completion date of the audit	05 June 2014
Reason for audit	Due diligence associated with a proposed zoning change.
Current land use zoning	Residential 1 Zone (R1Z) under the Wyndham City Council Planning Scheme.
EPA region	West Metro
Municipality	Wyndham City Council
Dominant – Lot on plan	The site is defined as part of Lot B on Plan of Subdivision 636839Q, on Certificate of Title Volume 11367, Folio 778. The surveyed site boundary and the relevant boundary coordinates are defined on the attached Figures 3 and 4.
Additional – Lot on plan	
Site/premises name	Riverwalk Estate
• Street/Lot – Lower No.	
• Street/Lot – Upper No.	
• Street Name	Princes
• Street type (road, court, etc.)	Highway
• Street suffix (North, South etc.)	

Summary Information Required	
• Suburb	Werribee
• Postcode	3030
GIS Coordinate of Site centroid • Longitude / Northing (GDA94) • Latitude / Easting (GDA94)	 Northing 5801283 Easting 293042.8
Site Area (hectares)	21.32 ha
Members and categories of support team utilised	Mr Eric Friebel, Risk Assessment
Outcome of the audit	Statement of Environmental Audit.
Further works or requirements	None
Nature and extent of continuing risk	None. The contamination condition of soil and groundwater were not expected to adversely impact site uses provided.

***NB – Leave cell blank if not applicable**

Table 2 Physical site information

Summary Information Required	
Site aquifer formation	Newer Volcanics and Brighton Group Formations are located in the vicinity of the site. Wells at the site were installed within the Newer Volcanics aquifer.
Average depth to groundwater	10.3 – 14.5 m
Groundwater segment	Segment C
Groundwater flow direction	Groundwater flow is expected to be the east towards the Werribee River which flows in a southerly direction, and is located approximately 500 m to the east north east of the site (at its closest point), Regionally, the flow is expected to be to the south east toward Port Phillip Bay, located approximately 7 km to the south east of the site.
Past use/site history	Dairy farming, stock grazing, Melbourne Water Activities and RAAF occupation.
Surrounding land use	North: Area 4E. East: Areas 4I, 4G, and 4F. South: Area 4B West: Area 5 and Area 4H.
Proposed future use	The site is proposed to be used for mixed use, including retail, commercial, medium, and low density residential use.

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1. Introduction

1.1 Background

A large portion of Melbourne Water Corporation's Farm Road site, called the Riverwalk Estate is under Environmental Audit (herein referred to as the 'Overall Audit Area'). Melbourne Water voluntarily initiated an environmental assessment (undertaken by OTEK Australia Pty Ltd (OTEK)) and environmental audit as a due diligence measure. The Overall Audit Area is roughly triangular in shape and comprises approximately 200 hectares. The current Melbourne Water operations office and Discovery Centre will remain onsite and are not subject to an audit. The locality of the Overall Audit Area is shown on Figure 1.

In order to simplify the audit process and allow for areas with specific issues and development times to be considered separately, the Overall Audit Area was divided into the following 13 "Sub-Areas": 1, 2, 3, 4A, 4B, 4C, 4D, 4E, 4F, 4G, 4H, 4I, and 5 (herein referred to as 'Areas'). Audits for the majority of these areas were completed, with Area 4E remaining under audit at the time of reporting. Figure 2 shows the majority of the Overall Audit Area with the exception of the full extent of Area 2 and Area 3, which are shown on the proposed development plan attached as Appendix D. Area 2 extends further to the south, while Area 3 is located to the east and south of Area 4C.

This audit report pertains to Area 4D only, herein referred to as 'the site'. The total area of the site is 20.34 hectares. The site boundary is shown on Figure 3 and Figure 4.

The site is part of the Riverwalk Estate which is proposed to be developed for residential purpose (with lot sizes between 300 m^2 and 600 m^2; which, in accordance with EPA publication 759.2 (EPA 2014) is defined as 'Residential – single dwelling' and 'medium-density residential') and associated uses such as public open space and recreation areas.

1.2 Purpose

The purpose of the audit was to conduct an audit to achieve a certificate or statement of audit for the site. The conduct of an environmental audit, the preparation of an environmental audit report and the subsequent issue of a certificate or statement is a statutory process outlined in Part IXD of the Environment Protection Act, 1970. The report was completed in accordance with the guidelines issued by the EPA for environmental audit of contaminated sites in Victoria.

The role of the auditor is to evaluate the environmental condition of a site at the date of signing of the certificate or statement and to form an opinion regarding the suitability of the site for use.

1.3 Input to this report by auditor's support team

The GHD staff and support team members that assisted with this audit are provided in Table 3.

Table 3 Auditor's team assisting with audit

Name	Qualification/Role/ Experience Area	Contribution to audit
Elvira Ryan	Auditor's assistant (GHD Staff)	Assisted in the auditing process and inspected the site.
Kate McCallum	Project Manager / Auditor's assistant (GHD Staff)-	Assisted in the auditing process and inspected the site.
Penny Flukes	Auditor's assistant (GHD Staff)	Assisted in reviewing the consultant's assessment report, inspected the site, undertook verification sampling and assisted in preparation of the draft environmental audit report.

Name	Qualification/Role/ Experience Area	Contribution to audit
Venetia Stewart (then GHD)	Auditor's assistant	Assisted in the auditing process and inspected the site.
Eric Friebel	Senior Risk Asssessor (GHD Staff)	Assisted with assessment of a potential of a risk associated with hexavalent chromium and dioxins/furans at the site.
Geoff Pettifer	Principal Geophysist (GHD Staff)	Assisted with review and comment on the geophysics survey results when Enterra conducted its geophysics survey and investigation.

1.4 Audit methodology

Melbourne Water engaged OTEK Australia Pty Ltd (OTEK) to undertake the environmental assessment and subsequent infrastructure removal and remediation works in 2000, where the engagement was for the Overall Audit Site. OTEK conducted all the works mentioned above as the environmental assessor for the purpose of issuing audits for the different areas of the Site until 30 April 2013. During these years a number of assessments were completed and finalised by OTEK, and the auditor has issued a number of audits as discussed in Section 1.1 of this report. On 30 April 2013 OTEK went into Administration and then was in liquidation.

Prior to going into liquidation, OTEK had completed all the work required and also prepared a draft report for the Site; however, OTEK had not issued a final report. Melbourne Water has advised GHD (letter dated 25 October 2013) that all the intellectual property produced by OTEK in relation to the Site is owned by Melbourne Water and that it has retrieved both hard and electronic data relating to the work conducted by OTEK for the overall Site including this particular site. Melbourne Water (as the client) has given permission to the Auditor and GHD to use all the reports and all the data to enable the completion the continuation and completion of this audit (refer to Melbourne Water letter in Appendix K).

The auditor was involved with the audit since its commencement in 2000 and has overseen the various phases of works including a specialised military site history review (given that part of the site was used by the Department of Defence as discussed in this report); a subsurface geophysical survey; and various intrusive sampling and remediation works. The auditor considered that the audit has followed a logical sequence which provided the auditor with confidence that the site issues have been addressed and closed out – the details of which are the subject of later sections of this audit report.

The Auditor has followed the standard process of reviewing the draft OTEK report for the site and was satisfied that any significant issues including ecological and human health risks were closed out by the auditor (refer Appendix E) or addressed through auditor verification investigation (Section 4.4 and Appendix H), which was conducted in accordance with EPA Bulletin 759.1[1].

The auditor consulted with EPA (13 June 2013) on the fact that OTEK went into administration and consequently the OTEK report was issued as a draft only. Based on discussions between EPA and the auditor, EPA agreed that given the particular circumstances and the work done by OTEK had been substantially progressed to a close to final stage, that it was appropriate for the auditor to issue this audit report based on the attached OTEK draft report. It was also discussed and agreed with EPA that the fact that OTEK went into administration prior to finalising the report, resulted in the auditor having to undertake additional data review, data interpretation, and where applicable auditor verification works to reach conclusions and audit outcomes as stated in this report (having regard to EPA Bulletins 759.1 and 759.2).

[1] EPA Bulletin 759.1 was current at the time of the auditor verification sampling (October 2013). This publication has since been superseded by 759.2 (7 February 2014).

Following OTEK going into liquidation, several former OTEK employees who had previously worked on the Riverwalk project formed Total Environmental Consulting (TEC). TEC was subsequently engaged by Melbourne Water to undertake some further works and reporting for the Riverwalk project.

1.5 Documents reviewed

The following key historical documents relate to the Overall Audit Area and were reviewed as part of the audit process:

- Sinclair Knight Merz Pty Ltd (SKM), 17 February 1993, *Report 5V3590001.rp1* (only incomplete report provided).
- Biosis Research Pty Ltd (Biosis), March 2000, *Werribee Field, Victoria: An Archaeological and Cultural Heritage Survey* (Biosis 2000).
- Milsearch Pty Ltd (Milsearch), April 2000, *A Review of World War II-ERA Military Activity at Werribee Fields* (Milsearch 2000).
- Enterra Pty Ltd (Enterra), 31 May 2001, *Werribee Fields Development – Sub Surface Investigation.*
- OTEK, 10 October 2002, *Phase One Report, Werribee Fields, Werribee*, Victoria, (OTEK, 2002).

These reports are discussed in more detail in Section 2.8.1, and attached as Appendix B (with the exception of the SKM 1993 report).

In addition, on occasion the auditor has referred to data pertaining to other audits being undertaken in the Overall Audit Area. Where applicable the relevant assessment reports have been referenced.

The environmental assessor, OTEK, prepared a draft environmental assessment report specifically for the site (1 February 2013, *Environmental Site Assessment (Draft), Riverwalk Sub-Area 4D, New Farm Road, Victoria,* (OTEK 2013A)), attached as Appendix C. Although the auditor identified many discrepancies and data gaps in the draft report (discussed in detail in Section 4.3 and Appendix E (Table E1)), overall the assessment and remediation works undertaken were considered adequate to rely on for the purposes of the audit. Where deemed necessary to address data gaps or inconsistencies in OTEK 2013, the auditor undertook verification investigations (refer Section 4.4.2).

In addition to OTEK 2013A, the auditor referred to many other documents relating to the site and Overall Audit Area, including assessment reports from other audit areas, sampling and analysis plans (SAPs) and remediation action plans (RAPs). These are documented in Section 8 and referenced as required throughout this report.

Work plans were reviewed prior to intrusive works for the various phases of investigation undertaken during the audit, and comments were provided to OTEK. There was ongoing communication between the auditor and OTEK during the course of the field works.

1.6 Site assessment approach

The assessment of the Overall Audit Area (including the site) involved multiple phases of work. The approach and sequence of investigations undertaken to identify and investigate potential sources of contamination was thorough and in line with industry practice and guidelines, as follows:

- A specialised site history review of former site uses during RAAF occupation (predominantly of Area 4) was undertaken in 2000 by Milsearch (Milsearch 2000);

- Based on the findings of the Milesarch review, Enterra was engaged by Melbourne Water in 2001 to undertake a geophysical survey and, where required, physical investigation of sub-surface anomalies identified by Milsearch. The objectives of Enterra's survey and investigations (Enterra 2001) were:
  - "To locate any underground storage tanks (UST) and burials.
  - To quantify the extent of both ferrous and non-ferrous debris.
  - To resolve any uncertainty regarding the presence of unexploded ordnance."

  Enterra stated after its survey and investigation (Enterra 2001):"The investigations found no evidence of unexploded ordnance (UXO) or live ammunition on the site".
- OTEK subsequently undertook a Phase 1 Assessment (OTEK 2002) of the Overall Audit Area (including the site), which comprised:
  - "Site History Study – conducting a background study of the past and present use, review of previous investigations conducted at the site, a site reconnaissance, and a report of findings for these works; and
  - Further physical investigations – to determine present sub-surface conditions at the site".

  The scope included: review of Melbourne Water property files; a review of site ownership and land use history (Sands and McDougall directories; an historical title search dating back to 1880s; completion of a detailed site inspection to assess building layout, potential filled areas, usual activities, stored materials and to determine if any other visual signs of contamination exist; assessment of the nature and location of buildings and other improvements, past and present; co-ordination of archaeological historical and subsurface investigations; and derivation of conclusions concerning the potential for contamination at the property.
- OTEK then used the findings of the above reviews and investigations to develop sampling and analysis plans (SAPs) to investigate areas of potential concern in more detail. Multiple SAPs were prepared, initially for the Overall Audit Area then for individual areas as required (once the overall audit area was subdivided into separate audits as discussed above). The auditor reviewed and provided comment on each SAP prior to works being undertaken.

Over the course of the site assessments, OTEK prepared various scopes for remedial and validation works as required which the auditor reviewed and discussed prior to implementation.

1.7 Disclaimers

This statutory environmental audit report *Area 4D of Riverwalk Estate, Princes Highway, Werribee, Victoria,* ("Report") dated 05 June 2014 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 Statement of Environmental Audit at the date the Statement of Environmental Audit is signed. This Report:

1. has been prepared by Dr Fouad Abo and his team of GHD as indicated in the appropriate sections of this Report for Melbourne Water Corporation;
2. may be used and relied on by Melbourne Water Corporation;
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; and

5. may only be used for the purpose as stated in Section 1.2 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, his team and GHD 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 behaviour 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 Melbourne Water Corporation, 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, 2014). However, there may be some information which the Auditor and GHD cannot independently verify or check ("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. Site characterisation

2.1 Site physical definition and description

The description and definition of the site are presented in Table 4.

Table 4 Site definition and description

Aspect	Comments	
Site Locality	The site is located in the Werribee Fields, which is proposed to be developed as part of the Riverwalk Estate development, and is located on Princes Highway, Werribee, Victoria. The site locality plan (provided by OTEK) is included as Figure 1 of this report.	
Certificate of Title	The site is part of Lot B on Plan of Subdivision 636839Q, on Certificate of Title Volume 11367, Folio 778 (Appendix A). The site boundary is defined by the coordinates below. The defined audit area and survey coordinates are shown on Figure 3 and Figure 4.	
GIS coordinates defining the boundary of the site (MGA Zone 55).	Easting	Northing
	5,801,246.40	292,782.39
	5,801,528.03	292,934.81
	5,801,613.82	293,287.85
	5,801,517.71	293,296.14
	5,801,525.80	293,216.05
	5,801,398.01	293,197.21
	5,801,390.05	293,269.16
	5,801,118.06	293,237.76
	5,801,131.42	293,122.37
	5,800,956.04	293,107.14
	5,800,966.22	292,984.35
	5,800,942.32	292,931.50
Area	The site encompassed an area of approximately 21.32 ha[2].	
Surrounding Land Use	North: Area 4E. East: Areas 4I, 4G, and 4F. South: Area 4B West: Area 5 and Area 4H.	
Topography	The site and surrounding area was generally flat. A low-lying depression ran north-south between Hangars 3 and 4 (refer Figure 4), considered to be a regional drainage pattern[3].	
Site Coverage / Vegetation	At the time of this audit, the site was predominantly covered with grass and vegetation. There were no aboveground structures present on the site.	
Sampling Locations	The locations of soil assessment and validation sampling undertaken by OTEK are shown on Figures 5 to 14. Groundwater wells/sampling locations are provided on Figure 15.	

[2] OTEK provided two different areas in OTEK 2013A (i.e. 21.32 ha in Section 2 and 20.34 ha on Figure 2). The auditor used the survey plan and coordinates to verify the area and confirmed it to be 21.32 ha. Refer Item 6 of Table E1, Appendix E.
[3] email from OTEK to GHD, 2/6/2006.

2.2 Geology and hydrogeology

The borelogs for soil and groundwater assessment works are included in Appendix C of OTEK 2013 (attached as Appendix C).

2.2.1 Soils

The assessor indicated that the soil profile on site generally comprised:

- Grass surface underlain by silty clay soil to approximately 0.1 metres below ground level (mbgl);
- Silty clay and clayey silt with minor clayey sand to 0.5 mbgl;
- Medium to high plasticity clay soil of varying colour (yellow, brown) to approximately 9.6 mbgl (based on one monitoring well installed on the site); and
- Weathered basalt to approximately 17.8 mbgl (maximum depth of the investigation).

Minor fill material consisting of concrete, sand or gravel was observed in seven test pit locations. Fill material was also identified in the removal of various infrastructure, and in several burial pits. Further details are provided in Section 4.

During the auditor verification works undertaken in October 2013 (refer Section 4.4.2); the auditor confirmed the natural soil profile (to approximately 1.5 mbgl) was consistent with OTEK's description.

Assessment boreholes and test pits were typically terminated at a maximum depth of 1.0 mbgl, with the exception of three groundwater monitoring wells (one onsite, two offsite), which extended to a maximum depth of 17.86 mbgl. Test pits excavated during infrastructure removal works varied in depth, extending to a maximum of approximately 4 mbgl.

2.2.2 Geology and aquifers

The 1:63 360 Melbourne Geological Map (Geological Survey of Victoria) indicates that the site is underlain by approximately 15 m of Quaternary Age 'Deutgam Silt' alluvial deposits of the Werribee Delta, comprising grey to grey-brown silt with abundant carbonate nodules and some gravel, and sand and silty sand in the lower part of the sequence. The Deutgam Silt (of the Werribee Delta Formation) overlies approximately 40 m of Quaternary Age Newer Volcanic Formation, which predominantly comprises dark to light grey olivine basalt. The Newer Volcanic is underlain by the Brighton Group Formation and the Newport Formation. Regional data indicate that the Werribee Delta alluvial deposits may also directly overlie Brighton Group sands in places.

Groundwater is likely to be present within the alluvium deposits and the basalt fractures within the Newer Volcanic Formation.

2.2.3 Groundwater flow system

The Newer Volcanic and Brighton Group Formations are the two primary aquifer systems in the vicinity of the site. Groundwater flow was expected to be towards the Werribee River, which is the nearest receiving surface water body. The Werribee River flows from approximately north to south and is located approximately 500 m to the east north east of the Overall Audit Area (at its closest point). Regionally, groundwater is expected to flow in a south-easterly direction toward Port Phillip Bay, which is located about 7 km to the south east of the site.

The Werribee Delta is an unconfined to semi-confined shoe-string aquifer located near the mouth of the Werribee River, where it discharges to Port Phillip Bay. The Deutgam Silt is not expected to constitute a significant aquifer system in the vicinity of the site. Well yields in the Werribee Delta Aquifer range up to 15 litres per second (L/s) but are generally less than 5 L/s. Groundwater quality ranges from 500 to 6000 mg/L total dissolved solids (TDS), with the lower TDS occurring within the coarser lenses.

The Newer Volcanics Formation comprises fractured basalt with interbedded clay aquitards. The shallow parts of the aquifer are unconfined, while the deeper parts range from semi-confined to confined. Water occurs in fractures and vesicular voids. Hydraulic properties vary widely depending on the condition of the basalt. Well yields in the Newer Volcanics Aquifer range up to 40 L/s but are generally less than 1.2 L/s. Groundwater quality in this aquifer ranges from 100 to 6000 mg/L TDS with the chemistry largely dependent on the state of weathering of the surrounding basalt. This aquifer, along with the underlying Brighton Formation aquifer, is identified as a primary aquifer in the region.

Groundwater monitoring well logs for the site (refer to Appendix C of OTEK 2013, attached as Appendix C of this report) indicate that wells were installed within the Newer Volcanics aquifer.

2.2.4 Groundwater database search and groundwater quality

Groundwater database search

OTEK did not undertake a search of the Victorian Groundwater Management System (managed by DSE), therefore the auditor undertook a search and review. The search identified 29 wells within a 1 km radius of the site, as tabulated and shown on a plan in Appendix F (note several of the wells are plotted in the same location due to the scale of the plan). The well locations shown in Appendix F are approximate only. The information available was considered sufficient to determine the approximate location of wells relative to the site, and hence was adequate for the purposes of the audit. The wells were listed as being used for domestic, stock and investigation purposes, with the use of several wells listed as not known. No groundwater chemistry data were available. The majority of groundwater wells were located cross or up gradient of the site and were considered unlikely to be in the flow path of groundwater from the site.

One well was identified on the site, which was not installed by OTEK and was not used for the audit purpose. Another well was identified immediately to the west of the site, within audit Area 5. It was understood these wells were installed by another consultant for the purpose of monitoring groundwater levels across the Western Treatment Plant, with a water level assessment undertaken by Golder in 2008 (Golder 2008). No chemical data were available from these well, and construction details were not known.

Groundwater quality

Based on groundwater data from the Overall Audit Area including this site, information from nearby audits and published references, groundwater in the region was found to have elevated concentrations of some inorganics and nitrate. This was considered to be attributed to naturally occurring concentrations in the Newer Volcanics Aquifer, and to widespread regional agricultural land use, discussed further in Section 6.2.

2.3 Surface water

The Werribee River is located approximately 500 m to the east north east of the Overall Audit Area (at its closest point), and flows in a southerly direction towards Port Phillip Bay, located about 7 km south of the site.

2.4 Site physical status at audit commencement and completion

Historically, the majority of the site was vacant grassland. The RAAF previously occupied portions of the site with infrastructure including a guard hut and steam cleaning bay/degreaser shed, though only the concrete slabs remained at the commencement of the audit. A third concrete slab of unknown use was identified and removed by OTEK during the course of the assessment works. Underground structures on the site at the time of OTEK's assessment works included a septic and soak pit with associated bonded asbestos containing material (ACM) piping, bonded ACM piping associated with Hangar 3 (located in Area 4G to the east), and several pipes of varying composition. Much of the site was used as a satellite airfield for the Special Flying Training School during most of the RAAF occupation of the site. No arming of aircraft ever took place there; all training being in unarmed aircraft (Milsearch 2000).

Residual infrastructure that was present on the site at the commencement of the audit, and the status of infrastructure at audit completion (removed or remaining) is summarised in Table 5. The locations of former site infrastructure are provided on Figure 4. At the time of audit completion, the only infrastructure remaining on the site was the sewer, stormwater drain and empty galvanised metal pipe.

Table 5 On-site infrastructure present at commencement and status at completion of audit

Infrastructure	Status[1]
Former guard hut (only concrete slab (6 m x 15 m) remained, straddling boundary of the site and Area 4E)	Removed 15 June 2009
Former steam cleaning bay/degreaser shed (only concrete slab remained)	Partly removed 15 June 2009
Concrete slab of former unknown structure	Removed 15 June 2009
Metal pipe (former watering system)	Removed 6 to 22 August 2008.
Septic and soak pit, and associated underground bonded ACM pipe	Removed 10 September 2008
Bonded ACM pipe associated with Hangar 3 (pipe crossing boundary, Hangar 3 located in Area 4G)	Removed 10 to 28 June 2009
Stormwater pipe	Retained on site, in use
Trunk sewer	Retained on site, in use
Galvanised metal pipe	Retained on site, empty
Livestock watering trough	Removed 20 July 2009
Ceramic pipe (contents unknown)	Removed 21 August 2009

NOTES

[1] From OTEK 2013 and auditor inspections.

Further discussion regarding the investigation activities undertaken during the infrastructure removal is provided in Section 5.3 of this report.

2.5 Proposed site development

The site was part of the Riverwalk Estate which was proposed to be developed for residential development (with lot sizes between 300 m^2 and 600 m^2) and associated uses, such as public open space and recreation areas.

As per the development plan and in accordance with EPA (2014) the lot sizes would be defined as 'residential – single dwelling' (300 m^2 to 4000 m^2) and 'medium-density' (one dwelling between 200 m^2 and 300 m^2).

The proposed development plans and planning scheme information are included in Appendix D of this report.

2.6 Review of EPA Notices, Register, Licences and/or Trade Waste Agreements

There were no EPA licences or trade waste agreements relevant to Area 4D.

The site was not on the EPA Priority Sites register, and was not subject to an EPA clean-up or pollution abatement notice. Melbourne Water initiated this audit and environmental assessment as part of its own due diligence measures. Since the audit commenced an Environmental Audit Overlay (EAO) was placed over the site. It is understood the EAO was placed on the site at the time of re-zoning of the land for residential use.

2.7 Off-site investigations

At the time of the audit, investigations on other parts of the Overall Audit Area surrounding the site were being undertaken. Some of the assessment information from the surrounding sites was used in this audit due to a number of similarities (e.g. history, geology, hydrogeology, etc.). Such information hence provided further confidence in the auditor's understanding of the background conditions (where appropriate).

2.8 Site and surrounding site history

2.8.1 Summary of historical reports for the overall audit area

Four historical reports (as detailed below), completed from 1993 to 2001 were reviewed to provide information on the site history and potential contaminants of concern. The findings of the historical reports were summarised in OTEK's Phase I report (OTEK 2002). The first two reports (by SKM and Biosis) not relied upon for the purposes of the audit as they were out-dated and were superseded by the more recent site history report, geophysical report, and detailed intrusive soil and groundwater assessments. The historical reports, with the exception of SKM 1993, are attached as Appendix B.

SKM Pty Ltd (1993)

SKM (1993) conducted a preliminary site investigation for the Overall Audit Site prior to the commencement of the Environmental Audit. A total of 52 samples were collected from 26 locations across the Audit Site, four of which were analysed individually, and 21 of which were formed into three-part composites. Three of the composite samples appear to have been taken from within or part within Area 4D (the figure provided in the report was a hand drawn sketch with limited accuracy). The auditor noted the samples forming each composite were situated a long way apart (e.g. at either end of Area 4D) and hence do not provide meaningful information. Based on this, and the time elapsed since the work was completed (20 years) the auditor did not consider this report further.

Biosis Pty Ltd (March, 2000)

Biosis conducted an archaeological and cultural survey to identify any areas of archaeological and cultural heritage that may be impacted by the proposed site investigation and development across the Overall Audit Site. The survey included research of background information relating to the Overall Audit Area, site inspections, and a systematic ground survey. Liaison was also made with the Wathaurong Aboriginal Cooperative Ltd and the South West Region Cultural Heritage Group. The report did not identify any heritage or cultural issue at the site.

Milsearch Pty Ltd (April, 2000)

Milsearch undertook a review of the site history during the World War II era to determine the potential for the presence of residual munitions and other material burials or contaminants at the site.

Milsearch identified several potential sources of contamination on and proximate to the site:

- Hangar 1 debris: an area to the east/south east of Hangar 1 extending for approximately 50 m, was described as containing "*dense metallic contamination….at shallow depth and visible on the surface*" (Milsearch, 2000). Milsearch reported visible aircraft parts made of aluminium, steel, rubber, Perspex and Bakelite, and aluminium/lead slugs. This was likely to have been predominantly within Area 4H (the audit boundaries were defined after the Milsearch investigation), but might have extended across the western boundary of the site. The auditor observed small pieces of scattered debris (metal and ceramic) on the surface of the site, particularly towards the southern and western boundary (discussed further in Section 4.4), which was consistent with Milsearch's findings.
- Hangar 1 burials: Milsearch identified two large magnetic anomalies, one approximately 5 m by 7 m, and another of smaller, but unspecified size. The ground surface where both anomalies were encountered was overlain with metallic debris. The exact locations of these burials were not clear from the Milsearch 2000 (page 39) and no coordinates were provided. However, OTEK and Enterra undertook extensive surface and subsurface investigations proximate to Hangar 1, in the inferred vicinity of the burials (refer Section 5.3). The auditor also investigated this area as part of his verification works undertaken in October 2013 (refer Section 4.4.2).
- Burning area: an area of approximately 5 m by 5 m, with no vegetation, was described as being located to the north of the New Farm Road fence line. Milsearch considered this a burning ground for radios or instruments, as charred portions of components were evident on the surface. As noted above, the specific location of this area could not be clearly identified. The auditor subsequently undertook an inspection of the southern boundary of the site proximate to New Farm Road to look for evidence of burning, which is discussed further in Section 4.4.2.
- Other 'detritus'[4] zones, including an area of approximately 80 m by 20 m, which was observed running north and south between Hangar 3 (Area 4G) and Hangar 4 (Area 4B), which would have crossed the site. Another 'detritus' zone comprising aircraft parts, with some indication of deeper, non-ferrous items, was identified to the north near the former administrative camp area (located on Area 4E), which may have crossed onto the site. These areas were further investigated by Enterra and OTEK as discussed in Section 5.3.1.

[4] It was noted that Milsearch referred to 'detritus' throughout its report to describe foreign anthropogenic material observed across the surface of the site, whereas the auditor and OTEK generally referred to this material as 'debris'. The terms are considered interchangeable for the purposes of this audit.

- Hangar 3 suspect burial trench: underground metallic (ferrous and non-ferrous) content was identified to the north of Hangar 3, though very little surface detritus was evident. OTEK subsequently identified this to be a septic system (refer Section 5.3.1).

The Milsearch report is attached as Appendix B. A plan showing the approximate locations of the abovementioned potential sources is provided on page 38 of Milsearch 2000. This plan is rough, and it was difficult to connect the locations to the descriptions provided in the text. As a conservative measure the auditor considered both the descriptors in the text (as per discussion above) and the locations shown on the Milsearch 2000 plan, as well as later investigations of these potential anomalies by Enterra and OTEK.

Enterra Pty Ltd (May, 2001)

In response to the findings of the Milsearch report, Enterra undertook a subsurface geophysical investigation between November 2000 and February 2001 to locate any unexploded ordnance (UXO), buried wastes or other underground facilities. The auditor provided feedback to Enterra on the proposed scope of work. The investigation was undertaken using various geophysical techniques including the use of a digital magnetometer and electromagnetic detection equipment. The survey did not identify any UXO within the site, but did identify several potential burial sites or areas of surface debris, as described below (and shown in Figure 2-1 of Enterra 2001):

- Area 14: One large burial described as "*shallow, from the surface to a depth of approximately 0.5 metres, and broad covering an area of approximately 15 square metres*", comprising remains of burnt building material and metal scrap (Enterra 2001, page 15-16). No ammunition or armaments were observed. This area was investigated and remediated by OTEK as discussed in Section 5.3.1.
- Area 20: described as containing "*higher concentrations of small metallic surface contamination than most areas on the site" with "a large amount of lead ... located at or near the surface...*" (Enterra 2001, page 18). This area was extensively investigated and remediated by OTEK (through grid sampling, discussed in Section 5.1.1) and by the auditor (during auditor verification works, Section 4.4).
- Area 22: A burial was identified in the north east which was smaller and "*contained small metallic items such as nails and a number of glass bottles*" (Enterra 2001, page 20). The location of this burial corresponded with the burial described by Milsearch (2000). Enterra observed the whole area (referred to as Area 22) was relatively lightly contaminated with metallic debris'; however, the north east corner of the area was '*more heavily contaminated with metallic debris that may include further small burials*', particularly centred at one location. As OTEK did not investigate this area, the auditor undertook a verification investigation (discussed in Section 4.4).
- In addition to the above, the auditor requested that six 25m^2 areas determined to contain high metallic debris at the surface and near surface (0-300mm) be subject 100% metal counts using geophysical and physical investigation by Enterra and OTEK (OTEK, 2007A).

2.8.2 Site history terminology

The terminology and descriptions used in Milsearch 2000, Enterra 2001 and OTEK 2002 to describe burials, burning areas and surface debris varied. Table 6 provides a summary of descriptors used (where variability occurred), and the terminology adopted throughout this report. For ease of reporting the auditor has adopted OTEK's terminology where possible.

Table 6 Terminology adopted for burials, burning areas and surface debris

Milsearch 2000	Enterra 2001	OTEK 2013	This audit report
Hangar 1 debris (location described as "*north of the H1 apron for about 10m and east/south east of H1 itself for perhaps 50 or more metres*").	Area 20	Enterra #2	Enterra #2
Hangar 1 burials (location described as "*about 15 m north of the New Farm Road fence line and about 130m east along it from its junction with the Princes Highway fence line*" (page 39, Milsearch 2000).	Area 20 (no burial identified).	Not specifically discussed.	South eastern boundary.
Burning area (location not clear).	Area 21	Not discussed, refer Section 4.4.2 for further information.	Milsearch burning area.
'Detritus' zone between Hangar 3 and Hangar 4.	Area 15	Not specifically discussed. Several grid-based test pits excavated in area. Refer to Section 5.3.1 for further information.	Not applicable.
Not discussed as it was identified during subsequent Enterra investigations	Area 14	Enterra #1	Enterra #1
'Detritus zone'.	Area 22	Milsearch buried debris.	Milsearch buried debris.
Not discussed (proximate to a "zone of debris" (Milsearch 2000, page 38).	Area 22 burial	Not discussed. Description incorrectly provided in Table B against location "Enterra Location #2". Refer Section 4.4.2 and Appendix E of this report for clarification.	Enterra burial Area 22.

2.8.3 Summary of available site history information

OTEK undertook a history review for the Overall Audit Area (OTEK 2002), including a review of the historical reports by SKM (1993), Geo-Eng (1997), Biosis (2000), and Milsearch (2000), review of Melbourne Water historical property files, Sands and McDougall records and historical title records, personnel interviews, and an aerial photograph search (site photographs were not available prior to 1945). OTEK provided a brief summary of the site history findings relevant to the site in OTEK 2013A, and information relevant to former bonded ACM-containing buildings in OTEK 2010. The auditor also reviewed the historical reports discussed in Section 2.8.7 to support OTEK's summary. The site history information relevant to the site is summarised as follows:

- The Overall Audit Area and land in the general vicinity was used for dairy farming, stock grazing, and vegetable growing during 1880-1900.
- Circa 1900 the Board of Works ceased leasing approximately 10,000 hectares of land in Werribee, which included the site, and used it for waste water irrigation in winter and sheep grazing in summer (Biosis 2000). However, further information indicated that wastewater irrigation practices were undertaken only on a small portion of the former boundary of the Overall Audit Area land, this area was located outside the south west boundary of Area 2.An Environmental Audit was completed for Area 2 in 2004. This was practiced until 1958, when the Maltby Bypass was constructed adjacent to the southern boundary of the overall audit site. The Caltex Service Station and the Freeway Access Ramp now occupy this area, which was not part of the Overall Audit Area. The available information indicated that the Overall Audit Site was not historically irrigated using wastewater.

- Melbourne Water acquired the Overall Audit Area in the 1920s.
- The Overall Audit Area was occupied by the RAAF from circa 1940 to 1952.
- From the early 1950s to the late 1970s the site was used primarily for agriculture, and then in the late 1970s Melbourne Water began operating at the site.
- OTEK (in OTEK 2013A) indicated that known former RAAF infrastructure on Area 4D included a guard hut, wash bay, an unknown building (identified by a concrete slab, inferred to be from RAAF occupation), a septic and soak pit with associated underground bonded ACM piping, and underground pipework from Hangar 3. OTEK also identified multiple underground pipes associated with stormwater, sewer, and various unknown uses. The locations of former and current infrastructure are shown on Figure 4.
- Various historical buildings across the Overall Audit Area, though not within the site, were constructed with bonded ACM cement sheeting, particularly five aircraft hangars. Many structures were demolished in the 1950s. Although there were no ACM-containing buildings on the site (with the exception of underground pipework), there was a potential for ACM fragments to be present on the site, particularly in the western portion given the proximity of Hangar 1, and to the north east and south east proximate to former Hangars 3 and 4 respectively (refer Figure 4).
- Melbourne Water commenced operations on the Overall Audit Area in the late 1970s. There were no specific Melbourne Water operations on the site other than using it for grazing since the RAAF occupation.
- As discussed above, previous assessments by Milsearch (2000) and Enterra (2001) identified several suspected burials and areas of surface debris, considered to be associated with the former RAAF occupation.

2.9 Identified contaminants of potential concern

OTEK provided information on the contaminants of potential concern (CoPC) in Section 5.1 of OTEK 2013, which was based on the site infrastructure and historical site use. Based on his understanding of the historical site uses and Overall Audit Area, the auditor expanded on OTEK's limited summary, identifying CoPC associated with each land use or type of infrastructure. A summary of the previous site uses, terminology used throughout this report, and the associated CoPC identified are summarised in Table 7, along with specific observations related to each potential source.

Table 7 Potential sources and associated contaminants of potential concern

Site activity / Potential Source	Status of infrastructure at time of audit	Location	Contaminants of Potential Concern (COPC)
On site			
Infrastructure			
Former guard hut concrete slab	Only concrete slab remained at commencement of audit, removed by Enviropacific in June 2009.	Northern boundary of site.	None
Steam cleaning bay/degreaser shed concrete slab	Only concrete slab remained at commencement of audit, removed by Enviropacific in June 2009.	Western boundary (adjacent to 4H, close to Hangar 1).	Inorganics, BTEX, TPHs, PAHs, phenols, SVOCs, VOCs.
Unknown concrete slab	Removed by Enviropacific in June 2009.	South west of site centre.	Inorganics, BTEX, PAHs, phenols, nitrate, nitrite, SVOCs, VOCs, PCBs, asbestos
Septic and soak pit, and bonded ACM pipe (on site)	Removed from site by Transfield in July 2008.	North western corner.	Inorganics, pH, nitrate, nitrite, e.Coli, sulphate, asbestos (for pipe)
Hangar 3 underground bonded ACM pipe (crossed boundary to Area 4G)	Removed from site by Transfield in September 2008.	North west.	Asbestos
Underground metal pipe (water bearing)	Removed by Transfield between August – October 2008.	Running north-south across majority of site.	Inorganics
Ceramic pipe (use unknown)	Removed by Enviropacific in August 2009.	Southern portion of site.	Not known (use unknown).
Stormwater pipe (existing)	Pipe left in-situ.	Extensive across site.	Inorganics
Underground galvanised metal pipe (in situ, use unknown)	Pipe left in-situ.	Originating in Area 5 to the west, trending diagonally across the site from the west (from Area 4H) terminating in Area 4F to the south east.	Not known (use unknown)
Burials and surface debris			
Enterra #1	Fill material, ash and rubbish excavated and removed during audit.	Eastern boundary of site.	Inorganics, TPHs, PAHs, phenols, asbestos, dioxins/furans, SVOCs, VOCs, PCBs, pH
Enterra #2	Extensive trenching confirmed surface debris only (i.e. no burials were identified).	Western side of site, proximate to offsite Hangar 1.	Inorganics, TPHs, PAHs, SVOCs, VOCs, asbestos

Site activity / Potential Source	Status of infrastructure at time of audit	Location	Contaminants of Potential Concern (COPC)
4E burial	Buried domestic waste material, disturbed soil, and cess pit removed during audit period. Excavation crossed the northern boundary of the site and Area 4E.	Crossing northern boundary between Area 4E and site.	Inorganics, BTEX, TPHs, PAHs, phenols, VOCs, SVOCs, PCBs, asbestos, pH
Milsearch buried debris	Seven target test pits were excavated to investigate the potential burial identified by Milsearch. This work then uncovered the septic and soak pit (refer above), which OTEK considered may have been the anomaly that Milsearch identified.	North eastern corner of site.	Inorganics, TPHs., BTEX, asbestos
Enterra burial Area 22	Not investigated by OTEK. Auditor conducted verification assessment (refer Section 4.4.2).	North eastern corner of site.	Inorganics, asbestos
Other			
ACM (bonded and friable) in surface soil	Remediation of ACM fragments undertaken during audit.	Southern boundary of site associated with Hangar 4, western boundary proximate to Hangar 1, and north east proximate to Hangar 3.	Asbestos
General site use (agriculture, farming, grazing)	Not applicable	Widespread across the Overall Audit Area (onsite and offsite source).	Inorganics, OCPs/OPPs, nitrate, nitrite, ammonia
Off site			
Agriculture, farming and grazing		Overall Audit Area	Inorganics, OCPs/OPPs, nitrate, nitrite, ammonia
Surrounding aboveground ACM buildings (e.g. hangars)	Predominantly removed.	West, southeast and north east of the site	Asbestos (primarily fragments of bonded asbestos cement sheeting)
Area 4E: septics, USTs	Removed during course of audit.	North of the site	Septic: Inorganics, nutrients, e.coli USTs: lead, TPHs, PAHs, BTEX, phenols
Area 4H: sheep dip	Removed during course of audit	West of the site	OCPs/OPPs, herbicides

In addition to the abovementioned potential sources, OTEK 2013 also included the following as potential sources:

- OTEK identified a localised area of elevated cadmium in soil during the initial grid and target sampling (at 4D/T6), and undertook extensive sampling to delineate the lateral and vertical extent (refer Section 5.3.1). The auditor considered this to be an isolated occurrence, rather than a potential source of contamination, and as such did not include it in Table 7.
- USTs in Area 5 (suspected) and Area 1. The Auditor did not consider the USTs in Area 1 to be a potential source of contamination to the site, given the substantial distance to the site (approximately 200 m) and absence of any soil or groundwater hydrocarbon contamination. Extensive investigations by OTEK[5] did not identify any trace of a UST in Area 5; hence this was not considered to be a potential source of contamination and was not discussed further in this audit report.

2.10 Auditor's opinion on site history assessment

When the site history information from multiple sources was reviewed in its entirety, it provided a comprehensive understanding of potentially contaminating activities that may have occurred at the site. Based on the site history review, the majority of the site was considered likely to be green field land, with a low potential for contamination. The former RAAF infrastructure and site uses and remaining underground pipes were considered unlikely to have generated, or in the future generate significant impacts to soil and groundwater.

The auditor was satisfied that the site history review of the site and Overall Audit Area provided sufficient information to allow an appropriate sampling and analysis program to be developed and then implemented as discussed in this report.

[5] Reported in OTEK, 25 January 2013, *Environmental Site Assessment, Riverwalk Area 5, New Farm Road, Werribee,* (OTEK 2013C).

3. Assessment guidelines

Environmental protection in Victoria is legislated under the *Environment Protection Act 1970* (EP Act). Sub-ordinate legislation within the EP Act includes State environment protection policies (SEPPs) that prescribe beneficial uses and objectives that are to be met to protect the various segments of the environment.

3.1 Beneficial uses of the land to be protected

For the land segment, the *State environment protection policy (Prevention and Management of Contamination of Land)*, 2002 applies. Commonly referred to as the 'Land SEPP', the policy provides the beneficial uses to be protected under a number of different land use scenarios, and provides indicators and objectives for protection of land.

The land use categories of possible relevance to any site according to the Land SEPP are:

- Parks and Reserves;
- Agricultural;
- Sensitive Use including child care centre, pre-school, primary school and residential, any of which may take place in:
  - A high density area (where there is minimal access to soil) - Sensitive Use (High Density).
  - A lower density area (where there is generally substantial access to soil) - Sensitive Use (Other).
- Recreation/Open Space;
- Commercial; and
- Industrial.

The Policy defines protected beneficial uses for land as being:

- Maintenance of natural ecosystems, modified ecosystems and highly modified ecosystems;
- Human health;
- Buildings and structures;
- Aesthetics; and
- Production of food, flora and fibre.

The protected beneficial uses for each of the respective land uses are shown in Table 1 of the Land SEPP. This table is reproduced in Table 8 below.

Table 8 Protected beneficial uses of land

Beneficial Use	Land Use						
	Parks & Reserves	Agricultural	Sensitive Use (High Density)	Sensitive Use (Other)	Recreation / Open space	Commercial	Industrial
Maintenance of Ecosystems							
Natural Ecosystems	✓						
Modified Ecosystems	✓	✓		✓	✓		
Highly Modified Ecosystems		✓	✓	✓	✓	✓	✓
Human Health	✓	✓	✓	✓	✓	✓	✓
Buildings & Structures	✓	✓	✓	✓	✓	✓	✓
Aesthetics	✓		✓	✓	✓	✓	
Production of Food, Flora & Fibre	✓	✓		✓			

The site is proposed to be developed for residential uses including residential-single dwelling and medium-density residential use and as such the beneficial uses under the sensitive use (other) land use category apply as per the Land SEPP. The relevant beneficial uses of land to be protected under the sensitive use (other) category are:

- Modified Ecosystems;
- Highly Modified Ecosystem;
- Human Health;
- Buildings & Structures;
- Aesthetics; and
- Production of Food, Flora and Fibre.

3.2 Adopted investigation levels – land

The Land SEPP refers to the National Environment Protection (Assessment of Site Contamination) Measure in December 1999 (often referred to as "the NEPM"), which was formulated by the National Environment Protection Council (NEPC), under the *National Environment Protection Council Act 1994.* NEPM 1999 was amended in May 2013. All of the assessment work for the audit was undertaken during 2006 to 2012 which was well before the amended NEPM was released. The EPA has indicated that a 12 month transition process from May 2013 applies to the implementation of the NEPM 1999 (amended 2013) and as such the auditor considered that use of NEPM 1999 was appropriate in this instance. All the States and Territories of Australia were signatories to the making of the NEPM, including Victoria under the *National Environment Protection Council (Victoria) Act 1995.*

The NEPM provides investigation levels for soil and groundwater in the assessment of site contamination including Ecological Investigation Levels (EILs) and Health Investigation Levels (HILs) in Schedule B(1). The NEPM EILs and HILs are referred to in the Land SEPP as the principal objectives to be met to protect the beneficial uses of land.

3.2.1 Ecological protection

NEPM EILs (Interim Urban) (NEPC, 1999) were adopted as the initial screening level to assess potential impacts of soil contaminants on the environment (i.e. to consider impacts to the beneficial use 'Maintenance of Ecosystems'). EILs are set for urban land use (comprising city, suburban, and industrial areas). Where no EIL exists for an analyte, the following hierarchy of criteria were used by the auditor to assess potential ecological impact:

- Threshold concentrations for sensitive land use - soils (Table 3) from the NSW EPA (1994) *Guidelines for Assessment of Service Station Sites*;
- The Environmental Investigation "B" levels presented in the ANZECC & NHMRC (1992) *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites*; and
- The Dutch Target and Intervention Values provided in MHSPE (2009).

Where composite sampling occurred during the initial investigations at this site, modified investigation levels were adopted for these samples (i.e. ecological investigation criteria were divided by the number of a samples making up the composite sample).

3.2.2 Human health protection

NEPM HIL A criteria were adopted as the initial screening levels to assess impacts of soil contaminants on human health at the site. NEPM HIL A criteria are applicable for protection of human health in standard residential land uses with gardens / accessible soil (home grown produce contributing less than 10% fruit and vegetable intake; no poultry) and includes children's day care centres, preschools, and primary schools.

Where concentrations were below NEPM HIL A, it was generally considered that contamination would not adversely affect human health under any of the exposure scenarios (NEPM 1999). Where contaminant concentrations exceeded NEPM HIL A, results were then compared to HIL D to F to determine the land use scenarios under which human health would be protected. Such evaluation would typically include the nature and degree of the exceedance and a consideration of any proposed site use, human health risks or other impacts on the nominated beneficial use.

Where no HIL exists for an analyte, the following hierarchy of criteria were used by the auditor to assess potential human health impact.

- Threshold concentrations for sensitive land use - soils (Table 3) from the NSW EPA (1994) *Guidelines for Assessment of Service Station Sites*;
- The Environmental Investigation "B" levels presented in the ANZECC & NHMRC (1992) *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites*; and
- The Dutch Target and Intervention Values provided in MHSPE (2009).

Where composite sampling occurred during the initial investigations at this site, modified investigation levels were adopted for these samples (i.e. human health criteria were divided by the number of a samples making up the composite sample).

3.2.3 Aesthetics

There were no published criteria specific to assessment of aesthetic impact. However, the Land SEPP includes the aesthetic as a protected beneficial use of the land and also states (Table 2 of the SEPP) "contamination must not cause the land to be offensive to the senses of human beings". The NEPM (1999) also specifies the fundamental principle that the soils should not be discoloured, malodorous (including when dug over or wet) nor be of abnormal consistency.

3.2.4 Buildings and structures

The Land SEPP requires that "Contamination must not cause the land to be corrosive to or adversely affect the integrity of structures or building materials". The Land SEPP specifies pH, sulfate, redox potential, salinity or any chemical substances or waste that may have a detrimental impact on the structural integrity of buildings and/or other structures as indicators.

3.2.5 Production of food, flora and fibre

The Land SEPP requires that "Contamination of land must not:

(i) adversely affect produce quality or yield; and

(ii) affect the level of any indicator in food, flora and fibre produced at the site (or that may be produced) such that the level of that indicator is greater than that specified by the *Australia New Zealand Food Authority, Food Standards Code*".

The SEPP specifies any chemical substance or waste including those in the National Environmental Protection (Assessment of Site Contamination) Measure, Schedule B(2), Appendix 1.

In the absence of officially adopted investigation levels specifically for protection of food, flora and fibre, NEPM EILs have been considered for the purpose of this audit. It is noted that OTEK adopted NEPM A HILs as investigation levels for this beneficial use. The auditor considered the EILs should also be considered as they are, in relative terms more appropriate for determining potential adversity to produce quality or yield.

3.3 Beneficial uses of groundwater to be protected

The Victorian Environment Protection Authority (the Authority) will determine the segment to which groundwater in an aquifer belongs. The beneficial uses to be protected for each of the groundwater segments are defined in Table 2 of the *State environment protection policy Groundwaters of Victoria 1997*, herein referred to as the Groundwater SEPP. Water of higher quality (lower salinity) has more beneficial uses than low quality (more saline) groundwater.

The protected beneficial uses for each segment are shown in Table 2 of the Groundwater SEPP. This table is reproduced in Table 9 below.

Table 9 Protected beneficial uses of groundwater segments

Beneficial Uses	Segments (mg/L TDS)				
	A1 (0-500)	A2 (501-1000)	B (1001-3500)	C (3501-13,000)	D (greater than 13,000)
Maintenance of ecosystems	✓	✓	✓	✓	✓
Potable water supply					
Desirable	✓				
Acceptable		✓			
Potable mineral water supply	✓	✓	✓		
Agriculture, parks & gardens	✓	✓	✓		
Stock watering	✓	✓	✓	✓	
Industrial water use	✓	✓	✓	✓	✓
Primary contact recreation (e.g. Bathing, swimming)	✓	✓	✓	✓	
Buildings and structures	✓	✓	✓	✓	✓

As per clause 9(2) of the SEPP, the Authority may also determine that a beneficial use specified in Table 9 above does not apply to groundwater where:

- There is insufficient aquifer yield to sustain the beneficial use;
- The background level of a water quality indicator other than TDS precludes a beneficial use;
- The soil characteristics preclude a beneficial use; or
- A groundwater quality restricted use zone has been declared.

Clause 5. (1) of the Groundwater SEPP also states that "The goal of the policy is to maintain and where necessary improve groundwater quality sufficient to protect existing and potential beneficial uses of groundwaters throughout Victoria."

EPAV (2014) Publication 759.2 *Environmental Auditor (Contaminated Land) Guidelines for Issue of Certificates and Statement of Environmental Audit* provides further explanation:

- Section 9.2 (last paragraph, Explanatory Note) states: "Any assessment of the likelihood of particular beneficial uses of groundwater being realised should be based on an evaluation of whether a owner/occupier of the site or in the vicinity of the site *may reasonably expect* to use or be able to use groundwater for those purposes".
- Section 13.3 states: "Beneficial uses of groundwater may be considered 'relevant' for the purpose of determining whether to issue a Certificate in the following circumstances:
  - The beneficial use is 'existing' in the vicinity of the site. A beneficial use may be considered 'existing' where an existing receptor (bore, spring, creek) is, or could plausibly be, impacted by the pollution under existing or reasonably foreseeable conditions (including altered groundwater flow resulting from groundwater abstraction, injection or other means).
  - Where the beneficial use is 'likely' to be realised in the vicinity of the site. A beneficial use may be considered 'likely' in circumstances including, but not limited to:
    (i) use of groundwater in the same hydrogeological setting nearby or elsewhere in Victoria.
    (ii) the existing and likely future land uses both at the site and in the vicinity of the site are compatible with the beneficial use".

In this case the groundwater protected beneficial uses have been determined on the basis of the Groundwater SEPP for the purposes of this report.

TDS measured in the groundwater at and in the vicinity of the site ranged from 4910 mg/L (MW-5, November 2009) and 5850 mg/L (MW5, August 2007). Therefore, under the Groundwater SEPP, groundwater at the site would be classified as Segment C. Accordingly, the relevant beneficial uses of groundwater to be protected are:

- Maintenance of Ecosystems;
- Stock watering;
- Industrial water use;
- Primary contact recreation (e.g. bathing, swimming); and
- Buildings and structures.

3.4 Adopted investigation levels – groundwater

Table 3 of the Groundwater SEPP specifies the water quality investigation indicators required to protect beneficial uses (Table 10). In its 2013 assessment report, OTEK adopted ANZECC 1992 guidelines for comparison purposes; however, the auditor considered the most recent guidelines, as summarised in Table 10 below. The adoption of these more recent guidelines does not, in this instance, alter the conclusions OTEK reached based on its consideration of ANZECC 1992.

Table 10 Groundwater quality indicators

Beneficial Use Category	Water Quality Indicators
Maintenance of Ecosystem	Those specified in the relevant SEPP for surface waters as this beneficial use applies at the point of discharge of groundwater to a receiving surface water body. This site is located within the "Cleared Hills & Coastal Plains" segment covered by the *SEPP Waters of Victoria* (June 2003). The environmental quality objectives specified for this segment are those values in the ANZECC 2000 guidelines, and the level of ecosystem protection for this Segment is generally 95% for slightly to moderately modified aquatic ecosystems.
Potable Water Supply (Desirable and acceptable)	ANZECC (2000) *Australian Water Quality Guidelines for Fresh and Marine Waters*, refers to the Australian NHMRC and ARMCANZ (1996) *Australian Drinking Water Guidelines*. The NHMRC and ARMCANZ (2004) Australian Drinking Water Guidelines supersede these guidelines.
Potable Mineral Water	Australian Food Standards Code (1987) – Standard 08 Mineral Water, criteria for potable mineral water supply.
Agriculture, Parks & Gardens	ANZECC (2000) *Australian Water Quality Guidelines for Fresh and Marine Waters*, investigation levels for Primary Industries (Chapter 4.2 Water Quality for irrigation and general water use).
Stock Watering	ANZECC (2000) *Australian Water Quality Guidelines for Fresh and Marine Waters*, investigation levels for Primary Industries (Chapter 4.3 Livestock drinking water quality).
Industrial Water use	ANZECC (2000) *Australian Water Quality Guidelines for Fresh and Marine Waters* do not provide specific guidance for industrial water use, because industrial water requirements are so varied (both within and between industries) and sources of water for industry have other coincidental environmental values that tend to drive management of the resource. Industrial water use has been considered through regard for other environmental values.
Primary Contact Recreation	NHMRC (2008) Guidelines for Managing Risks in Recreational Water. The NHMRC (2008) refers to the Australian NHMRC and ARMCANZ (1996) *Australian Drinking Water Guidelines*. The NHMRC and ARMCANZ (ADWG 2011) *National Water Quality Management Strategy -Australian Drinking Water Guidelines* supersede these guidelines.
Buildings & Structures	Introduced contaminants shall not cause groundwater to be corrosive to structures or building materials (pH, sulphate, redox potential). Investigation levels are not specified and reference has been made to AS2159-2009 Piling – Design and installation.

3.5 Beneficial uses of the air environment

The State Environment Protection Policy *(Air Quality Management)* December 2001 (AQM SEPP) states (Clause 9) that the following beneficial uses are protected in the ambient (outdoor) air environment throughout the State of Victoria:

a. life, health and well-being of humans;

b. life, health and well-being of other forms of life, including the protection of ecosystems and biodiversity;

c. local amenity and aesthetic enjoyment;

d. visibility;

e. the useful life and aesthetic appearance of buildings, structures, property and materials; and

f. climate systems that are consistent with human development, the life, health and well-being of humans, the protection of ecosystems and biodiversity.

Table 11 below outlines the likely impact scenarios and provides a screening analysis of the beneficial uses of air for further consideration (if any), as relevant to this site:

Table 11 Relevance of beneficial uses of air

Beneficial Use	Possible Exposure Scenarios	Requires Further Consideration?
Life, health and well-being of humans	Volatile contaminants were not reported during assessment works at the site.	No
Life, health and well-being of other forms of life, including the protection of ecosystems and biodiversity	Volatile contaminants were not reported during assessment works at the site.	No
Local amenity and aesthetic enjoyment	Odours were not reported during assessment works at the site.	No
Visibility	Given the site coverage at the completion of the audit, it is unlikely that significant dust would result in impact to this beneficial use.	No
Useful life and aesthetic appearance of buildings, structures, property and materials	Volatile contaminants and odours were not reported during assessment works at the site.	No
Climate systems that are consistent with human development, the life, health and well-being of humans, the protection of ecosystems and biodiversity	Volatile contaminants were not reported during assessment works at the site.	No

4. Site investigation activities

4.1 Chronology of site activities relevant to the environmental audit

Site investigations were undertaken by OTEK over a period of approximately six years (2006 to 20012). Some of the investigations were undertaken concurrently with other parts of the Overall Audit Area. Therefore, for ease of reporting, the auditor defined three phases of investigation for the site:

- Soil assessment: including all grid soil sampling undertaken to gain an understanding of soil quality across the whole site, and any targeted sampling which was undertaken to investigate specific potential sources;
- Remediation and validation: including all removal of infrastructure and burials, excavation of contaminated soils (if present), and collection of validation samples from underlying soils; and
- Groundwater assessment: groundwater monitoring and sampling events.

The terminology adopted in this audit with respect to target and validation samples therefore differs on occasion from that in OTEK 2013A (i.e. in some instances OTEK defined a sample as 'validation', whereas the auditor considered it a target sample if it was to investigate the quality of soils beneath a structure that was retained onsite). The sample type terminology adopted by the auditor is clearly described in Table 12. The dates of site activities, phases of work and a description of the soil and groundwater works undertaken relevant to the environmental audit are also presented in Table 12, with a reference to where each activity is discussed in further detail in this report. The auditor's overall opinion of the adequacy of the assessment results and a consideration of risks to human health and the environment is discussed in Sections 5 (soil) and 6 (groundwater).

Table 12 Sequence of site activities

Date of Investigation	Type of field investigation	Potential Source / Area of investigation [1]	Site Activity and Objective	Relevant Sections of Audit Report
1993 - 2001	Site history review, geophysical survey	Overall Audit Area	Various historical reports were prepared for the Overall Audit Area.	Sections 1.4 and 2.8.1
2002	OTEK site history review	Overall Audit Area	OTEK undertook a site history investigation (OTEK 2002) of the Overall Audit Area to assess whether infrastructure and former activities may have resulted in contamination (refer Section 2.8). This review included the above mentioned reports so that the overall information collected from different sources were brought together and used to develop a good understanding of the potential source(s) of contamination, and then set up work plans to investigative such potential source(s).	Section 2.8.1
19 April - 10 July 2006	Soil assessment (grid and target sampling)	Broad site characterisation Milsearch burial 4E septic Enterra #1	Based on the abovementioned history review, OTEK developed an investigation scope of work which was reviewed by the auditor, after which the scope was implemented by OTEK at the site, including collection of soil samples from 262 grid-based test pits, and 11 targeted test pits[6]. Selected soil samples were analysed individually, and/or combined into three-part composites for analysis. At each investigation location a visual inspection for ACM fragments was undertaken.	Section 5.1.3
21 June and 19-20 July 2006	Soil assessment (target sampling)	Groundwater	Groundwater wells were installed across the whole of Area 4 to assess groundwater quality. Three were considered relevant to this audit: one within the site (MW-2) and two up-hydraulic gradient, proximate to the site (MW-5 and MW-6). Soil samples were collected during the installation of MW-2 and MW-5.	Section 5.1.2
22-23 April 2008	Soil assessment (target)	North east corner of site	OTEK conducted "metals step-out delineation sampling" (OTEK 2013A) to establish the lateral and vertical extent of elevated cadmium (above the HIL) identified in 2006 at location 4D/T6.	Section 5.1.2
7 March – 7 May 2007	Remediation and validation	4E Burial	OTEK supervised the excavation of burial of anthropogenic material (wire, glass, plastic, "general rubbish") that extended from Area 4E across the northern boundary of the site. Validation samples were collected from the excavation.	Section 5.3.1
August 2007	Groundwater monitoring event (GME) 1	Groundwater	Groundwater sampling event (of wells across Overall Audit Area).	Section 6

[6] This differs from the number of grid-based test pits described in OTEK 2013A. The auditor therefore relied on the test pit logs and laboratory analytical reports to determine the number of test pits excavated at site (refer Item 32 in Table E1, Appendix E).

Date of Investigation	Type of field investigation	Potential Source / Area of investigation [1]	Site Activity and Objective	Relevant Sections of Audit Report
November 2007	GME 2	Groundwater	Groundwater sampling event (of wells across Overall Audit Area).	Section 6
February 2008	GME 3	Groundwater	Groundwater sampling event (of wells across Overall Audit Area).	Section 6
10 – 29 June 2008	Remediation and validation	Hangar 3 bonded ACM pipe	The bonded ACM pipe associated with former Hangar 3 (in Area 4G) was removed and disposed offsite. Validation samples were collected from the base of the trench.	Section 5.3.1
6 to 22 August 2008	Remediation and validation	Metal water pipe	Approximately 500 m length of a 100 mm diameter metal pipe (formerly water containing) was removed. Several rounds of validation sampling and soil removal were undertaken.	Section 5.3.1
April 2009	GME 4	Groundwater	Groundwater sampling event (of wells across Overall Audit Area).	Section 6
10 September 2008 and 19 February 2009	Remediation and validation	Septic and soak pit, and associated bonded ACM pipe	The septic and soak pit (described as comprising buried basalt cobbles and boulders) and approximately 84 m of associated bonded ACM pipe were removed and disposed offsite. Several rounds of soil removal and validation sampling were undertaken.	Section 5.3.1
15 June 2009 to 5 August 2009	Remediation and validation	Guard hut concrete slab Steam cleaning bay/degreaser shed concrete slab Unknown concrete slab	The concrete slabs associated with the former guard hut, steam cleaning bay/degreaser shed and an unknown structure were removed, and validation samples collected from underlying soils. The livestock water trough was also removed.	Section 5.3.1
20 July 2009	Remediation and validation	Enterra #1	OTEK supervised the excavation of ash and "general rubbish" from a burial (Enterra #1), previously identified by Enterra (2001) and investigated by OTEK in 2006, then collected validation samples from the underlying soils.	Section 5.3.1
April-May 2006 and 20 July 2009	Assessment	Enterra #2	Trenching was undertaken on the western side of the site proximate to Hangar 1, to investigate area containing substantial surface debris, initially identified by Enterra. Eight trenches of varying lengths/depths were excavated and validation samples collected.	Section 5.3.1
21 August 2009	Remediation and validation	Ceramic pipe	Approximately 120 m length of 100 mm diameter underground ceramic pipe was removed and validation samples collected from underlying soils.	Section 5.3.1
11 September 2009	Assessment	Stormwater pipe	Samples collected adjacent to in-situ stormwater pipe to assess for potential contamination. Stormwater pipe remained on site.	Section 5.1.2

Date of Investigation	Type of field investigation	Potential Source / Area of investigation [1]	Site Activity and Objective	Relevant Sections of Audit Report
14 September 2009	Assessment	Surface ACM fragments (Hangar 5)	OTEK collected nine surface soil samples to assess for potential asbestos that may have originated from Hangar 5 (on Area 4B to the south).	Section 5.2.3
7-8 February 2010	Remediation and validation	Surface ACM fragments (entire site)	OTEK removed approximately 14 kg of non-friable ACM fragments from three areas where surface asbestos had been observed on the surface of the site during the previous site works.	Section 5.3.2
December 2011	GME 5	Groundwater	Groundwater sampling event (of wells across Overall Audit Area).	Section 6
28 November 2012	Assessment	Galvanised metal pipe	OTEK identified and supervised the uncovering (by excavator) of a galvanised metal pipe (use unknown) extending across the southern portion of the site. Three soil samples were collected to assess for potential contamination.	Section 5.3.1
2-3 October 2013	Auditor verification	Enterra #1, Enterra Area 22, Enterra #2, south western boundary	The auditor and assistant undertook a verification assessment to address data gaps, uncertainties in OTEK's work, and to confirm OTEK's findings. Trenches were excavated at three locations, and surface scrapes at five locations (Figure 16).	Section 4.4.2
7 March 2014	Remediation	To the south of Area 4G, crossing the boundary of the site and Area 4I (opposite the letter box of 35 Farm Road)	TEC removed ACM fragments from the surface of the site. The ACM was observed by the auditor during a site inspection of Areas 4I and 4G, undertaken on 25 February 2014.	Section 5.3.2
29 June 2014	Auditor final site inspection	Not applicable	The auditor undertook his final site inspection.	Sections 4.4.1 and 5.5.4

NOTES:

[1] Refer Table 7 in Section 2.9 for descriptions of potential sources.

[2] TEC was engaged by Melbourne Water as assessors to conduct specific and limited works following OTEK going into liquidation (discussed in Section 1.4).

4.2 Field sampling and laboratory testing program

The field sampling and laboratory testing program was designed by OTEK to assess the presence of contamination in the natural soils, any fill materials on site, and the groundwater beneath the site. The auditor reviewed and provided feedback on various Sampling and Analysis Plans (SAPs) prepared by OTEK for the various phases of site investigations.

Analysis of soil samples was undertaken by the following laboratories:

- Primary laboratory: Australian Laboratory Services Pty Ltd (ALS), Labmark Pty Ltd (Labmark, formerly Amdel Ltd); and
- Secondary laboratories: Leeder Consulting (Leeder), Groundswell Laboratories (Groundswell).

The assessor indicated these laboratories were NATA accredited for the testing undertaken. The auditor noted the laboratory reports received were NATA stamped and signed by NATA signatories.

4.3 Review of OTEK's draft ESA report, and quality assurance and quality control (QA/QC) procedures

4.3.1 Review of draft ESA (OTEK 2013A)

The auditor carefully reviewed OTEK 2013A and compiled a summary of comments. As noted in Section 1.4, because the auditor was not able to obtain clarification from OTEK regarding any of the queries raised (due to OTEK going into receivership), the summary of issues and the auditor's comments has been included as Table E1, Appendix E.

The auditor identified numerous issues and errors associated with OTEK's reporting, but through a detailed review of historical documents and his knowledge of the site as well as the Overall Audit Area he was able to resolve the majority of issues. To address those issues that could not be resolved, the auditor undertook verification sampling, as detailed in Section 4.4.2 below.

4.3.2 Review of OTEK's QA/QC procedures

The auditor undertook a detailed review of the quality assurance and quality control (QA/QC) documentation presented by the assessors, and reviewed OTEK's field procedures to verify the integrity and the reliability of the data presented. This review is provided in Table E2, Appendix E, and indicated the following:

- Overall the frequency of QC samples analysed was adequate. The analytical suite for QC samples was slightly less than required. Based on the following lines of evidence, the auditor was satisfied that sufficient information was available to assess the integrity and the reliability of the data set:
  - OTEK followed correct field sampling procedures, and samples were stored and handled appropriately;
  - Laboratory analytical results were consistent with site observations and site history review, and with findings from the Overall Audit Area; and
  - Results for QA/QC samples that were analysed indicated good field and laboratory accuracy and precision.

- The RPDs were generally acceptable, except a limited number of results that were above the recommended range for calculated RPDs for soil and groundwater results. These were considered minor in the context of the entire data set. It was also considered that at least partly this would be due to the inherent soil heterogeneity.
- The majority of rinsate and trip blank sample results were below the laboratory detection limit, with the exception of some inorganics (i.e. zinc, barium, copper, manganese) in samples from April to July 2006. The auditor considered these positive detections to potentially be a result of poor quality blank water provided by the laboratory, rather than from cross contamination during sampling. Regardless of the origin, the auditor noted that all soil analytical results collected during this period were reasonably consistent, and therefore the positive detections in the rinsate/trip blank samples were not considered to have impacted on the reliability of the data set.
- While trip blank samples were not always analysed for volatile contaminants (as is standard practice) this was not considered a significant issue given that volatile contaminants were not detected in soil or groundwater. Additionally and based on historical activities at the site volatiles were not considered CoPC.
- Sample holding times were generally acceptable. Where holding times were occasionally exceeded, the auditor was satisfied that analytical results were unlikely to have been compromised given correct handling and storage of samples, and low likelihood of the specific contaminants being identified.
- Laboratory internal QA/QC results were generally acceptable. Minor exceedances were noted on the laboratory reports and discussed by OTEK.
- As discussed in Section 5.1.1, composite samples were analysed for pH and semi-volatile analytes (PAHs, OCPs/OPPs), which is not in accordance with Australian Standard 4482.1. However, given a reasonable number of individual samples were analysed for pH, PAHs and OCPs/OPPs across the site (refer Table 15) and the results of the composite samples were consistent with the results of the individual samples, as well as those from the Overall Audit Area, this error in methodology was not considered to be an issue of concern.

4.4 Auditor verification activities

4.4.1 Site inspections

The Auditor and/or his representative observed the field investigations across the site and the Overall Audit Area on numerous occasions since the commencement of the project. Works were frequently undertaken both on the site and other audit areas during the same sampling event. Of particular relevance to the site were the following inspections:

- 17 October 2005: The auditor inspected the whole of Area 4, focusing on potential sources of contamination (e.g. Area 4B CCA timber treatment area, hangars, incinerators, USTs, etc.);
- 28 April 2006: The auditor and auditor's assistant inspected works across the site (and other parts of the Overall Audit Area). Debris was observed to the west of Hangar 3, and ACM fragments noted near the surface in the vicinity of the hangars. It was noted there was no evidence of a former air strip within the site. Some areas of the site were observed to be undulating, considered to possibly be manmade drainage lines from the air strip.

- 15 May 2006: The auditor and auditor's assistant visited the site (and other sections of the Overall Audit Area). The area of the three houses that were historically present at the northern border of the site and the southern part of Area 4E was also inspected. It was understood the houses were demolished circa late 1980s/early 1990s. There was no evidence of the house formerly on the site, though concrete slabs and garden paths were evident in the adjacent Area 4E.

  The OTEK investigations into anomalies detected in the north east corner of the site (refer Section 2.9) were in progress. Three long trenches were observed in the location of the former house on the site, extending to up to 2 mbgl. The trenches covered the location of the houses in 4D. The western-most trench was observed to contain concrete, metal and shell grit to 0.3 mbgl, potentially indicating a small shallow burial. The middle trench did not contain anything of concern. The eastern-most trench identified cesspits (one small wooden and one larger concrete structure) and fragments of terracotta pipes (in top 0.3 mbgl), which were presumed to be related to the houses. In a small trench near the border of 4E a thin layer of ash was identified at approximately 0.3 mbgl. An old concrete footpath was identified in the middle of area 4D, which was not referenced on historical maps.

  The auditor noted OTEK did not provide any discussion relating to the trenching works described above in OTEK 2013A. The auditor therefore relied on his observations and photographs available (provided by OTEK).

  Open trenches proximate to H1 were also observed. The concentration of surface debris was noted to be very high around H1 (on Area 4H), decreasing in concentration as proximity to the hangar increases. Debris noted included old metal scrap, a part of an old piston, plastic and metal piping, pieces of melted lead and aluminium, plane scraps, plastic. Debris was typically smaller than 0.3 m in size.

- 26 June 2006: The auditor inspected trenches excavated on the western side of the site, proximate to offsite Hangar 1, that were intended to target anomalies and surface debris identified by Milsearch 2000 and Enterrra 2001. OTEK had excavated trenches to approximately 0.7 mbgl (refer Figure 11 for trench locations). The auditor looked for signs of disturbed soil, soil profile inconsistencies, metal debris or ACM pieces. There was virtually nothing observed across the soil profile, and minimal debris at the surface. The auditor requested OTEK to excavate an additional trench to investigate an area where a difference was noted in the vegetation cover and the soil profile was slightly less compacted than other areas. No signs of contamination or disturbance were observed.

  The basis for the investigation was the surface debris identified by Enterra (2001). The auditor requested OTEK use the Enterra report to select areas with the highest number of geophysical hits and to choose two areas to further investigate, including sieving the top 20 cm of soil, and documenting the number of individual pieces of debris encountered. Initially the intention was to excavate trenches to a minimum of 1 m, however, as nothing was observed in the trenches, the auditor indicated to OTEK that shallower trenches would be appropriate in sections to speed up the process.

  The auditor requested that in its assessment report, OTEK clearly link the findings from Enterra 2001 with the investigation undertaken, but this was not done in this instant.

- 18 July 2006: The auditor's assistant observed location Enterra #1, approximately 5 x 5 m containing some metallic debris.
- 5 March 2007: The auditor's assistant observed sieving of soils across Area 4.
- 6 June 2007: The auditor and auditor's assistant visited Area 3 and Area 4, and observed open excavations.

- 2-3 October 2013: The auditor and his assistant undertook a verification investigation.
- 29 May 2014: the auditor conducted his final site inspection and noted that the site appearance has not chneges. The site was covered with grass, weeds, trees and some shrubs. The auditor also noted that a concrete slab associated with the steam cleaning bay/degreasing shed remained on the site and was noted as a condition number 2 in the Statement of Environmental Audit and shown in Figures 4.

4.4.2 Auditor verification

The auditor undertook a verification assessment on 2-3 October 2013 to confirm Enterra's and OTEK's findings in several areas of the site and Area 4F. A summary of the issues identified and verification scope is provided in Table 13 below, and locations are shown on Figure 16. Further information regarding the issues identified with OTEK 2013A is provided in Table E1, Appendix E.

Laboratory analytical reports and photographs from the verification works are provided in Appendix H.

Table 13 Auditor verification

Location[1]	Co-ordinates[2]	Data gap / issue	Auditor verification
Verification area one (V1) (Enterra #2)	E 292859 N 5801360	OTEK did not provide an accurate description of why trenches were excavated, nor an adequate description of what was encountered. There were multiple errors identified in OTEK 2013A regarding investigation in this area which did not correspond with the auditor's knowledge of the site, nor the findings by Enteral. Given this location was within an area used by RAAF and was known to contain substantial surface debris and ACM fragments; investigation was necessary to confirm the absence of contamination. Refer Items 10, 11, 58 and 59 in Table E1 of Appendix E.	Three trenches of up to 15 m length were excavated in the location of OTEK's previous investigations, to a maximum depth of 1.5 mg. Disturbed natural soil was observed as expected in the vicinity of OTEK's investigations (western-most trench), the remaining soils were undisturbed natural material. There were no visual or olfactory signs of contamination. One sample (4D_V1_0.2) was submitted for laboratory analysis of asbestos and inorganics. All results were below the laboratory LORs.
V2 (Enterra burial Area 22)	E 293226 N 5801554 (coordinates from Enteral 2001, Area 22)	It was doubtful from OTEK 2013A whether a potential burial identified by Enterra (within Enterra Area 22) was investigated. The sampling locations provided in OTEK 2013A did not correspond with the location described in Enterra's report 2001, page 20. Refer Items 10 and 11 in Table E1 of Appendix E.	Two perpendicular trenches of approximately 6 m length were excavated to a maximum depth of approximately 0.5 mbgl. Natural soils were encountered with no signs of contamination; therefore no soil samples were collected.
V3 (Enterra #1)	E 293208 N 5801139 (coordinates from Enterra 2001, Area 14)	During the remediation of a small burial initially identified by Enterra (within Enterra Area 14), OTEK reportedly backfilled the location with excavated soil which was not validated. The soil was potentially contaminated given it contained ash and rubbish (which OTEK reported that it was removed prior to backfill). Refer Item 56 in Table E1, Appendix E.	Two perpendicular trenches of approximately 6 m length were excavated to a maximum of 1 m depth. Disturbed natural soil with trace charcoal inclusions was observed in soil to approximately 0.5 mbgl, underlain by undisturbed natural soil with no evidence of contamination. One soil sample (4D_VS3_0.1-0.2) was collected from 0.1-0.2 mbgl and analysed for PAHs, inorganics and asbestos. All results were below the laboratory LORs.
South eastern boundary (Milsearch burning area and a south eastern boundary burial)	South eastern boundary along New Farm Road	Milsearch identified an area proximate to Area 5 (New Farm Road) that was potentially used for burning, described in Milsearch 2000 (page 33) as: "a discoloured/stained area about 5m x 5m and devoid of vegetation…located just north of the New Farm Road fence-line. This site showed evidence of having been a burning ground for radios or instruments, amongst other things. Charred portions of resistors, condensers and electric flex were in evidence on the surface. This site was roughly equidistant between H1 and H5 in an area consistent with Maclay's description of where several aircraft were burnt". The quality of the site plan provided on page 28 of Milsearch report was poor, and it was not possible to determine where the potential burning location was situated. OTEK did not provide any discussion in OTEK 2013A regarding these findings by Milsearch, and hence there was a knowledge gap as to whether the area was adequately investigated. Refer Item 15 in Table E1, Appendix E for further discussion.	A visual inspection was conducted along the southern boundary of the site, to look for any areas consistent with Milsearch's description (e.g. stressed vegetation, debris). Additionally at five locations (4D_V4 to 4D_V8, see Figure 16) an area of up to 8 x 8 m was cleared of vegetation and the top 0.1 m of soil exposed by backhoe. Scattered small pieces of debris (metallic, glass, ceramic) were observed along the south eastern fence line (predominantly between vehicle track and fence line), and at location 4D_V8. The material was restricted to surface soils less than 0.1 mbgl. No staining or odours were observed, and hence no samples were collected. Further discussion with respect to the debris observed in relation to the aesthetic beneficial use is provided in Section 5.5.4.

NOTES:

1. Locations are shown on Figure 16.
2. Coordinates were derived from OTEK 2013A figures (V1), or Enterra 2001 (V2, V3). Coordinates from Enterra 2001 were converted from AGD66 to GDA94.

4.5 Conclusions on QA/QC

Overall the laboratory results were considered to be consistent with the site history review and field observations made during OTEK's assessment of the site. The auditor was satisfied that when considered in conjunction with the auditor's verification assessment and his long term knowledge of the site, the sampling undertaken was adequate and the laboratory results reported were representative of the condition of soil and groundwater on site at the time of the assessments.

5. Assessment of soil quality

A summary of the locations of key information within the OTEK's assessment report (OTEK 2013) is provided in Table 14 below.

Table 14 Assessor's site assessment information – soil

Assessment Details	Section in OTEK 2013A
Site history	Section 3
Details of soil sampling (including soil assessment, remediation, and validation sampling) and laboratory analytical results.	Sections 6, 7, 9.1, 10 and 13.1.
Field observations	Section 7
Borelogs	Appendix C
Site plans	Figures 1 to 9 and Figure 11
Analytical results (summary tables)	Tables 1 to 42 and Tables 56 to 84

As noted in Section 4.1, the auditor considered all sampling works as three unique phases (soil grid and target assessment, soil remediation and validation, and groundwater). The following sections discuss soil assessment and remediation and validation (groundwater is discussed in Section 6).

5.1 Soil sampling and analytical program

To assess soil contamination at the site, OTEK collected soil samples from grid based and targeted sampling locations, and undertook a trenching exercise to investigate a burial towards the western boundary (Enterra #2, see Figure 4).

OTEK summarised the soil investigation activities in Section 7 of OTEK 2013A (attached as Appendix C of this report).

5.1.1 Soil assessment - grid

Based the auditor's review of site plans, analytical tables and borelogs provided in OTEK 2013A, a total of 262[7] grid based test pits were excavated across the site between 19 April and 9 May 2009, which provided a sampling density of approximately 13 locations per hectare. This exceeded the density specified in Australian Standard AS4482.1 to allow detection of contamination hot spots of 35.6 m diameter (refer Table E1 of AS4482.1) with a confidence of 95% (AS4482.1 specifies 11 sampling points per hectare for a 5.0 ha site). It was noted AS4482.1 does not provide guidance on sites larger than 5.0 ha other than stating the sites "are usually subdivided into smaller areas for more effective sampling". Samples were typically collected from 0.25 mbgl, 0.5 mbgl, and 1.0 mbgl at each location.

Grid soil sampling locations are shown on Figure 5. Given the majority of the site was essentially green field for a long period, extensive targeted sampling was undertaken, infrastructure was removed and underlying soils appropriately remediated (if required) and validated, the auditor considered the sampling density was adequate to characterise the site.

[7] This differed from the total provided in Section 7.1.1 of OTEK 2013 (257), which the auditor concluded was an error (refer Item 94 in Table E1, Appendix E for details).

Individual Grid Samples

A total of 264 individual samples from the grid based test pits were selected for laboratory analysis. Additionally, the laboratory formed and analysed 144 three-part composite samples (from 48 grid based test pit locations). Table 15 below provides a summary of the grid and composite analytical schedule (derived from Tables 1 to 25 in OTEK 2013A).

Table 15 Grid-based sample analytical schedule

Analyte	No. of individual samples analysed	No. of composite samples analysed
Inorganics[1]	63 (7 analysed for arsenic, barium, manganese, nickel and vanadium only)	137
OCPs	16	47
OPPs	9	43
Asbestos	100	-
pH	201	29
EPA screen[2]	4	-
PAHs	17	84
TPHs	23	-
Phenols	17	47
PCBs	16	47
Ethylene glycol	10	26
Fluoride	20	53
Cyanide	15	53

NOTES:
[1] Inorganics: antimony, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, copper, lead, manganese, molybdenum, nickel, selenium, tin, vanadium, zinc, mercury.
[2] EPA screen: Inorganics (as above), cyanide, ethylene glycol, fluoride, phenols, TPHs, MAHs, PAHs, OCPs/OPPs, PCBs, chlorinated hydrocarbons, VOCs.

Based on the site history and limited potential for contamination across the broader site area, it was considered that sufficient samples were analysed for CoPC.

Composite Samples

Composite samples were analysed for pH and semi-volatile analytes (PAHs, OCPs/OPPs), which is not in accordance with Australian Standard 4482.1, and is not standard industry practice. The Auditor raised this with OTEK, which acknowledged that although this practice was not appropriate, OTEK considered that composite results still provided information regarding the condition of soils at the site (OTEK 2013A). The auditor considered the composite results in his assessment of the site condition, and noted they were consistent with results from individual sample analyses from the site. Given a reasonable number of individual samples were analysed for pH, PAHs, and OCPs/OPPs across the site (refer Table 15) and results were consistent with data from the Overall Audit Area, this error in methodology was not considered to affect the outcome of the audit.

5.1.2 Soil assessment – target locations

A total of 32 target sampling locations were advanced between 2006 and 2009 to assess potential contamination sources that were identified as part of the site history review (as discussed in Section 2.9), as summarised in Table 16 below (sampling locations are shown in Figure 5).

As noted in Section 4.2, although OTEK variously referred to samples as 'target' or 'validation', for the purposes of reporting the auditor has used 'target' sampling to describe all locations that investigated potential sources and infrastructure that was retained on site (i.e. stormwater pipe, galvanised metal pipe, sewer). All samples collected following the removal of infrastructure and/or remediation of soils were considered 'validation' samples (discussed in Section 5.3 below).

5.1.3 Soil sampling - asbestos

Asbestos was identified as a key COPC during the site history review, due to the historical presence of buildings containing ACM proximate to the site, and also currently remaining adjacent to the site (e.g. Hangar 1 to the west).

Grid sampling

During the 2006 grid sampling program OTEK undertook a visual assessment for the presence of ACM at each sampling location. Additionally, approximately 38% of grid samples were analysed by the laboratory for asbestos fibres.

It was noted that although the SAPs for grid based sampling were developed prior to the 2009 *Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in WA (DOH, 2009)* asbestos guidelines, OTEK indicate the works were in accordance with these guidelines. The auditor noted that there were several minor deviations from DOH 2009, as discussed in Items 67 to 73 of Table E1, Appendix E, however, these were not considered to impact the overall outcome of the audit.

Targeted sampling (Hangar 5 (Area 4B))

In a separate investigation, on 14 September 2009, OTEK collected nine targeted surface soil samples (4V/VS40/SS-1 to 4B/VS50/SS-1) to investigate for potential asbestos associated with Hangar 5, to the south of the site. No asbestos was detected. The rationale behind sampling location selection was not provided. Given OTEK undertook a visual inspection for asbestos at each grid based sampling location, and there was an adequate density of grid and target sampling locations in the southern portion of the site, the auditor considered that sufficient investigation into the potential for surface asbestos fragments arising from Hangar 5 to the south was undertaken. Based on the available information, and confirmed by the auditor final site inspection (29 May 2014), the likelihood of significant asbestos fragments being present in the southern portion of the site was considered to be low.

ACM remediation

Following the findings of the grid and targeted sampling programs, in 2010 a separate investigation and remediation of surface ACM at selected areas across the site was undertaken. Details are provided in Section 5.3.2.

Table 16 Potential contamination sources and associated target sampling

Potential Contamination Source	Investigation Dates	No. of Target Sampling Locations	Sample location IDs	Sample Analyses [2]	Summary of Work Undertaken
Stormwater pipe	11 Sept 2009	9	4D/VS-97 to 4D/VS-103	Inorganics, BTEX, TPHs, PAHs, phenols, OCPs, pH, VOCs, SVOCs, PCBs, asbestos, ammonia, E. coli, coliform, sulphate.	The location of the stormwater pipe was identified based on aboveground pits. Overburden excavated and placed on plastic adjacent to the pipe (OTEK 2009A). Test pits were excavated to approximately 1.2 mbgl adjacent to the pipe, and soil samples collected below the depth of the pipe. Sampling locations are shown on Figures 5 to 9. The pipe ranged in diameter from 300 mm to 450 mm, at approximate depths 1.0-1.5 mbgl (OTEK 2009A). Sampling locations were situated at approximately 150 m intervals along the pipe, or to target inlet points or sections of the pipe uncovered during other remediation activities (on Overall Audit Area) (OTEK 2009A).
Hangar 5 ACM[1]	14 Sept 2009	9	4B/VS-40/SS-1, 4B/VS-42/SS-1 to 4B/VS-50/SS-1	Asbestos	Surface soil samples were collected and analysed by the laboratory, to assess for the presence of asbestos which might have potentially originated from Hangar 5 in Area 4B to the south. No asbestos was identified.
Milsearch buried debris	11 May 2006	6	4D/T1 to 4D/T6 and 4D/T9 Additional 16 locations at 4D/T5 to delineate extent of cadmium	Metals, TPH, PAH, phenols, OCP, OPP, PCB, pH, asbestos	Test pits were advanced to investigate a potential burial identified by Milseach 2000. No evidence of a burial was encountered, however OTEK stated the septic and soak pit, and associated asbestos pipe were uncovered. OTEK considered this was likely the anomaly detected by Milsearch, rather than a burial. The auditor noted that OTEK described the investigation locations as test pits, however, during the auditor's inspection he observed that long trenches were actually excavated (refer Section 4.4.1 for auditor's observations). The trenches provided a good indication of the soil profile. The auditor further noted that the septic and soak pit and associated asbestos pipe were located further to the west of these targeted locations. The auditor considered OTEK was possibly referring to a septic and cess pit that was identified in Area 4E, and location 4E/T25 (see below). The auditor considered that sufficient investigations were undertaken in the area, and the errors in OTEK's reporting did not impact the outcome of the audit.
Septic and soak pit in 4E	19 June 2006	1 (within site)	4E/T25	Inorganics, PAHs, e.coli	A single test pit was excavated within the site, reportedly to target a septic and soak pit on Area 4E.

Potential Contamination Source	Investigation Dates	No. of Target Sampling Locations	Sample location IDs	Sample Analyses [2]	Summary of Work Undertaken
Enterra #1	22 June 2006	1	4D/T10	Inorganics, TPHs, PAHs, phenols, asbestos, dioxins/furans, SVOCs, VOCs, PCBs, pH, sulphate	Location 4D/T10 was excavated to investigate the burial. All fill material and rubbish was subsequently excavated to 0.3 mbgl (refer Section 5.3.1 for details of remediation).
Enterra #2	April/May 2006	6 trenches	No samples collected	Inorganics, TPHs, BTEX, pH, phenols, VOCs, SVOCs, PCBs, sulphate	OTEK excavated six trenches proximate to the western boundary of the site. The description and dates provided in OTEK 2013A regarding the field works undertaken to investigate Enterra #2 were inaccurate (refer to Table E1, Appendix E for details). The auditor based his opinion onsite inspections (auditor and auditor's assistant), discussions with OTEK during the works, and verification investigation. The auditor requested excavation of trenches to investigate the areas containing high quantities of surface debris (identified by Milsearch and Enterra), to investigate the lateral and vertical extent of such debris. The auditor observed the open trenches (discussed in Section 4.4.1). Photos taken by OTEK[8] are included in Appendix I. Trenches were initially excavated in a triangular pattern, proximate to the western boundary and offsite Hangar 1, as this is where the majority of surface debris was observed. Trenches were extended to a maximum depth of 1 mbgl. Debris was found to be confined to surface, with the trenches intersecting natural soils only. Where an area of slightly less compacted soil was encountered, the auditor requested additional trenches be excavated (T6 and T9). Only natural soils were encountered at these locations. The auditor undertook a verification assessment in October 2013, and did not encounter any signs of surface debris or contamination. One soil sample 0.2 mbgl (4D_V1_0.2) analysed for inorganics and asbestos did not contain any detectable concentrations. Refer to Section 4.4.2 for further details.
	20 June 2006	1 test pit	4D/T9 then inferred to be in wrong location, multiple trenches in 'correct' location		Test pit 4D/T9 was excavated in the north east of the site, but OTEK 2013A reported this was the wrong location. OTEK did not specify why the incorrect location was investigated, but did note that no signs of contamination were observed at this (incorrect) location. Refer to Items 11 and 58 in Table E1, Appendix E for further discussion.

[8] OTEK provided photos as part of a draft GIS package in 2007

Potential Contamination Source	Investigation Dates	No. of Target Sampling Locations	Sample location IDs	Sample Analyses [2]	Summary of Work Undertaken
	20 July 2009	2 trenches	4D/VS-72 to 4D/VS-86		Two additional trenches were excavated at the location of what OTEK deemed a suspected burial, but which the auditor understood (from Enterra 2001 and site observations) instead contained scattered surface debris. OTEK's trenches extended to a maximum of 15 m length and 1.1 mbgl depth. Fifteen samples were collected to assess the condition of the walls/base of trenches. Refer Items 10, 11 and 59 in Table E1, Appendix E for further details regarding discrepancies in OTEK 2013A. There were discrepancies in OTEK 2013A regarding the depth and location of samples (refer to Item 59 in Table E1, Appendix E for details). No visual, olfactory or analytical indications of contamination were detected. Natural soil was encountered with no signs of anthropogenic material. Excavated soil was used to backfill the trenches. Verification sampling undertaken by the auditor encountered natural soils only, with no visual or olfactory signs of contamination. As noted above, a soil sample collected from 0.2 mbgl (4D_V1_0.2) was analysed for inorganics and asbestos; all results were below the laboratory limit of reporting (inorganics) or not detected (asbestos). Auditor verification sampling is discussed further in Section 4.4.2.
Galvanised metal pipe	28 November 2012	3	4D/VS-104 to 4D/VS-106	Inorganics, TPHs, PAHs	Approximately 400 m of 60 mm diameter pipe running west to east across the southern portion of the site was exposed using an excavator and inspected. Three samples were collected to investigate soils proximate to the pipe. OTEK 2013A contained typographical errors relating to 4D/VS-104 to 4D/VS106 – refer to Item 64 in Table E1, Appendix E for details. These errors did not impact the outcome of the audit. There were no visual, olfactory or analytical indications of contamination. The auditor did not consider the pipe to be a potential source of historical or ongoing contamination, and agreed with OTEK to leave the pipe in-situ.
Monitoring well installation	21 June 2006, 19 July 2006	2 (on site)	B-2 (converted to MW-2), B-5 (converted to MW-5).	Inorganics, TPHs/BTEX (B-5 only).	Two soil samples were analysed from B-2 (from 0.2 mbgl and 4.0mbgl) and five from B-5 (from 0.25, 0.5, 2.0, 6, and 10 mbgl). Natural soil was encountered at both locations.

NOTES:

[1] Although labelled "4B", samples were collected from within the site (Area 4D)

5.1.4 Auditor's opinion on adequacy of soil assessment program

The auditor and his team assessed the information available. It was considered that overall the grid-based and targeted sampling locations and analytical program provided sufficient information to allow assessment of the likely risk from potentially contaminating sources at the site. This was based on the following lines of evidence:

- Based on the available site history information and his field visits, the auditor and his team reviewed and provided feedback on the sampling and analysis plans, prior to commencement of work;
- The sampling program was based on a thorough understanding of potential sources and activities, which might have resulted in contamination of soil at the site;
- The analytical program sufficiently addressed all identified COPC;
- Target sampling locations were positioned appropriately to investigate identified potential contamination sources[9];
- Samples were collected using appropriate methodologies; and
- The auditor and his assistant undertook multiple site visits during the assessment of the site, and of the Overall Audit Area, and conducted verification assessments in several locations to confirm OTEK's findings.

In order to complement the, sometime lacking adequacy of the draft ESA report (OTEK 2013A), the auditor had to refer to multiple other documents as well as his own site knowledge. This was necessary to gain sufficient information.

5.2 Summary of soil assessment results

5.2.1 Inorganics

A total of 50 *individual* soil samples from the grid and target soil assessment works contained concentrations of one or more of barium, cadmium, manganese, nickel and vanadium above the EILs. Additionally, multiple *composite* samples contained concentrations of one or more of arsenic, barium, copper, manganese, nickel, vanadium or zinc above the modified EILs.

One target sample from proximate to the stormwater pipe contained asbestos.

Concentrations of all other COPCs analysed were below the EILs.

With the exception of a single concentration of cadmium (21 mg/kg in sample 4D/T6/0.25, just marginally exceeding the criterion of 20 mg/kg) all concentrations of all COPC analysed were below the applicable NEPM A HILs.

A summary of maximum concentrations of each contaminant identified above the adopted investigation levels in fill and/or natural soil during the assessment works is provided in Table 17 below. The table only shows individual samples containing contaminants at concentrations exceeding the adopted investigation levels (i.e. samples with concentrations below the investigation levels have not been included) and does not include composite samples, which are discussed further below.

Grid and target soil sample analytical results are presented in Tables 1 to 42, and Tables 56 to 70 of OTEK 2013A, attached as Appendix C of this report.

[9] Despite OTEK incorrectly positioning one targeted sampling location (4D/T9, intended to target Enterra #2) and not providing any explanation, the correct location was subsequently investigated.

Table 17 Summary of maximum contaminant exceedances in soil (individual samples)

Analyte	NEPM or Adopted Investigation Level (mg/kg)		Sample Type	Concentration (mg/kg)	Fill/ Natural	Samples exceeding adopted investigation level	
	NEPM EIL	NEPM HIL A					
Barium	300	-	Grid	340-730		4D/G18/0.5 4D/G35/0.5 4D/G136/0.5	4D/G211/0.5 4D/G234/0.5 4H/G42/0.5
Cadmium	3	*20*	Target (Milsearch debris)	21	Fill	4D/T6/0.25	
			Target (cadmium delineation at 4D/T6)	3-5	Natural	4D/T6/E3/0.25 4D/T6/S2/0.25 4D/T6/S3/0.25	
			Target (galvanised metal pipe (insitu))	4-9	Natural	4D/VS104 4D/VS105 4D/VS106	
Manganese	500	*1500*	Grid	513-810	Natural	4D/G40/0.25 4D/G102/0.25 4D/G228/0.25 4D/G247/0.1	
Nickel	60	*600*	Grid	110	Natural	4D/G247/0.1	
Vanadium	50		Grid	51-61	Natural	4D/G18/0.5 4D/G24/0.5 4D/G35/0.5 4D/G40/0.5 4D/G47/0.5 4D/G59/0.5 4D/G64/0.5 4D/G66/0.5 4D/G98/0.5 4D/G130/0.5	4D/G160/0.25 4D/G217/0.5 4D/G224/0.5 4D/G228/0.5 4D/G234/0.25 4D/G234/0.5 4D/G247/0.5 4H/G25/0.5 4H/G28/0.5
			Target (Milsearch debris)	51-67	Natural Fill (4D/T5/0.5)	4D/T1/1.0 4D/T2/0.5 4D/T3/1.0 4D/T4/0.5 4D/T4/2.0	4D/T5/0.5 4D/T5/1.0 4D/T6/0.5 4D/T6/2.0
			Target (Area 4E septic)	53	Natural	4E/T25/0.5	
			Target (north west corner)[1]	62	Natural	4D/T9/0.5	
			Target (monitoring well MW-5)	58	Natural	B-5/0.5	
Asbestos			Target (stormwater pipe (in-situ))	Chrysotile asbestos fibres detected [2]	Natural	4D/VS-96	

NOTES:

Underlined: result higher than NEPM EIL investigation levels.

Italics: result higher than NEPM HIL A investigation levels.

[1] As discussed in Item 11 of Table E1, Appendix E, OTEK 2013A indicated this sample was intended to target Enterra #2, but it was later found to be the incorrect location. The auditor considered that this location provided further information in the vicinity of the Milsearch burial in the north east of the site.

[2] The sample described by the laboratory as comprising a "mixture of clayish soil, fibres*, stones and plant matter". *chrysotile asbestos

The following provides a discussion of each analyte where concentrations exceeded the EIL or HIL A. Additionally, as OTEK did not refer to any investigation levels in OTEK 2013A for the results of nutrient (i.e. nitrate, nitrite and ammonia) analyses or asbestos; the Auditor also discussed these as they were considered CoPC.

Arsenic, Barium, Copper, Manganese, Nickel, Vanadium and Zinc

Multiple composite samples contained concentrations of the following contaminants above the modified ecological investigation levels (as per AS4482.1 the investigation levels were divided by number of samples in the composite, which is conservative in reality; AS4482.1 indicated that such "method of adjustment may give rise to false positive results"), as outlined in Section 10.1.1 of OTEK 2013A (attached as Appendix C):

- Arsenic: 69 composites;
- Barium: 53 composites;
- Copper: one composite;
- Manganese: 124 composites;
- Nickel: 91 composites;
- Vanadium: 137 (all) composites; and
- Zinc: one composite.

OTEK did not analyse any individual samples from composites containing concentrations above the modified investigation levels, due to an oversight. However, 37 other individual samples (grid and target) from across the site were analysed for inorganics (including arsenic, barium, manganese, nickel and vanadium), with the following results (as summarised in Table 17):

- Arsenic, copper and zinc: Concentrations of arsenic, copper and zinc were below the EILs for all individual grid or target soil samples. On this basis, and considering the comparability of results with the Overall Audit Area, and absence of a specific source for arsenic, the arsenic detected in composite samples was considered naturally occurring and is not discussed as an exceedance henceforth.
- Barium, manganese, and vanadium: Multiple grid and target samples contained concentrations of barium, manganese, or vanadium above the EILs.
- Nickel: one grid sample contained a concentration of nickel above the EIL.

The concentrations of barium, manganese, nickel and vanadium detected in individual samples during the soil assessment works were considered to be naturally occurring, based on the following:

- Samples were all collected from natural soils with no sign of contamination;
- Results were consistent with concentrations detected across the Overall Audit Area (as detailed in Section 10.1.1 of OTEK 2013A for barium, manganese and vanadium) and likely to be within the natural background variation for this type of soil; and
- Concentrations were all within NEPM background ranges.

It was acknowledged that where sample compositing is undertaken and investigation level exceedances occur, individual samples should subsequently be analysed. In this instance, the auditor did not consider the oversight to be significant, given the generally low concentrations of inorganics detected and the above lines of evidence. The auditor considered sufficient data were available to indicate that concentrations of barium, manganese, nickel and zinc were unlikely to pose a risk to beneficial uses of the land.

Nitrate, nitrate and ammonia

Samples targeting the stormwater pipe were also analysed for nitrate, nitrite and ammonia (as detailed in Table 17). All nitrate and nitrite results were low (maximum nitrate and nitrite concentrations 7.15 mg/kg and 1.53 mg/kg respectively) and were within the range of concentrations detected in the Overall Audit Area (provided in OTEK 2013A, Section 10, Table T). Ammonia was not detected in any target sample. Based on this, it was considered these concentrations were likely to be representative of background conditions, and unlikely to be attributed to historical activities at the site. Further discussion is provided in Section 5.5.

5.2.2 Organics

All concentrations of all organic analytes tested were below the investigation levels and below the laboratory limits of reporting.

A sample collected from the location of a burial identified by Enterra (Enterra #1, target location 4D/T10) was analysed for dioxins and furans due to the presence of ash and charcoal. OTEK (in OTEK 2013A) considered there was a low potential for dioxins to be present at the site. The auditor considered that an adequate number of soil samples were analysed from across the site and Overall Audit Area to assess for the presence of potential dioxins, and noted the results did not indicate the presence of dioxins at level of concern.

There were no soil guidelines for dioxins in Australia, therefore OTEK referred to site specific human health risk based criteria developed by another consultant (URS Pty, Ltd (URS)) for another Melbourne Water site, the Dandenong Treatment Plan (DTP). OTEK provided a discussion on the suitability of adopting these risk based criteria in Section 9.3 of OTEK 2013A. The auditor and his senior human health risk assessment team member reviewed the information provided at the time and concurred with the use of the DTP guidelines as a conservative approach. Therefore, the auditor was of the opinion that the dioxin levels present were not a concern for residential use at the site. Additionally the auditor noted that OTEK reported all ash material was removed from the site during remedial works, thereby removing any potential source of dioxins.

5.2.3 Asbestos (laboratory analysis)

Of a total 166 grid and target samples analysed for asbestos, only one sample (4D/VS-96, as per Table 17 above) contained asbestos. OTEK did not indicate why asbestos was analysed in a sample targeting the concrete stormwater pipe. The auditor did not consider asbestos to be a CoPC associated with the stormwater pipe.

The detection of asbestos in this sample was considered anomalous, and unlikely to be representative of soil at 1.2 mbgl depth given the absence of a potential source and no visual observations of fragments. Additionally, there was no historical evidence of potential asbestos in that area or at that depth. The auditor reviewed the test pit logs for nearby grid locations, and noted there were no asbestos fragments noted in the surrounding area. . Irrespective, should this be a true result, the auditor considered that based on the following any associated risk to future users of the site is low:

- The sample was located at depth (1.2 mbgl) and therefore not readily accessible;
- The detection of asbestos was within natural soils, with no observations of ACM material (i.e. a potential source) made in the test pit or nearby; and
- It was an isolated result out of a total of 166 samples analysed for asbestos.

Given the absence of a source, exposure by future residents and maintenance workers is considered low. However, if ACM fragments are identified in the future they should be handled in accordance with the requirements presented in "Other Information" of the Statement of Environmental Audit.

5.2.4 Auditor's opinion on the soil assessment results

The auditor concluded that the information obtained during the soil assessment, including field observations and analytical results, indicated that the identified potential contamination sources and activities historically undertaken at the site had not resulted in soil contamination of concern. Concentrations of several inorganics above the investigation levels for maintenance of ecosystems were considered to be naturally occurring, based on NEPM background ranges, data from the Overall Audit Area, and absence of potential sources.

The inconsistencies identified in OTEK 2013A were resolved through the auditor's review of historical document, knowledge of the Overall Audit Area, and auditor verification sampling as discussed in this report, and were not considered to impact the findings of the audit.

5.3 Source removal and soil validation sampling

5.3.1 Infrastructure / burial removal and validation sampling

During the course of the site assessment and remediation, remains of former RAAF infrastructure, minor buried waste and several underground pipes were removed from the site, and the underlying soils validated. Details of works undertaken are summarised in Table 18 below. Figure 4 shows the location of former infrastructure (including structures removed prior to the commencement of the audit) and burials. The resultant excavations and validation sampling locations are shown in Figures 6 to 13.

As noted previously, there were discrepancies and errors noted in OTEK 2013A, which the auditor was not able to clarify with OTEK. The auditor has summarised these in Table E1, Appendix E and provided comment regarding the implications for the audit. Key issues have also been highlighted in the body of the audit report.

Table 18 Assessment and removal of potential sources and associated validation sampling

Potential Source	Date of works	Description of works	Analyses[1]	Sample(s) remaining on site that exceeded EILs[2]	Backfill/Site reinstatement and Stockpiles
Infrastructure					
Former guard hut (concrete slab)	15 June 2009, 22 June 2009	Slab removed by Enviropacific. 6 validation samples from underlying soils analysed (4D/VS-44 to 4D/VS-46)	Inorganics, BTEX, phenols, VOCs, SVOCs, PCBs, ammonia, E. coli, sulphate	Vanadium 4D/VS44, 4D/VS46	No backfill required.
Steam cleaning bay/degreaser shed (concrete slab)	15 June 2009	Slab partly removed by Enviropacific. 16 validation samples collected (4D/VS-47 to 4D/VS-62)	Inorganics, BTEX, TPHs, PAHs, phenols, pH, VOCs, SVOCs, PCBs, asbestos, ammonia, sulphate	Validation: none Stockpile: Cadmium 4D/SP-44/1	Not known. Estimated 9 m^3 material stockpiled as 4D/SP-44. It was not known whether material was backfilled or disposed offsite as OTEK 2013A provided conflicting information (refer Table E1, Appendix E). Three samples were analysed from 4D/SP-44, one for an EPA screen and two for inorganics only. All results were below the investigation levels, with the exception of a single concentration of cadmium (6 mg/kg) above the EIL. As a conservative approach it was assumed this sample remained on site.
	22 June 2009	Additional validation sample collected for e. Coli analysis (4D/VS-47)	e.Coli		
	8 July 2009	Soil from 5 locations containing cadmium >EIL excavated to 0.2 mbgl 5 validation samples collected (4D/VS-48/a, 4D/VS59a to 4D/VS-62a)	Cadmium, mercury (1 sample only)		
	21 July 200	Soil removed from location 4D/VS-48a where cadmium was >EIL 1 validation sample (4D/VS-48b) analysed	Cadmium		
	5 August 2009	Location 4D/VS-48b excavated to approximately 0.4-10.6 mbgl 5 validation samples analysed (4D/VS-48/VS-1 to 4D/VS-48/VS-5)	Cadmium		
Concrete slab from unknown structure	15 June 2009	Concrete slab removed, 9 validation samples analysed (4D/VS-63 to 4D/VS-71)	Inorganics, BTEX, TPHs, PAHs, phenols, pH, VOCs, SVOCs, PCBs, asbestos, ammonia, E. coli, sulphate	None	No backfill required.
Septic and soak pit	10 September 2008	Transfield excavated basalt and boulders comprising the septic and soak pit. 10 validation samples collected from walls (8 samples) and base (2 samples) of excavation (4D/VS-35/1 to 4D/VS-35/5, 4D/VS-36/1 to 4D/VS-36/5)	Inorganics, pH, nutrients, E.coli, asbestos, pH, sulfate	None above EIL Elevated nitrate in one sample (4D/VS-36/5, 192 mg/kg)	Validated quarry material was used as backfill. OTEK did not mention the fate of the basalt boulders and pipe; however, the auditor verified during his final site inspection (29 May 2014) that all material had been removed from site. Approximately 75 m^3 of excavated soil from the septic and soak pit, and
	29 September 2008	Soil excavated from southwest wall of excavation where vanadium and zinc >EILs were detected.	Vanadium, zinc		

Potential Source	Date of works	Description of works	Analyses[1]	Sample(s) remaining on site that exceeded EILs[2]	Backfill/Site reinstatement and Stockpiles
		2 validation samples (4D/VS-36/3a and 4D/VS-36/4a) from 0.7 mbgl analysed			associated asbestos pipe was stockpiled as 4D/SP-41 and 4D/SP-42 and then disposed offsite as Category C material. Waste Transport Certificate (WTC) numbers were provided but not the WTC certificates. OTEK went into liquidation before the auditor was able to request the WTCs. However, as the WTC numbers indicate that the correct procedures were followed for waste disposal, the absence of WTCs is not considered to impact the outcome of the audit. Excavated material: approximately 75 m^3 from septic and soak pit, and associated asbestos pipe disposed offsite as Cat C material. WTC number provided but not document.
	21 October 2008	Soil excavated from base of excavation in vicinity of 4D/VS-35/5 where manganese >EIL. 3 validation samples (4D/VS-35/5a to 5c) from 3.5 mbgs analysed	Manganese		
Septic and soak pit ACM pipe	10 September 2008	Concurrently with the removal of the septic and soak pit pipe; Transfield removed approximately 84 m of ACM pipe (situated at approximate depth 0.5-1.8 mbgl). OTEK indicated that 15 validation samples were analysed from the base of the trench (4D/VS-37/1, 37/2 and 37/3 to 4D/VS-41/1, 41/2 and 41/3). The auditor identified discrepancies between the sampling locations and depths provided in OTEK 2013A, this was discussed in Items 46 and 47 of Table E1, Appendix E. Given all analytical results were below the investigation levels, the inconsistencies were not considered to have impacted the findings of the audit	Metals, asbestos, pH, nitrate, nitrite, e.coli, sulphate	No EIL exceedances. Elevated nitrate (61.5 to 415 mg/kg)[10] at 10 locations ranging from 0.5 to 2.0 mbgl depth.	
	19 February 2009	9 soil samples analysed from footprint of stockpiled material (4D/SP-41/SS-1 to SS-4 and 4D/SP-42/SS-1 to SS-5)	Manganese, vanadium, zinc	Vanadium 4D/SP41/SS3	
Hangar 3 ACM pipe (crosses boundary of site and Area 4G)	10 to 29 June 2008	Approximately 60 m length of 100 mm diameter pipe (depth 1.0 mbgl) removed by Transfield. The pipe was disposed offsite by Transfield. 12 validation samples were analysed (4G/VS-8/1 to 8/3, 4G/VS-9/1 to 9/3, 4G/VS-10/1 to 10/3, 4G/VS-11/1 to 11/3)	Inorganics (all samples), asbestos (8 samples)	None	Backfilled with validated quarry material Excavated material was stockpiled in Area 4G then disposed offsite as fill material (from 4G ESA report, OTEK 2013B).
Underground metal pipe (removed, water bearing)	6 to 22 August 2008	Transfield removed approximately 500 m of a 100 mm diameter metal pipe that formerly contained water. 102 validation samples were analysed from the walls and base of the trench (4D/VS-1/1 to 4D/VS-34/3, refer Table 56 in OTEK 2013A)	Inorganics (all), nitrate/nitrite/ammonia, e.coli (three samples from two locations		Imported validated quarry material was used to backfill excavation. Approximately 93 m^3 was stockpiled as 4D/SP-44 and disposed to unknown offsite location as fill material.

[10] There were no investigation levels available for nitrate concentrations in soil. The auditor therefore considered the typical concentrations across the Overall Audit Area which were generally less than 38 mg/kg (refer Table T of OTEK 2013).

Potential Source	Date of works	Description of works	Analyses[1]	Sample(s) remaining on site that exceeded EILs[2]	Backfill/Site reinstatement and Stockpiles
	22 August to 29 September 2008	Trench excavated to approximately 0.5 mbgl to remove soil containing zinc >EILs. 39 validation samples were collected to validate the trench, and analysed for zinc (4D/VS-1/2A to 4D/VS-34/2A, 4D/VS-3/1A and 4D/VS-3/2A, and 2 samples labelled 4D/VS-8/2A, 2 samples labelled 4D/VS-32/1, 2 samples labelled 4D/VS-32/2 and 2 samples labelled 4D/VS-32/3 collected on different dates, refer Table 56 in OTEK 2013A)[4]. A further 5 samples (4D/VS-2/SS-1, 4D/VS-3/SS-1, 4D/VS-5/SS-1, 4D/VS-8/SS-1, 4D/VS-19/SS-1) were listed in Table 57 of OTEK 2013A, but there was no discussion provided. Table 57 in OTEK 2013A indicates these samples were "Surface Sample[s] from Below Stockpile".	Zinc, nitrate, nitrite, e.coli (4D/VS-32/1, 4D/VS-32/2 and 4D/VS-33/3 only)		
	7 October 2008	Soil excavated to approximately 0.8-1.0 mbgl at location 4D/VS-4 where zinc above the EIL was detected. 6 validation samples analysed (4D/VS-4/3A, 4D/VS-4/1B, 4D/VS-4/2B, 4D/VS-4/3B, 4D/VS-4/1C, 4D/VS-4/2C)	Zinc		
Ceramic pipe (removed, use unknown)	21 August 2009	Enviropacific removed approximately 120 m of 100 mm diameter pipe, located at depths ranging from 0.1 to 0.4 mbgl. 2 validation samples from base of trench analysed (4D/VS-93 and 4D/VS-94). Pipe disposed offsite by Enviropacific.	Inorganics, BTEX, PAHs, OCPs, E. coli, coliform	None	Excavated soil was stockpiled as 4D/SP-45. Three samples were analysed by the laboratory (one for an EPA screen, two for inorganics only). It is not known whether it was retained or disposed offsite (conflicting information provided in OTEK 2013A). This was not considered an issue as the results from three stockpile samples were below investigation levels.
Livestock watering trough	20 July 2009	Enviropacific removed the 2 m long concrete water trough. 1 validation sample (4D/T11) analysed	Iinorganics, TPHs, pH, asbestos, nitrate, nitrite, E. coli, coliform, sulphate	None	Backfill not required.

Potential Source	Date of works	Description of works	Analyses[1]	Sample(s) remaining on site that exceeded EILs[2]	Backfill/Site reinstatement and Stockpiles
Burials					
4E burial excavation	7 March – 4 May 2007	Buried waste material (plastic bags, crockery, motor oil containers, cow bones, chicken wire, wood, disposable nappies (OTEK 2007B), ash (OTEK 2013A)) was excavated from the site and Area 4 E. The excavation also extended to encompass a cesspit on Area 4E (OTEK 2007B). The portion of the excavation within the site was approximately 1048 m^2, with a maximum depth of 4 mbgs. The total excavation covered approximately 2400m^3. Excavated material was sifted to separate rubbish, which was disposed offsite. Soil was stockpiled within Area 4E. 7 validation samples were analysed from the site (4E/T23/0.25, 4E/T23/3.5, 4E/T24/0.8, 4E/T33/0.5, 4E/T34/2.0, 4E/T35/4.0, 4E/T55/1.0)	Inorganics, TPHs, pH, e.coli EPA screen (4E/T35/4.0 only)), Dioxins (4E/T23/0.25 only)	None	Excavated soil was stockpiled in area 4E. Stockpiles were sieved to remove rubbish. OTEK 2007B indicated rubbish was to be disposed offsite and soil was suitable for reuse onsite, and OTEK 2013A indicated the soil was stockpiled on Area 4E. It was, therefore concluded there was no material retained on the 4D site. This is supported by the fact that the excavation was backfilled with validated imported material. 49 stockpile samples were analysed, for one or more of CoPC, all results were below HILs; two samples contained a concentration of zinc or mercury marginally above EIL.
Enterra #1	Soil and fill removed 20 July 2009 burial	Material comprising soil, ash and general rubbish was excavated from an area of approximately 4 m^2 by 0.3 mbgl deep. Six validation samples were collected from the base of the excavation (4D/VS-87 to 4D/VS-92)	Inorganics, TPHs, PAHs, phenols, asbestos, dioxins and furans	None	Rubbish was disposed off-site by Enviropacific. OTEK did not state how rubbish was separated from the soil matrix. The separated soil was then used to backfill the excavation. No samples were collected from this material for analysis. The auditor therefore undertook verification sampling at this location, as discussed in Section 4.4.2. One sample analysed for PAHs, inorganics and asbestos (4D_VS3_0.1-0.2) did not contain any concentrations above the laboratory limits of reporting, and there were no visual/olfactory signs of contamination.

NOTES:

[1] Samples analysed for one or more of listed analytes.

[2] All results for all validation samples were below NEPM HIL A. The table does not include samples exceeding investigation levels that were removed and disposed offsite.

[3] OTEK initially collected three samples for analysis on 15 June 2009 which were analysed for a range of analytes. However, OTEK then collected another three samples (to analyse for e.coli) from the same location on 22 June 2009 and gave them the same sample IDs. The samples can be differentiated by sample dates.

[4] OTEK initially collected three samples labelled 4D/VS-32/1, 4D/VS-32/2, and 4D/VS-33/3 on 12 August 2008, which were analysed for zinc. OTEK then collected another three samples on 22 September 2009 from approximately the same lateral location, be at greater depth (0.5 mbgl) to analyse for nitrate, nitrite and e.Coli. The samples can be differentiated by the sample dates.

[5] Information sourced from OTEK 2007B and OTEK 2013A.

5.3.2 Surface ACM fragments

Investigation and remediation

As noted in Section 5.1.3, during the grid and target sampling undertaken in 2006, OTEK visually inspected surface soils for the presence of bonded ACM fragments at, and immediately surrounding 269 locations across the site. In order to complement the information presented in OTEK 2013A regarding investigation and remediation of ACM; the auditor also referred to a remedial action plan (RAP) prepared by OTEK (*Remedial Action Plan (Asbestos in Soil) Riverwalk Area 4, New Farm Road, Werribee, Victoria*, 15 December 2010 (OTEK 2010A), as well as his knowledge of the Overall Audit Area for information pertaining to asbestos assessment, contamination, and remediation.

OTEK reported (in OTEK 2010A) that approximately 11 fragments of bonded ACM were observed at the surface, as well as 25 individual fragments within three concentrated areas in the north east and west. Table 4 of OTEK 2010A indicated ACM fragments were observed at 16 discrete locations. OTEK considered the fragments were associated with historical ACM structures such as Hangars 1 and 3. The auditor noted that only three of the testpit logs out of the 16 locations (provided in OTEK 2014A) contained reference to ACM, with the majority providing conflicting information (e.g. reference to debris and no debris observed in the footnote of same log), some with reference to "debris", and others not making reference to surface material. As a conservative approach the auditor assumed that Table 4 of OTEK 2010A was correct and ACM was observed at 16 locations.

OTEK indicated that in the absence of applicable Victorian guidelines, the remediation of asbestos contamination was undertaken with consideration to the WA Department of Health (DOH), May 2009, *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites* (WA DOH 2009). The auditor agreed this was an appropriate reference, but noted OTEK's scope of work did not necessarily follow the WA DOH 2009 guidelines. The minor deviations from the WA DOH 2009 guidelines were not considered to affect the remediation outcome (discussed further in Items 66 to 73 in Table E1, Appendix E), especially considering the extent and likelihood of asbestos presence at the site.

Between 7 and 8 February 2010, OTEK undertook works to remove ACM fragments. OTEK designated each location where ACM fragments were observed as "remediation zones". At those locations where only one fragment was observed, a 1 m buffer zone was applied (to give a remediation zone of 2 m x 2 m), and for locations where more than one fragment was observed the remediation area extended to midway to the next closest locations where no ACM was observed (remediation zone of 10 m x 10 m). There were three remediation zones within the site where more than one fragment of ACM were identified (D1 to D3, refer Figure 14 of this report), as well as 11 scattered individual fragments.

A two phased approach was adopted for remediation. Initially ACM fragments were collected using an emu-bob methodology, and then surface soils (to 0.15 mbgl depth) were scraped, stockpiled and subsequently sampled for laboratory analysis of asbestos.

Emu-bobbing entailed dividing each remediation zone greater than 4 m^2 into 5 m wide lanes the length of the remediation zone. Visual inspection and manual collection of ACM fragments was carried out under the supervision of OTEK by a licensed asbestos removal contractor with a minimum of three passes per lane carried out. Identified ACM fragments were bagged and disposed offsite (OTEK 2010A). The number of fragments observed and removed per pass was documented, and approximately 14 kg of ACM material was collected and disposed offsite (refer Appendix F of OTEK 2013A).

Three "validation areas" of 10 m x 10 m were then identified based on the highest number of asbestos fragments (one area) as well as two random locations (refer Figure 14). Each validation area was excavated to 0.15 mbgl, soil was stockpiled for visual assessment, and visible asbestos fragments removed, bagged and disposed of appropriately. Samples were collected from each stockpile and analysed for the laboratory for asbestos.

OTEK presented the results of the asbestos remediation in Appendix F of OTEK 2013A (attached as Appendix C). There was no asbestos detected in any laboratory analysed sample. The auditor noted that OTEK's description of samples from D3/SP-1 and D3/SP-2 included "small charcoal pieces". However, no analysis of associated potential COPC (e.g. TPHs, PAHs) was undertaken. It is understood this material was retained on site. This was not considered a significant issue, as extensive trenching undertaken in this area as part of the works to investigate the vertical extent of surface debris and look for potential buried material (refer Section 5.3.1), as well as the auditor's verification assessment (refer Section 4.4.2) did not identify any signs of potential contamination. Furthermore, all soil analytical results were below the investigation levels.

OTEK concluded the asbestos material remediation was adequate, and the single detection of asbestos in a target sample was not significant given the sample depth, and isolated occurrence. The auditor has disused this further in section 5.2.3 above.

OTEK did not specify the name of the licensed asbestos contractor, the fate of ACM, or provide Waste Transport Certificates (WTCs). The auditor was not able to request this information from OTEK due to OTEK going into liquidation. Although it is acknowledge that the lack of documentation is not in accordance with standard industry practice, ultimately it is not considered to impact the outcome of the audit, as the auditor is satisfied the fast majority of ACM fragments were successfully removed from site. The auditor observed the asbestos remediation when conducted by OTEK, and also investigated it during the auditor verification works on 2-3 October 2013, and did not observe any ACM (refer Section 4.4.2 for further discussion regarding auditor verification works).

During an inspection of Areas 4G and 4D, undertaken on 25 February 2014, the auditor observed an area of ACM fragments located across the boundary of the site with Area 4I, to the south of Area 4G. Melbourne Water was of the opinion the ACM was illegally dumped material, and subsequently engaged TEC to remove the ACM from Area 4I and the site.... TEC provided a letter report (TEC 2014, attached as Appendix L) indicating that TEC collected approximately 2 kg[11] of ACM, which was subsequently disposed to Hi Quality Sales, Bulla landfill under an EPA Waste Transport Certificate (WTC). The methodology outlined by TEC was acceptable.

Overall the auditor considered the investigation and removal of surface ACM fragments at the site was comprehensive, and successfully removed the vast majority of ACM fragment contamination. The auditor did not identify any ACM fragments at the site during his verification works or during his final site inspection. However, it was noted the adjacent Hangar 1 (offsite to the west) was a potential ongoing source of ACM to the site, particularly given the prevailing westerly wind direction.

[11] The WTC indicates that 2000 kg of asbestos was removed from the site. The auditor queried this volume, and Melbourne Water and TEC confirmed that it was a typographical error, and the correct volume removed was 2 kg as per TEC 2014.

5.3.3 Backfill material

Imported fill material sourced from Cemex Werribee Quarry (formerly Readymix Werribee Quarry) located at Wests Road, Werribee was used to backfill the septic and soak pit excavation. This material was formerly classified as suitable for use as backfill material across the Overall Audit Area. Details of sampling and analysis were provided under separate covers, which the auditor reviewed and provided comment on (attached as Appendix G). The fill material was found to contain concentrations of barium, manganese, nickel and vanadium above the EILs but within NEPM background levels. The concentrations were consistent with those detected at the site (as discussed in Section 5.2.1) and across the Overall Audit Area, and were considered to be naturally occurring given the basaltic origin of the material. The auditor was satisfied the material used to backfill excavations was of suitable quality for the proposed intended residential use of the site.

For ease of reporting, a summary of the final condition of soil at the site is presented in Section 5.5 below.

5.3.4 Auditor's opinion on the removal of potential sources and validation sampling

From a review of the information provided by OTEK, including description of infrastructure removed, validation sampling methodology, analytical suite and analytical results, the auditor considered that potential contaminating structures/sources were adequately removed from the site, and the underlying soils appropriately validated. The auditor undertook verification investigations as discussed in this report. Overall it was considered that OTEK's findings and, where appropriate complemented by the auditor's verification works, there was sufficient evidence (as outlined above) to adequately demonstrate the successful removal and validation of potential sources of contamination at the site.

The remaining structures/features on site (i.e. underground galvanised metal pipe and stormwater pipe) were not considered to be potential sources of contamination of concern.

5.4 Consistency with clean up regulations

Aside from minor inorganic exceedances described in Sections 5.2.1 and 5.5 , there was no contamination of concern identified in soils at the site.

Site infrastructure including underground pipes, concrete slabs, septic and soak pit and buried waste were removed and disposed offsite by a licenced contractor (as described in Section 5.3.1).

Asbestos fragments identified at various locations across the site were removed and adequately validated (refer Section 5.3.2). Further asbestos remedial works were undertaken proximate to Hangar 1 on the western side of the site to identify and remove surface asbestos fragments in this area. These works were undertaken in general accordance with WA DOH (2009) asbestos guidelines, and did not identify any residual asbestos post-remediation as discussed above.

The auditor noted that OTEK 2013A referenced the appropriate waste guidelines for the duration of the works, and stated that works were undertaken in accordance with these guidelines. As discussed in this report (Section 5.3), it was noted that no asbestos clearance and waste transportation documentation was provided in OTEK 2013A.

OTEK did not discuss the fate of the boulders/cobbles removed from the septic/soak pit. This was not considered an issue of concern as there was no indication of contamination within or underlying the material, with the exception of a slightly elevated nitrate concentration (discussed in Sections 5.3.1 and 5.5) which was not considered to pose a risk to future users of the site.

5.5 Summary of final soil conditions and protected beneficial uses of land

The remediation works involved the removal of potentially contaminating infrastructure and associated soil containing elevated concentrations of various inorganics. Following completion of the assessment, remediation, and validation concentrations of barium, cadmium, manganese, nickel, zinc, and vanadium above the EILs remained on site.

As discussed in Section 5.2.1, concentrations of barium, manganese, nickel, and vanadium were considered naturally occurring in the region and were not considered to pose a risk to beneficial uses of the site.

One sample remained containing a concentration of cadmium above the HIL A and EIL, and another sample contained asbestos fibres; these are discussed below. The locations of these samples are provided on Figures 7 and 6 respectively.

Additionally, as discussed in Section 5.2.1 above, the analytical suite for target soil samples collected proximate to the stormwater pipe, and validation samples collected from the septic and soak pit excavation included nitrate, nitrite and ammonia. OTEK 2013A did not compare the concentrations to any guidelines values indicated that all concentrations were consistent with results across the other audit areas in Area 4. The auditor did not agree with this conclusion, noting that ten validation samples collected from the septic, soak pit and associated asbestos pipe excavation contained elevated concentrations of nitrate (4D/VS-37/1 to 4D/VS37-3, 61 to 415 mg/kg at depths ranging between 0.5-2.0 mbgl), when compared with concentrations across the site and Overall Audit Area. Nitrite concentrations in these samples were of similar magnitude to concentrations across the Overall Audit Area. Ammonia was not analysed in any sample beneath the septic/soak pit or associated asbestos piping. This was not considered an issue however, as nitrate was considered a sufficient indicator of potential contamination from historical sources.

The isolated elevated concentrations of nitrate were not considered to pose a risk to human health or the environment, based on the following lines of evidence:

- the majority of nitrate concentrations across the site were below 10 mg/kg, which is the concentration often required for pasture soils (NSW DPI, 2004);
- the primary source (i.e. septic/soak pit and asbestos pipe) was not in use for more than 60 years (since the RAAF ceased activities at the site circa 1952), and was removed during the course of the audit;
- The elevated concentrations were limited in extent;
- The predominantly low permeability nature of shallow soils (clays) would have minimised migration of nitrate, nitrite and ammonia to groundwater; and
- Nitrate is not typically a contaminant of concern in soil; rather and within certain levels it is an important nutrient promoting plant growth.

5.5.1 Maintenance of ecosystems

Barium, manganese, nickel, and vanadium

Several minor concentrations of barium, manganese, nickel and vanadium above the EILs detected in target and validation samples remained on the site. These marginally elevated concentrations were considered to be representative of background levels and not likely to pose a risk to ecological or human health (as discussed in Sections 5.2.1 and 5.5.2).

Cadmium

Four samples contained concentrations of cadmium marginally above the EIL (4 to 22 mg/kg). These concentrations were not considered to pose a risk to ecological receptors; this opinion is based on the following lines of evidence:

- The lateral and vertical extent of cadmium above the EIL was adequately delineated. Concentrations marginally above the EIL were limited to shallow soils (less than 0.5 mbgl) across a small area of approximately 3 m by 3 m;
- Leachability testing on the sample containing the highest concentration of cadmium (4D/T6/0.25, 22 mg/kg) indicated very low leachability (TCLP analysis, 0.012 mg/L);
- The nature of the soil (i.e. silty clay, generally from volcanic origin) was expected to have above average cation exchange capacity (CEC) and hence higher assimilative capacity, which mitigates any phytotoxicity and also leachability of cadmium;
- The mobility of cadmium on soil is also dependent on pH and the amount of organic matter, but it typically bonds strongly to organic matter and therefore has low mobility. (ATSDR, September 2012[12]);
- Vegetation at the site was observed to be healthy, with no evidence of stress;
- Concentrations of cadmium across the remainder of the site and the Overall Audit Area were typically below the investigation levels; and
- Although cadmium in soil may be attributed to the application of phosphate fertilisers which might have occurred during the agricultural use of the site, there were no potential point sources of cadmium identified in the site history review. It would be expected that if cadmium in soil was derived from broad application of phosphate fertilisers, detections would be widespread across the Overall Audit Area; this was not the case.

Additionally, although a broad pH range (4.1 to 10) was observed across the site, the pH value of soil at 0.5 mbgl depth at the location containing the highest concentration of cadmium was alkaline (pH 8.6), and hence is expected to mitigate leaching of cadmium to underlying soils and/or groundwater.

5.5.2 Human health

With the exception of one concentration of cadmium detected in a target sample that was marginally above the HIL A, all concentrations of analytes tested were below the investigation levels for protection of human health. The single concentration of cadmium was considered to be an isolated occurrence and not considered to pose a risk to human health; the lines of evidence presented in Section 5.5.1 above supports this opinion as well.

The concentration of asbestos detected in a sample collected from 1.2 mbgl proximate to the stormwater pipe was considered likely anomalous. The auditor considered it unlikely that asbestos would occur at this depth in natural soils, with no identified source. However, as it was not known where the asbestos in this sample was derived from, or whether it was a truly representative result, the auditor adopted a conservative approach and assumed it was a true result.

The isolated concentration detected was not considered to pose a risk to human health, as there was no nearby source identified, and OTEK did not observe any asbestos fragments (OTEK 2013A). Additionally asbestos fibres were not detected in any of the other 166 grid, target, and validation samples analysed for asbestos.

[12] Agency for Toxic Substances and Disease Registry (ATSDR), Public Health Statement, Cadmium CAS #7440-43-9, September 2012 (http://www.atsdr.cdc.gov/ToxProfiles/tp5-c1-b.pdf).

The auditor considers that surface ACM fragments were adequately identified and removed from the site to the extent practicable. However, given the size of the site, extensive grass cover and vegetation, and former tilling of shallow soils, the potential for residual ACM fragments to remain on site cannot be discounted. This is mentioned in the "Other Information" section of the Statement of Environmental Audit.

The auditor considered that adequate assessment and remediation of asbestos was undertaken at the site, as discussed in Section 5.3.2.

5.5.3 Buildings & Structures

The pH in soils across all assessment and validation samples was broad, ranging from slightly acidic to alkaline soils (4.7 to 10).

The pH range observed was consistent with that observed in similar natural soils across the Overall Audit Area, and was consistent with the nature of the soil developed from the parent materials described in this report (refer to Section 2.2). With the exception of soils surrounding the septic and soak pit (and associated asbestos pipe) where several samples contained low pH (<5), the range of pH results detected were distributed across the site. Given there were no identified potential sources that might have attributed to altering soil pH, the pH range observed was generally considered naturally occurring.

Overall the soil pH range observed across the site was not expected to adversely impact the integrity of future concrete buildings and structures on site. Additionally, OTEK compared soil sulphate concentrations and pH levels with the exposure classification for concrete piles in Australian Standard AS2159-2009. OTEK concluded soil at the site would not impact the integrity of structures or buildings.

Acid sulphate soils were not expected or encountered at the site given the geological conditions and location of the site.

5.5.4 Aesthetics

OTEK reported there were no offensive odours noted during field works, the site was free of debris, redundant infrastructure had been removed from the site, and all visible asbestos fragments had been removed (OTEK 2013A).

The auditor noted during the verification works that scattered minor debris such as metal, ceramic and glass fragments remained in the south eastern portion of the site (refer Section 4.4.2 regarding auditor verification). The debris appeared to be limited to surface and soils less than 0.1 mbgl, and was quite sparsely distributed. This included ACM, which was largely removed from the site (refer Section 5.3.2). Debris was generally inert and not considered to pose a risk to human health.

During the auditor's final site inspection on 29 May 2014, he observed no items that may constitute an aesthetical issue at the site, albeit most of the site was covered with weeds and grass. However, the auditor used a geaological axe to expose the surface ground in numerous locations across area 4D to look for any aesthetical issue.

5.5.5 Production of food, flora & fibre

The objectives of this beneficial use were discussed in Section 3.2.5, and are generally applicable in an agricultural setting for which produce may be available for consumption.

As noted in Section 3.2.5, OTEK adopted HIL A investigation levels when assessing this beneficial use. The auditor considered the EILs should also be taken into account. On this basis the concentrations of cadmium, barium, manganese, nickel and vanadium in a limited number of samples exceeded the EIL. As discussed previously (Section 5.2 and 5.3), with the exception of cadmium, these exceedances were considered to be naturally occurring, and unlikely to pose an adverse impact to ecological receptors and hence nor to the beneficial use production of food, flora or fibre.

5.6 Off-site soil contamination

Based on the available information through the collation of data for the Overall Audit Area, there was no evidence that any activities undertaken on the site have resulted in contamination of soil at the surrounding sites.

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

As per the proposed development plan provided in Appendix D, the site was part of the Riverwalk Estate, which was proposed to be developed for residential 'single dwelling' and 'medium-density' development and associated uses such as public open space and recreation areas.

Based on all the data available as discussed in this report, the auditor was of the opinion that the site was suitable for the proposed sensitive land use subject to the conditions stated in the Statement of Environmental Audit included in this report.

6. Assessment of groundwater quality

OTEK undertook a groundwater assessment across the Overall Audit Area, including the installation of 11 groundwater monitoring wells (MW-1 through MW-11) between June 2006 and October 2009. Two monitoring wells, MW-2 and MW-5 were installed within the site. The findings of the overall groundwater assessment were reported under separate cover as a draft document (OTEK 2010B). The auditor referred to the draft hydrogeological report for background information, but did not rely on it for the purposes of this audit as the findings relevant to the site (i.e. results for MW-2 and MW-5) were reported in OTEK 2013A. The auditor also referred to a draft report prepared by OTEK for Area 4G (*Environmental Site Assessment (Draft), Riverwalk Sub-Area 4G, New Farm Road, Werribee, Victoria,* 4 February 2013 (OTEK 2013B)) for information relating to two monitoring wells up-gradient of the site (MW-1 and MW-6). The auditor considered these wells provided important information regarding the condition of groundwater up-gradient of the site, particularly in the vicinity of former underground infrastructure in Areas 4E and 4H (refer Section 2.9). Relevant tabulated results and the borelog for MW-6 obtained from the Area 4G report (OTEK 2013B) are attached as Appendix J.

A summary of key information within OTEK 2013A (relating to wells MW-2 and MW-5) is provided in Table 19 below.

Table 19 Assessor's site assessment information – groundwater

Assessment Details	Section in OTEK 2013A
Details of Groundwater Sampling and Analysis	Sections 8 and 11
Field Observations	Section 8, Appendix G
Monitoring Well Logs	Appendix C
Field Measurements (Groundwater)	Appendix G
Site Plans	Figure 10
Analytical Results (Summary Tables)	Tables 43 to 55, Appendix L

6.1 Adequacy of the groundwater assessment program

6.1.1 Groundwater assessment program

Two groundwater monitoring wells were installed across the site to assess groundwater quality and the potential for adverse impact from potential sources identified, as detailed in Table 20. An additional up-gradient monitoring well was also considered by the auditor.

Table 20 Monitoring well details

Monitoring Well ID	Potential Source Targeted	Total Well Depth (m)	Aquifer	SWL (mTOC)[1]	Top of Screen (mbgl)
MW-1 (offsite)	Area 4E, in vicinity of former UST and septic pit	16.2	Werribee Delta	11.2	10.2
MW-2	General site groundwater quality.	15	NVA	12.4	11.0
MW-5		16	NVA	10.5	9.0
MW-6 (offsite)	Area 4E UST (offsite)	13	NVA	12.209[3]	9

NOTES:
mTOC – metres below top of casing.
mbgl – metres below ground surface.
NVA – Newer Volcanic Aquifer.
[1] Measured on date of well installation for MW-2 and MW-5 (21 and 19 July 2006 respectively), as reported in OTEK 2013A.
[2] Measured 23 August 2007. Not directly comparable with SWLs for MW-1, MW-2 and MW-5 which were measured on different dates.
[3] Measured on date of well installation (20 June 2006).

Groundwater at the site and across the Overall Audit Area was generally inferred to flow towards the east (refer to Figure 15), which was consistent with the expected flow direction towards the Werribee River, which runs along the east of the site and is located approximately 500 m to the east/north east of the Overall Audit Area (at its closest point). Groundwater within the northern portion of the site was inferred to flow to the south east; consistent with regional groundwater flow towards Port Phillip Bay (located approximately 7 km to the south east).

The rationale behind monitoring well locations was as follows:

- MW-1 was installed to assess conditions down gradient of a UST;
- Monitoring well MW-2 was installed centrally on the site to assess general groundwater quality;
- Monitoring well MW-5 was installed at the western-most corner of the site to target a suspected off site UST (inferred to be within Area 5, however extensive investigations by OTEK did not find any evidence of a UST (refer Section 2.9)); and
- Well MW-6 was installed to assess for potential contamination arising from a former arsenic sheep dip located approximately 50 m north west of the site (within Area 4H).

Wells were installed using a combination of hollow stem augers and air hammer drilling through basalt to the maximum depth. Screens were constructed above the measured standing water in all wells, so that the potential for non-aqueous phase liquids (NAPL) and hydrocarbons (if any) could be adequately assessed if present. A sand pack was installed from the base of each well to 0.5 m above the screen, a bentonite seal of 1.0 m was installed above the sand pack, followed by grout to surface.

The monitoring wells were developed by injecting compressed air into the well to cause a surging action, then groundwater was pumped out to remove fines. OTEK 2013A reported that development continued until the extracted water was clear, but did not provide well development records.

Five rounds of groundwater sampling were undertaken (as part of sampling events of the Overall Audit Area), as summarised in Table 21.

Table 21 Summary of groundwater sampling events and analysis

Monitoring Event	Date	Analysis Undertaken
GME1	August 2007	BTEX, inorganics[2], major cations/anions[3], nitrate/nitrite, PAHs, pH, sulphate, TPHs, TDS.
GME 2	November 2007	BTEX, inorganics, PAHs, TPHs.
GME 3	February 2008	BTEX, major cations/anions, inorganics, nitrate/nitrite, PAHs, pH, sulphate, TPHs, TDS.
GME 4	November 2009	TPHs/BTEX (MW-5 only), inorganics, pH, conductivity, TDS, nitrate, nitrite, major anions/cations.
GME 5	December 2011	Conductivity, TDS, inorganics, major cations/anions, nitrate/nitrite.

NOTES:

[1] Field record sheets stated that purging was undertaken on 2/5/2008 for MW-1 and MW-2; and on 2/4/2008 for MW-6. This is considered to be a typographical error, likely associated with different date formats, as sampling records indicate sampling on 5/2/2008.

[2] Inorganics – arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, copper, lead, manganese, molybdenum, nickel, selenium, tin, vanadium, zinc.

[3] major cations/anions: alkalinity, bicarbonate, calcium, carbonate, chloride, electrical conductivity, magnesium, nitrate, nitrite, potassium, sodium, sulphate.

Groundwater samples were collected using low flow micro-purge to reduce the potential loss of volatiles. Purging continued until stabilisation of the groundwater's physical and chemical parameters had occurred. Groundwater quality parameters for the wells sampled during both GMEs were included in Appendix G of OTEK 2013A. OTEK reported that samples were collected in laboratory-prepared sampling containers with the headspace minimised to reduce the potential for loss of volatile contaminants during transport and storage. The sampling methodologies employed were considered appropriate.

Samples were submitted to the following NATA accredited laboratories:

- GME 1 (August 2007), GME 2 (November 2007) and GME 3 (February 2008): Labmark (primary laboratory) and ALS (secondary laboratory);
- GME 4 (November 2009): ALS (primary laboratory) and Labmark (secondary laboratory); and
- GME 5 (December 2012): ALS (primary) and Groundswell (secondary).

Laboratory reports were NATA stamped and signed by a NATA signatory.

6.1.2 Auditor's opinion on the adequacy of the groundwater assessment program

Based on available relevant guidelines and current industry practice, the groundwater characterisation works completed by OTEK were considered adequate for the purposes of assessing the groundwater quality beneath the site. This is based on the following lines of evidence:

- The number of monitoring wells installed across the Overall Audit Area enabled groundwater flow direction to be inferred;
- The data from the Overall Audit Area allowed for an assessment of regional groundwater conditions and provided further indication on the groundwater quality beneath the site;

- The monitoring wells were placed appropriately to assess groundwater quality from potential sources;
- Wells were appropriately constructed and screened across the standing water level;
- The laboratory analytical suite and field measurements were adequate; and
- The low flow sampling methodology adopted was considered appropriate.

In summary, the monitoring wells were appropriately located down/cross gradient from potential sources or to provide adequate information of overall groundwater quality beneath the site, and were correctly constructed to allow assessment of contamination. An adequate number of sampling events were undertaken with an appropriate analytical suite to address all CoPC. It is also noted that soil and groundwater analytical results did not indicate contamination at levels considered to adversely impacting the relevant beneficial uses, and no potential ongoing sources of groundwater contamination were identified within the site.

6.2 Beneficial uses of groundwater to be protected

The TDS of groundwater at, and in the vicinity of the site ranged from 4910 mg/L (MW-5, November 2009) to 5510 mg/L (MW-2, August 2007) (OTEK 2013A). Therefore, groundwater at the site was classified as Segment C of the protected beneficial categories of the groundwater environment (*Groundwater SEPP*, 1997). Based on the salinity of the groundwater, the beneficial uses protected under the *Groundwater SEPP* were:

- Maintenance of Ecosystems;
- Stock watering;
- Industrial water use;
- Primary contact recreation (e.g. bathing, swimming); and
- Buildings and structures.

In addition to these beneficial uses, groundwater contamination should not be present at concentrations that would adversely affect the use of land at the site. Given that volatile contaminants were not encountered in groundwater at the site, it was not considered that groundwater conditions would have any adverse impact on the beneficial uses of land.

6.3 Regional groundwater quality

In order to gain a comprehensive understanding of regional groundwater quality, the auditor undertook a review of groundwater data across the Overall Audit Area (i.e. data from Areas 1, 2, 3, 4, and 5). This review found that elevated concentrations of various inorganics in groundwater (e.g. boron, copper, manganese, nickel, selenium, zinc, and nitrate) above the investigation levels (predominantly for maintenance of ecosystems) were widespread across the region.

Typical concentrations of inorganics, considered to be naturally occurring and/or regionally representative in groundwater across the Overall Audit Area are summarised in Table 22, and discussed further below.

Table 22 Regional groundwater quality

Analyte	Investigation Level Maintenance of Ecosystems [e]	Audit Area and Sampling Dates			
		Area 1 *March 2003*	Area 2 *October 2003*	Area 3 *May 2005 to Sept 2005 (three monitoring events)*	Area 4 *August 2007 – Dec 2011 (six monitoring events)*
		Concentration Range (mg/L)			
Boron	0.37	0.18-0.42	0.29-0.71	0.16-0.23	0.16-0.45
Copper	0.0014	<0.001-0.008	0.005-0.011	0.002-0.021	0.004-0.158[a]
Manganese	1.9	0.017-0.068	0.018-0.13	0.15-2.3	<0.001-0.861[c]
Nickel	0.011	<0.001-0.006	0.006-0.01	0.011-0.26	0.002-0.100
Selenium	0.011	0.028-0.051	0.038-0.072	<0.005-0.031	<0.01-<0.02
Zinc	0.008	0.015-0.019	0.009-0.014	0.01-0.047	0.01-0.331[b]
Nitrate-N	0.16	12.4[d]	5.3-6.7	2.3-9.8	1.25-5.82

Notes:
[a] isolated result in MW6 Area 4, November 2007, all other results for Area 4 wells ≤0.011 mg/L.
[b] isolated result in MW6 Area 4, November 2007, all other results for Area 4 wells ≤0.066 mg/L.
[c] Results from November 2009 for Manganese were an order of magnitude great than all other manganese results for Area 4, and considered anomalous.
[d] converted from nitrate-NO_3 (55 mg/L).
[e] ANZECC (2000), 95% level of protection (slightly to moderately disturbed ecosystems) for freshwater guidelines
Sources:
GHD 2004, GHD 2008, GHD 2011, OTEK 2010A, OTEK 2012B (refer Section 8 References).

Boron, copper, manganese, nickel, selenium, and zinc

Detected concentrations of boron, copper, manganese, nickel and zinc above the EILs were considered to be generally naturally occurring and representative of regional groundwater conditions in the Werribee Area, rather than attributed to point source contamination arising from historical uses of the Overall Audit Area. This was based on the following lines of evidence.

- Concentrations of inorganics were generally consistent across all audit Areas (i.e. Areas 1, 2, 3, 4, and 5.), in both up and down gradient monitoring wells;
- The concentrations of these analytes in soils were typically low, with few exceedances of soil investigation levels across the whole data set. In addition, the depth to groundwater, the low permeability of soils, and the low concentrations in groundwater indicated migration from surface soil concentrations is unlikely to have occurred to any significant extent across the Overall Audit Area;
- There were no specific point sources of these inorganics identified in the vicinity of the Overall Audit Area or the site itself; and
- A review of nearby audits undertaken during the audit of Area 3 (GHD 2003) found that groundwater at two sites located approximately 5 km north east (Dames and Moore Pty Ltd, 2000, Statutory Environmental Audit, 200-208 Derrimut Road, Hoppers Crossing, Victoria) and 6 km north east (HLA Envirosciences Pty Ltd, 2002, Statutory Environmental Audit, 60 Warringa Crescent) of the Overall Audit Area contained concentrations of chromium, selenium, zinc, nickel, and copper above the investigation levels. Based on all this information, the auditor was of the opinion that these concentrations were considered naturally occurring in the Newer Volcanics Aquifer.

Nitrate

Groundwater in the vicinity of the Overall Audit Area was found to contain "elevated" concentrations of nitrate, with concentrations in groundwater across all audit Areas (Areas 1, 2, 3 and 4) exceeding the maintenance of ecosystems guidelines. It was noted that ANZECC issued an errata in June 2005 stating that all nitrate trigger values should be deleted and replaced with "under review". Therefore, the investigation level has been retained for general guidance only. The concentrations of nitrate observed across the Overall Audit Area were considered either naturally occurring or representative of the regional land use, based on the following lines of evidence.

- Although a few potential point sources of nitrate were identified in the Overall Audit Area, including septic tanks and associated infrastructure located in Areas 4A, 4B, 4C, 4D, 4E, 4F/4I and 4G the distribution of nitrate concentrations in groundwater did not indicate contamination from point sources (i.e. no elevated concentrations of nitrate were detected close to such potential sources). The concentrations of nitrate observed across the Overall Audit Area were reasonably consistent (refer Table 22 above), with up gradient (i.e. background) wells containing similar concentrations to wells in the vicinity and down gradient of potential sources.
- Concentrations of nitrate in soil across Area 4 were typically low (generally less than 20 mg/kg, with the exception of several samples collected from below the septic/soak pit and associated asbestos pipe on the site, discussed in Section 5.5). Nitrate in soil was considered unlikely to migrate to groundwater given the low permeability of soils and depth to groundwater.
- Nitrate is known to be naturally occurring in the Newer Volcanics Aquifer at concentrations up to 60 mg/L (as nitrate, Leonard 1992). Furthermore, the widespread agricultural land use across the Werribee Area may have contributed, to an extent, to the nitrate concentrations (e.g. through fertilizer application and livestock).

Given these lines of evidence the concentrations of the above mentioned inorganics (including nitrate) observed across the Overall Audit Area were considered to be regionally occurring and not derived from a site source.

Further discussion regarding specific analyte concentrations is provided in Section 6.4 below.

6.4 Summary of groundwater assessment results

The findings of the groundwater assessment undertaken at the site are summarised below. Tabulated groundwater results from MW-2 and MW-5 are presented in Tables 43 to 55 of OTEK 2013A (attached as Appendix C). Tabulated results from OTEK 2013B (MW-1 and MW-6) are provided in Appendix J.

As noted in Section 3.4, OTEK adopted ANZECC 1992 investigation levels, despite the auditor requesting OTEK to consider the more recent ANZECC 2000 guidelines. The following discussion is based on a comparison of groundwater analytical results with ANZECC 2000 and NHMRC 2008. Concentrations of inorganics above the adopted investigation levels in groundwater at the site are summarised in Table 23 below.

Guidelines for industrial water use have not been included given that the relevant investigation levels would depend upon the broad potential application of this use. The beneficial use of buildings and structures was not considered to be adversely impacted by the detected elevated concentrations of inorganics and, therefore this beneficial use has not been presented in Table 23.

Table 23 Exceedances of adopted investigation levels (mg/L)

Sample Date	Monitoring Well	Analytical Result					
Beneficial Use		**Boron**	**Copper**	**Lead**	**Nickel**	**Zinc**	**Nitrate-N**
Maintenance of Ecosystems[1]		*0.37*	*0.0014*	*0.0034*	*0.011*	*0.008*	*0.16*[7]
Primary Contact Recreation[2]		**4**[4]	**2**[4], **1**[5]	**0.01**[4]	**0.02**[4]	**3**[5]	**11.3**[4]
Stock watering[6]		5	0.5[3]	0.1	1	20	90
August 2007	MW-1	*0.38*			*0.016*	*0.021*	5.82
	MW-2		<0.01*		*0.02*	*0.024*	4.44
	MW-5		<0.01*		*0.014*	*0.021*	5.03
	MW-6		<0.01*		***0.026***	*0.03*	2.97
November 2007	MW-1					*0.015*	NA
	MW-2		<0.01*			*0.011*	NA
	MW-5		*0.011*			*0.039*	NA
	MW-6		*0.158*	*0.004*	***0.024***	*0.331*	NA
February 2008	MW-1					*0.011*	NA
	MW-2		<0.01*			*0.031*	NA
	MW-5		<0.01*		<0.005	*0.030*	NA
	MW-6		*0.011*			*0.034*	NA
November 2009	MW-1		*0.004*			*0.013*	*5.19*
	MW-2		*0.01*		*0.019*	*0.041*	*3.87*
	MW-5		*0.012*			*0.031*	*1.28*
	MW-6		*0.014*		*0.019*	*0.031*	*3.14*
December 2011	MW-1		*0.006*			*0.043*	*4.23*
	MW-2		*0.008*			*0.043*	*3.06*
	MW-5	0.39	*0.004*		*0.012*	*0.044*	*1.24*
	MW-6		*0.004*		0.006	*0.016*	*3.13*

NOTES:
Only results exceeding ILs are presented (blank cell indicates result was <IL).
Italicised results exceed ecosystem protection criteria.
Underlined results exceed stockwatering guidelines.
Bold results exceed protection of primary contact recreation.
NA - Not analysed
1. ANZECC (2000), 95% level of protection (slightly to moderately disturbed ecosystems) for freshwater guidelines.
2. NHMRC (2008); Guidelines for Managing Risks in Recreational Water.
3. Values range for various animals. Most conservative value selected (i.e. for sheep).
4. Health Guideline.
5. Aesthetic Guideline.
6. ANZECC (2000) water quality trigger values (low risk) for heavy metals and metalloids in livestock drinking water.

7. ANZECC issued an erratum in June 2005 stating that for nitrate: "Delete all trigger values and replace with "Under review". The investigation level has been retained for general guidance only.
*LOR greater than investigation level

6.4.1 Organic analytes

Concentrations of BTEX, VOCs, PAHs, and phenols in groundwater at the site were below the laboratory LORs.

6.4.2 Inorganic analytes

Boron, copper, nickel, zinc and nitrate

Concentrations of boron, copper, nickel, zinc, and nitrate in monitoring wells (MW-1, MW-2, MW-5 and MW-6) were within the range of the regional groundwater concentrations reported in Table 22 (Section 6.3). As shown in Table 23, the concentrations of copper and zinc in the sample from MW-6 collected in GME2 (November 2007) were an order of magnitude higher than detected across the Overall Audit Area. These concentrations were considered anomalous as all other results were much lower, and were consistent with background levels detected in the Overall Audit Area.

As discussed in Section 3.3, and in accordance with the Groundwater SEPP (part IV, 10, 2(c)), where concentrations encountered are considered to be representative of regional conditions, these concentrations become the objective and no groundwater clean-up is required. This is also so as it is considered a regional issue and not a site source point. Therefore, concentrations of boron, copper, nickel, zinc and nitrate-N were not considered to exceed the environmental objectives and are not discussed as exceedances within the remainder of this report.

Lead

A concentration of 4 µg/L of lead was above the investigation level protective of maintenance of ecosystems in MW-6 in GME 2 (November 2007). Concentrations in all other rounds were below the laboratory limit of reporting and there was no evidence that the site was a source. As such this result was considered anomalous and is not discussed henceforth.

Chloride, sodium, sulphate

In addition to the abovementioned inorganics, OTEK noted that concentrations of chloride and sodium were above the investigation level for recreational use in all three wells during all rounds. Sulphate was also above the investigation level for recreational use in MW-6 during two GMEs.

These analytes were not considered COPC, rather were assessed to provide an indication of groundwater hydrochemistry. Additionally, all results were below the modified criteria (to account for limited ingestion of recreational waters). Accordingly the concentrations observed were not considered to exceed the investigation levels, were not likely to impact on the beneficial uses of groundwater, and have not been discussed henceforth.

6.4.3 Aesthetic impacts

There was no sheen or odour observed in groundwater from any of the wells.

6.4.4 Off-site migration of groundwater contamination

Groundwater was not considered to be polluted and therefore offsite migration of groundwater was not considered an issue of concern.

6.5 Summary of groundwater conditions and impact on beneficial uses

Results of the groundwater assessment program indicated groundwater was not polluted and that detected concentrations of boron, copper, nickel, zinc, and nitrate were naturally occurring. Therefore, potential or existing beneficial uses were not adversely impacted by a site source. The relevance of protected beneficial uses at the site and the potential for an adverse impact of the groundwater conditions on the relevant beneficial uses is summarised in Table 24 below.

Table 24 Likelihood of beneficial uses being realised

Protected Segment C Beneficial Uses	Existing Use?	Likelihood/ Relevance of Beneficial Use	Analytes (above investigation levels)	Comments
Maintenance of ecosystems	Yes	The groundwater was likely to discharge to the Werribee River and/or Port Phillip Bay, located approximately 500 m to the east and 7 km to the south east of the site respectively.	Boron, copper, nickel, zinc, and nitrate.	Maintenance of ecosystem not precluded, given that concentrations of boron, copper, nickel, zinc and nitrate were considered naturally occurring in the region as discussed in this report.
Stock watering	Unlikely	It is possible, given the current rural setting that stock watering may be realised on neighbouring properties in the future. However, the proposed urban development, lot size, and access to a reticulated water system make this unlikely.	None	Beneficial use was not precluded.
Primary contact recreation	Unlikely	This was not considered relevant on site. Groundwater wells may be used to fill or top up swimming pools in the vicinity of the site; however, this was considered unlikely given access to a reticulated water system.	None	Beneficial use was not precluded, given that concentrations of manganese and selenium below modified criteria, and were considered anomalous as discussed in this report.
Industrial use	No	Criteria are usually industry specific, however, given neutral pH and low TDS groundwater could support a number of industries.	NA	Use of groundwater for this beneficial use was considered unlikely given proposed development.
Buildings and structures	No	Groundwater results were compared with the requirements set in Australian Standard AS2159:1995 (Piling – Design and Installation). The pH results indicated that the groundwater was not aggressive. It was considered that buildings and structures would not come in to contact with the groundwater.	N/A	Beneficial use not precluded given that concentrations did not indicate potentially corrosive conditions to buildings and structures. This beneficial use was considered unlikely to be realised, as the depth of any foundation would be unlikely to come into contact with groundwater.

6.6 Conclusion on groundwater quality, existing and likely future uses

As discussed above, the relevant beneficial uses of maintenance of ecosystems, stock watering, industrial water use, primary contact recreation (e.g. bathing, swimming), and buildings and structures were not precluded by the concentrations of any contaminant tested that were attributed to the site (i.e. not naturally occurring). Therefore, groundwater at the site was not considered to have adversely impacted on-site or off-site current or future uses.

Based on all the information available and as per the multiple lines of evidence provided above, the auditor was of the opinion that historical onsite potential sources and activities, including the former septic/soak pit, rubbish burials, underground pipework, and general agricultural use did not impact any beneficial uses of groundwater. This was further supported by the absence of elevated concentrations of concern in soil, and observations made during field works (e.g. no visible staining or odours).

Concentrations of boron, copper, nickel, manganese, zinc, and nitrate were reported above the adopted investigation levels for the beneficial uses maintenance of ecosystems and/or stock watering. However, the concentrations of these inorganics were considered naturally occurring, and were not considered to have impacted any beneficial use of groundwater at the site (refer discussions through Section 6.4 above).

7. Audit conclusions

Following completion of this environmental audit for Area 4D of Riverwalk Estate, Princes Highway, Werribee, Victoria and based on all the data available to the auditor at the time of the completion of the site assessment, remediation and validation works, and auditor verification works, as detailed and discussed in this report, the following conclusions are provided:

- The overall QA/QC activities undertaken by the assessor, considered in conjunction with the auditor's verification assessment, indicated that the analytical results of the soils and groundwater were representative of site conditions and could be relied on to reach the opinions stated in this audit report at the time of assessments.

  As noted throughout this report, the auditor identified numerous errors and inconsistencies in OTEK's draft report (OTEK 2013A). However, through a thorough review of historical reports, his knowledge of the Overall Audit Area, and many site inspections during the assessment/remediation works the auditor was able to resolve the majority of issues; where data gaps remained the auditor undertook verification sampling to close out the issues (refer to Section 4.1 and Table E1, Appendix E for details).

- The density and distribution of sampling exceed and were in general accordance with AS4482.1 requirements and identified former potential sources and activities, which were appropriately assessed. When considered in conjunction with the auditor verification assessment, the sampling and analysis program was considered acceptable (refer to Sections 5.1 and 5.2 for details).

- Based on the data available up to the completion of the audit, several concentrations of barium, manganese, nickel, and vanadium exceeding the EILs were observed in soils across the site. These concentrations were considered to be naturally occurring, and were not considered to impact the future use of the site (refer to Sections 5.2 to 5.5 for details).

- Scattered debris (e.g. metal, ceramic and glass fragments) remain on the site surface, particularly in the south western portion of the site. This debris was not considered to pose a risk to future users of the site.

- A single detection of asbestos fibres was reported in a soil sample collected at 1.2 mbgl depth proximate to the stormwater drain. This was an isolated occurrence, which was not considered to impact current or future beneficial uses of the site (refer to Section 5.2.3 for details).

- ACM fragments were historically observed on the surface of the site, predominantly located in the vicinity of former and existing hangers (existing Hangar 1 to the west, and Hangar 3 to the north east). The auditor considered the visible ACM fragments were removed from the site to the extent practicable. Results of laboratory analysis of asbestos in soil samples collected from across the site samples indicated friable asbestos was unlikely to be present in soil. However, given the size of the site, remaining ongoing potential source of ACM immediately west of the site (i.e. Hangar 1), and the presence of scattered residual ACM fragments the potential for further ACM fragments to be identified in the future cannot be discounted (refer to Section 5.3.2 for details).

- Groundwater was not considered polluted at the site. The elevated concentrations of boron, copper, nickel, manganese, selenium, zinc, and nitrate detected were considered to be naturally occurring and as such were not considered to impact relevant beneficial uses (refer to Sections 6.3 and 6.4 for details).

- At the time of completion of this audit, the site surface was covered with grass, weed, and trees. There was no above surface infrastructure remaining on the site, with the exception of some sporadic wire fencing, a concrete slab, and a gravel track as stated in conditions 1 and 2 of the Statement of Environmental Audit included in this report. The auditor confirmed the site appearance during his final site inspection on 29 May 2014.
- The conditions of soil and groundwater were not expected to adversely impact off-site uses (see Sections 5.5 and 6.6 for details).

The auditor is, therefore of the opinion that the site is suitable for Parks and Reserves; Agricultural; Sensitive use (i.e. high density, medium and single dwelling/low density residential use, child care centre, pre-school or primary school); Recreation/Open space; Commercial; and Industrial. In accordance with the Environment Protection Act 1970 and the appropriate policies and guidelines issued by the EPA, a Statement of Environmental Audit has been issued as part of this report.

These conclusions must be read in conjunction with the full environmental audit report, "*Melbourne Water Corporation, Area 4D of Riverwalk Estate, Princes Highway, Werribee, Victoria, 05 June 2014*" (ref. 31/11575/00/220960 – CARMS Reference 41460-6).

DATED: 05 June 2014

SIGNED: .....

DR FOUAD ABO
ENVIRONMENTAL AUDITOR
(Appointed pursuant to the Environment Protection Act 1970)

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Figures

REGIONAL MAP

LOCALITY MAP

VICINITY MAP

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Project: Environmental Audit of Area 4D, Riverwalk Estate, Princes Highway, Werribee
Source: Environmental Site Assessment (Draft), Riverwalk Sub-Area 4D, New Farm Road, Werribee, Victoria (OTEK 2013A)

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Figure 1
Regional & Vicinity Maps

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* OTEK displayed the incorrect site boundary and site area in the original ESA figure. The figure displays the old Sub-Area 4D boundary prior to it being moved in December 2008 (OTEK, 2013A, pg. 4). Consequently, the area was incorrectly shown on the original ESA figure in OTEK (2013A) as 20.34ha. The correct area of Sub-Area 4D reported by OTEK, and verified by survey coordinates, is 21.32ha (OTEK, 2013A, pg. 4).

The area has been corrected for this figure; however the boundaries have not been changed. Figures 4 to 16 display the correct Sub-Area 4D boundary.

Note: image (above) was extracted from OTEK 2013A and is not represented to scale.

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Project: Environmental Audit of Area 4D, Riverwalk Estate, Princes Highway, Werribee
Source: Environmental Site Assessment (Draft), Riverwalk Sub-Area 4D, New Farm Road, Werribee, Victoria (OTEK 2013A)

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Figure 2
Riverwalk Area Site Map

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Site Corner Coordinates – MGA 94 Zone 55	
Easting	**Northing**
292782.39	5801246.40
292934.81	5801528.03
293287.85	5801613.82
293296.14	5801517.71
293216.05	5801525.80
293197.21	5801398.01
293269.16	5801390.05
293237.76	5801118.06
293122.37	5801131.42
293107.14	5800956.04
292984.35	5800966.22
292931.50	5800942.32

* OTEK displayed the incorrect site boundary and site area in the original ESA figure. The figure displays the old Sub-Area 4D boundary prior to it being moved in Decemeber 2008 (OTEK, 2013A, pg. 4). Consequently, the area was incorrectly shown on the original ESA figure in OTEK (2013A) as 20.34ha. The correct area of Sub-Area 4D reported by OTEK, and verified by survey coordinates, is 21.32ha (OTEK, 2013A, pg. 4).

The area has been corrected for this figure; however the boundaries have not been changed. Figures 4 to 16 display the correct Sub-Area 4D boundary.

This figure was originally prepared by OTEK (1/02/2013) for "Environmental Site Assessment (Draft), Riverwalk Sub-Area 4D, New Farm Road, Werribee, Victoria" (OTEK 2013A). The image represented above is an extract from OTEK (2013A) and therefore the accuracy of the data displayed cannot be guaranteed by GHD.
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Source: Environmental Site Assessment (Draft), Riverwalk Sub-Area 4D, New Farm Road, Werribee, Victoria (OTEK 2013A)

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Figure 3
Riverwalk Area Site Map - Sub-Area 4D

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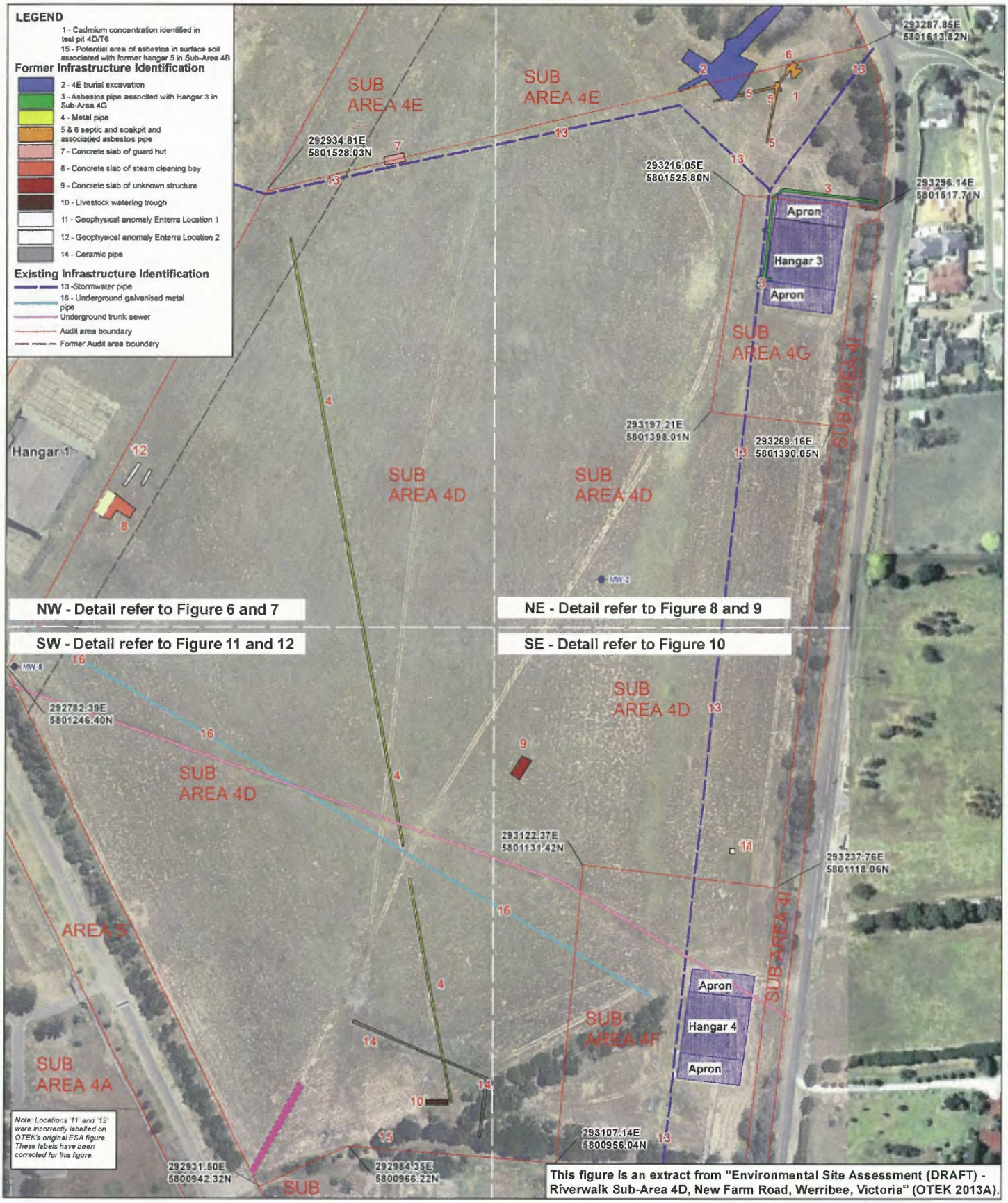

LEGEND

- Groundwtater Monitoring Well (Area 4D)
- Section of Steam Cleaning Bay Concrete Slab Remaining On-Site - Identified During Final Auditor inspection (292840E , 5801344N)
- Section of Road Remaining On-Site - Identified During Final Auditor Inspection

The image was prepared by OTEK (2013A).

Note: The image displayed in this figure has been extracted from Figure 3 (Existing and Former Infrastructure and Sampling Locations (as of Jan 2013)), of OTEK (2013A) *Environmental Site Assessment (Draft) - Riverwalk Sub-Area 4D, New Farm Road, Werribee, Victoria*. GHD have not had access to the raw data used to produce this figure. Therefore GHD cannot guarantee the accuracy of this data. This figure should only be viewed as a point of reference.

Paper Size A3

0 21 42 63 84

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Melbourne Water
Environmental Audit of Area 4D,
Riverwalk Estate Princes Highway Werribee VIC

Job Number 31 / 1157500
Revision 5
Date 04 Jun 2014

Site Layout

Figure 4

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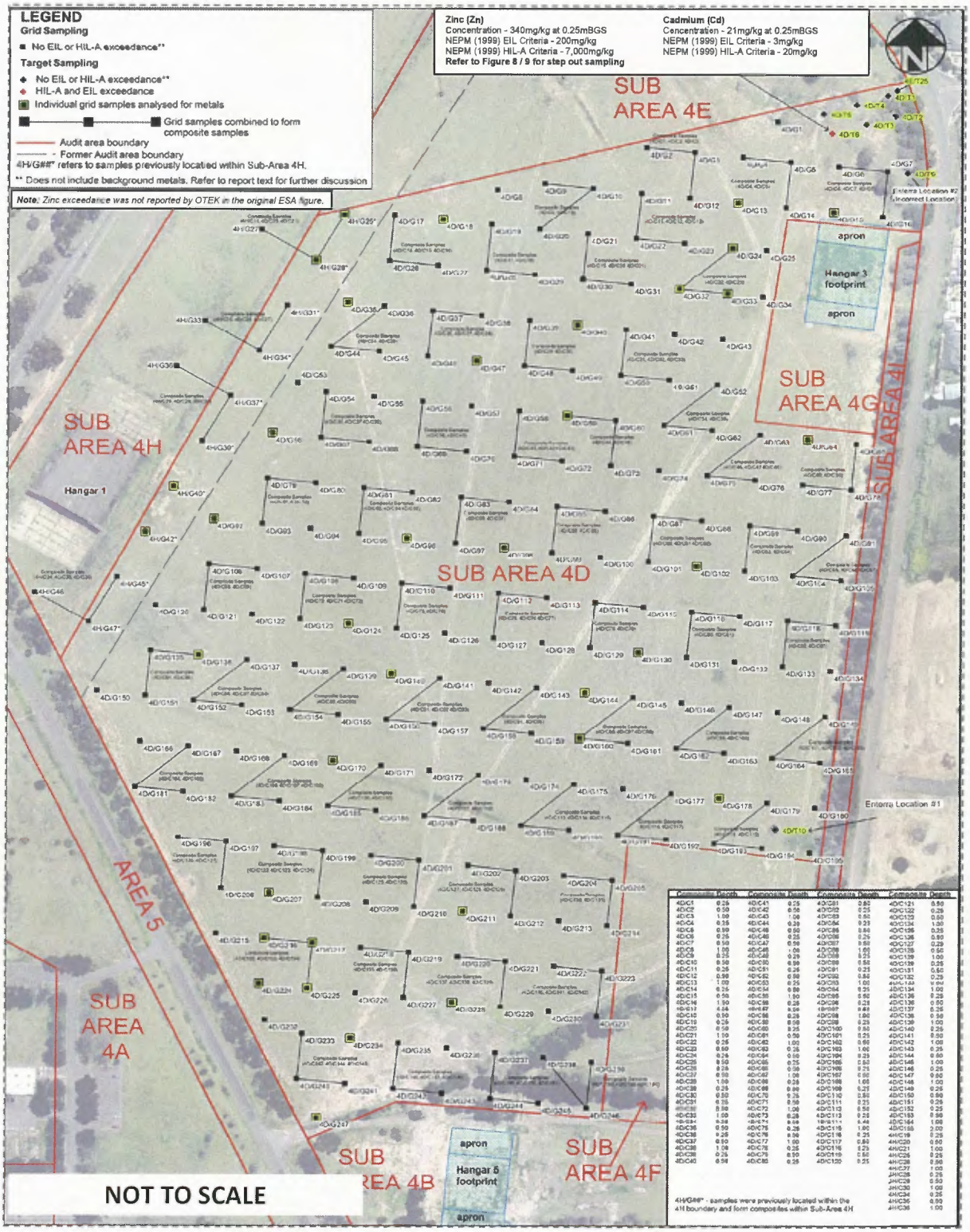
180 Lonsdale Street Melbourne VIC 3000 Australia T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com W www.ghd.com

Data source: Groundwater Monitoring Well, OTEK, 2013, Section of Road & Concrete Slab (Remaining On-Site), GHD, 2014, Figure Image, OTEK, 2013A, Aerial (Background) Imagery, Google Earth Pro, 2009 (captured 18/05/2013) Created by: bcoughlan



This figure was originally prepared by OTEK (1/02/2013) for "Environmental Site Assessment (Draft), Riverwalk Sub-Area 4D, New Farm Road, Werribee, Victoria" (OTEK 2013A). The image represented above is an extract from OTEK (2013A) and therefore the accuracy of the data displayed cannot be guaranteed by GHD.
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Source: Environmental Site Assessment (Draft), Riverwalk Sub-Area 4D, New Farm Road, Werribee, Victoria (OTEK 2013A)

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Figure 5
OTEK Grid & Target Sampling Locations

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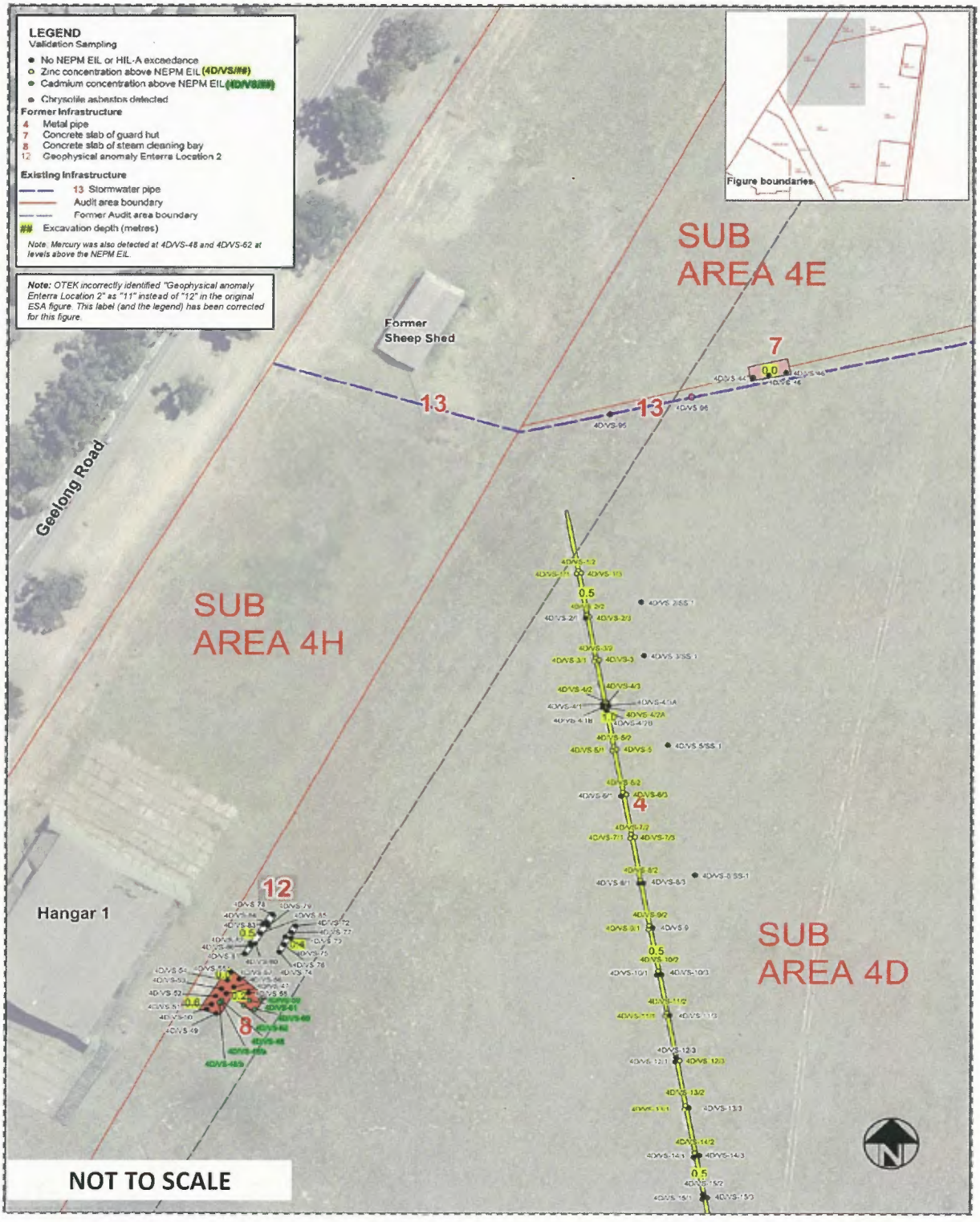

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Figure 6
OTEK Validation Sampling Locations (Northwest Quadrant)

scale: Not to Scale date: 30 May 2014

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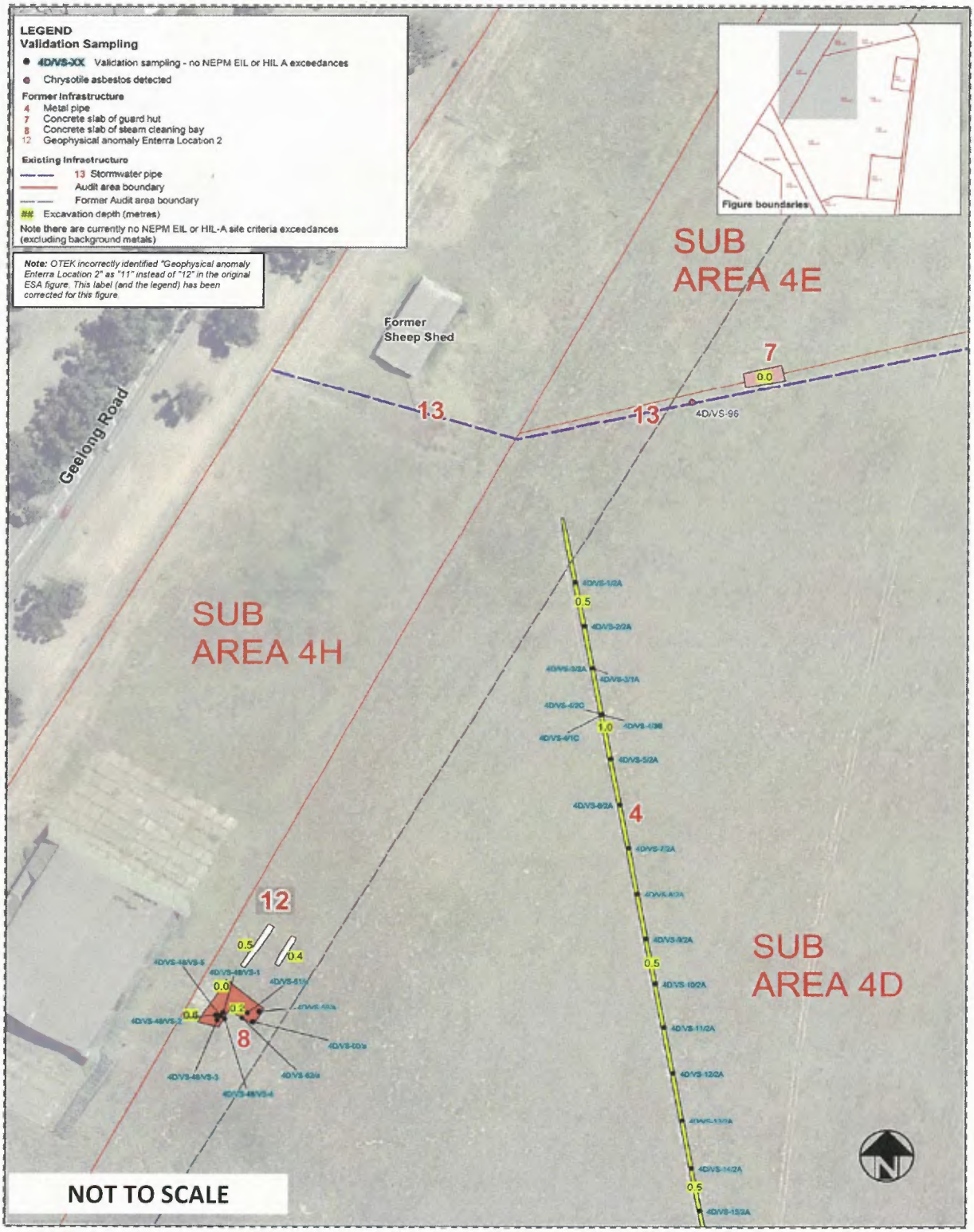

This figure was originally prepared by OTEK (1/02/2013) for "Environmental Site Assessment (Draft), Riverwalk Sub-Area 4D, New Farm Road, Werribee, Victoria" (OTEK 2013A). The image represented above is an extract from OTEK (2013A) and therefore the accuracy of the data displayed cannot be guaranteed by GHD.
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Note: Image (above) was extracted from OTEK 2013A and is not represented to scale.

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Source: Environmental Site Assessment (Draft), Riverwalk Sub-Area 4D, New Farm Road, Werribee, Victoria (OTEK 2013A)

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Figure 7
OTEK Validation Sampling Locations - Final Site Condition (Northwest Quadrant)

scale: Not to Scale date: 30 May 2014

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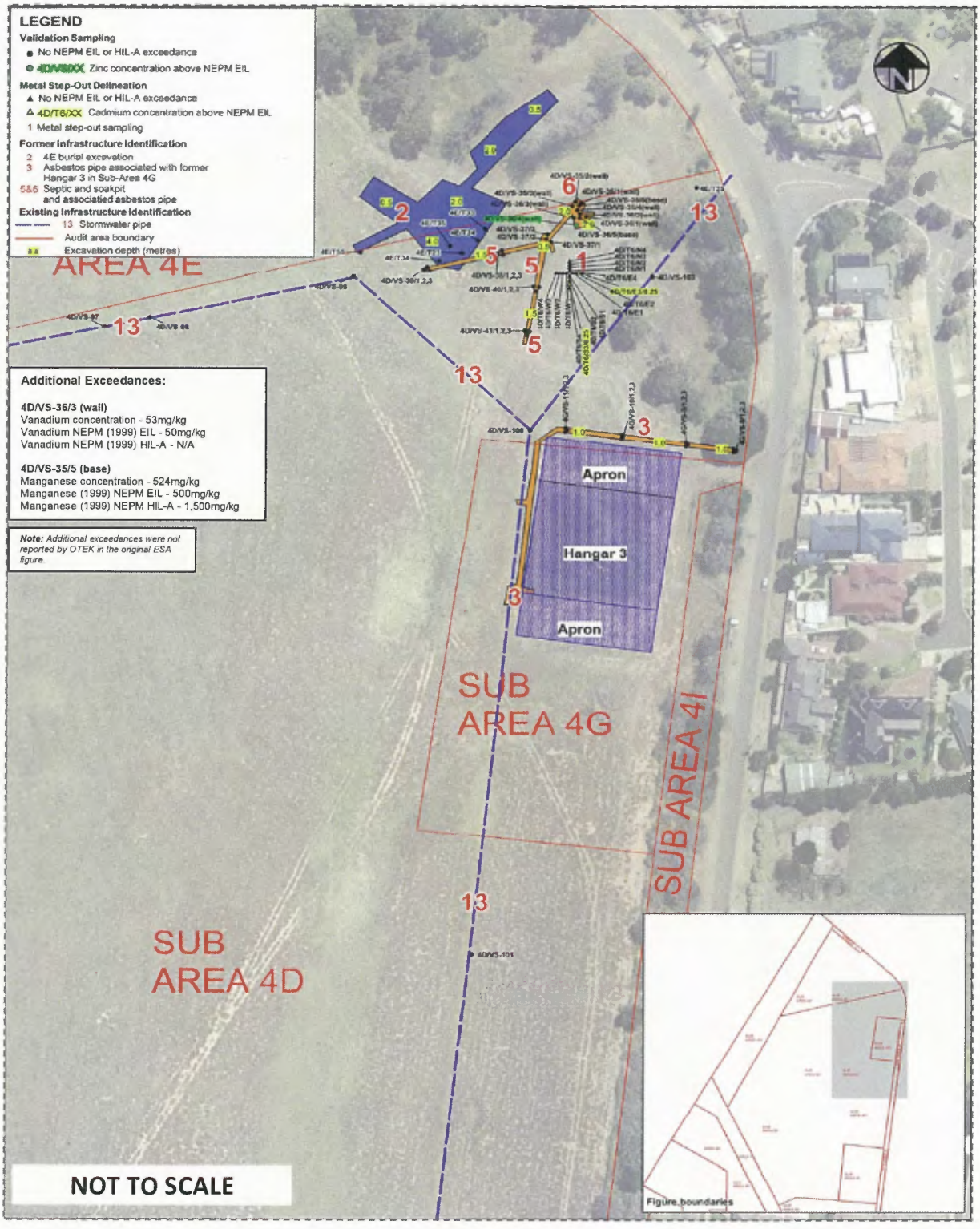

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Source: Environmental Site Assessment (Draft), Riverwalk Sub-Area 4D, New Farm Road, Werribee, Victoria (OTEK 2013A)

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Figure 8
OTEK Sampling Locations (Northeast Quadrant)

scale: Not to Scale | date: 30 May 2014

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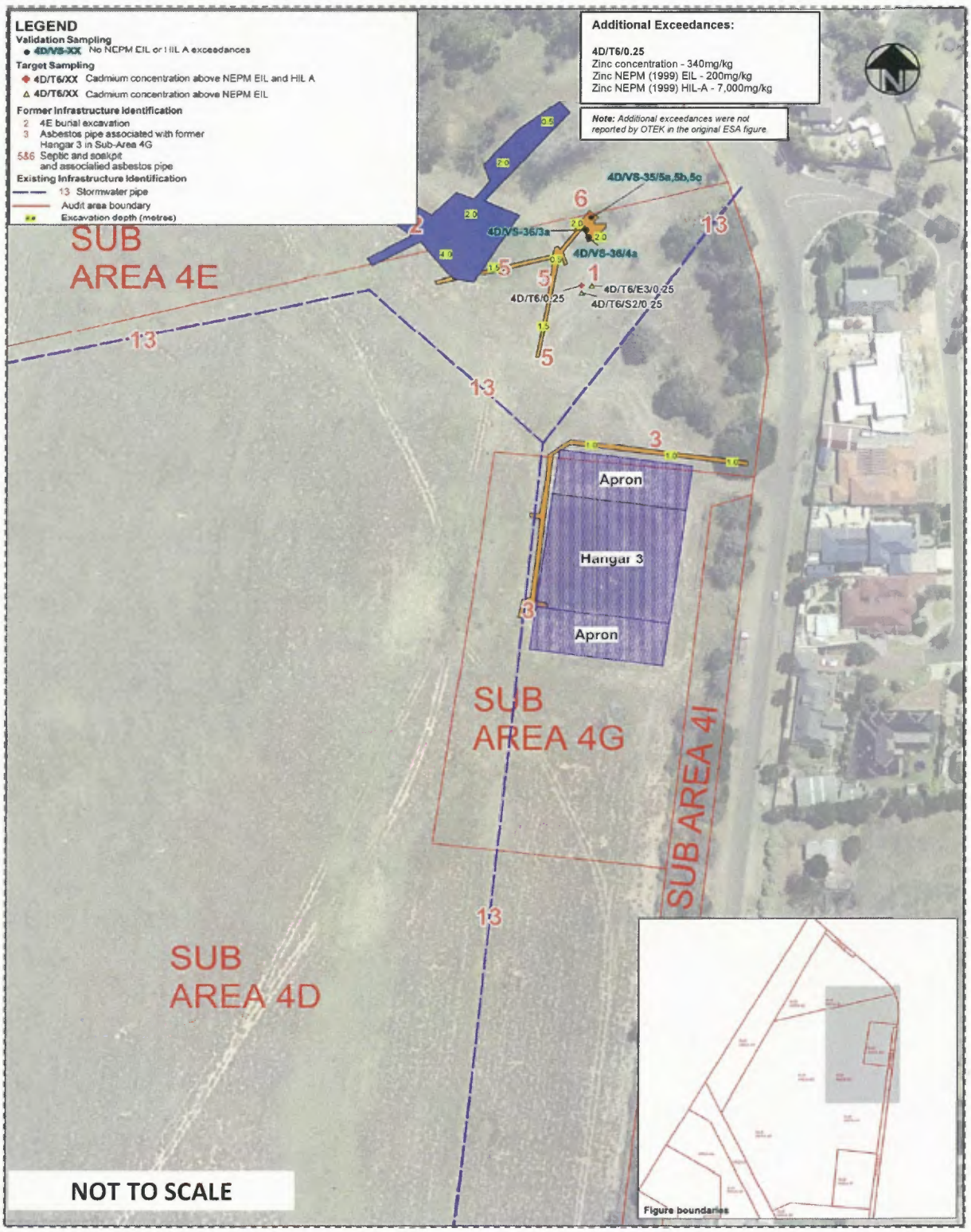

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Source: Environmental Site Assessment (Draft), Riverwalk Sub-Area 4D, New Farm Road, Werribee, Victoria (OTEK 2013A)

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Figure 9
OTEK Sampling Locations - Final Site Condition (Northeast Quadrant)

scale: Not to Scale | date: 30 May 2014

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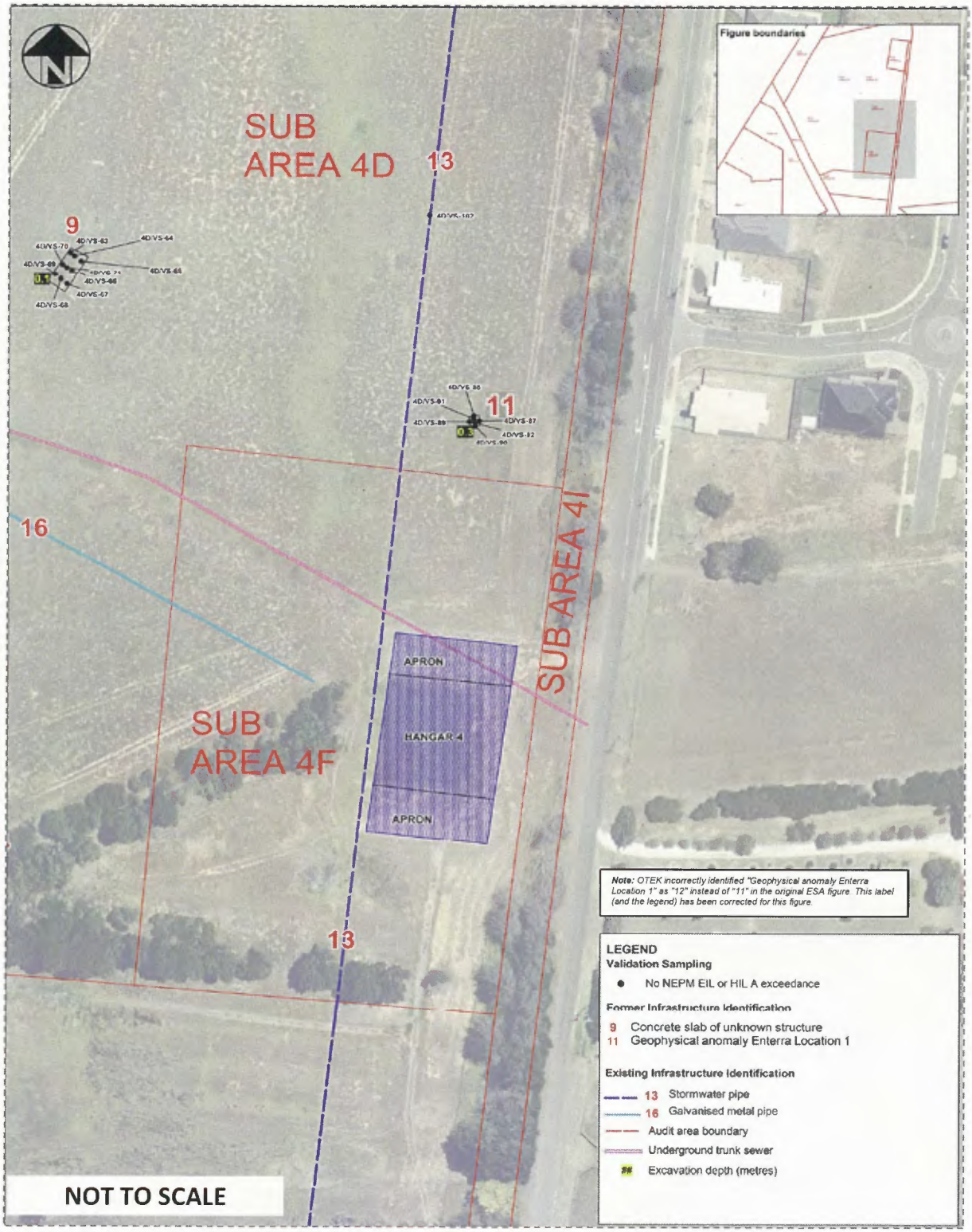

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Figure 10
OTEK Sampling Locations-
Final Site Condition (South Quadrant)

scale: Not to Scale | date: 30 May 2014

Level 8, 180 Lonsdale Street, Melbourne VIC 3000 T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com.au

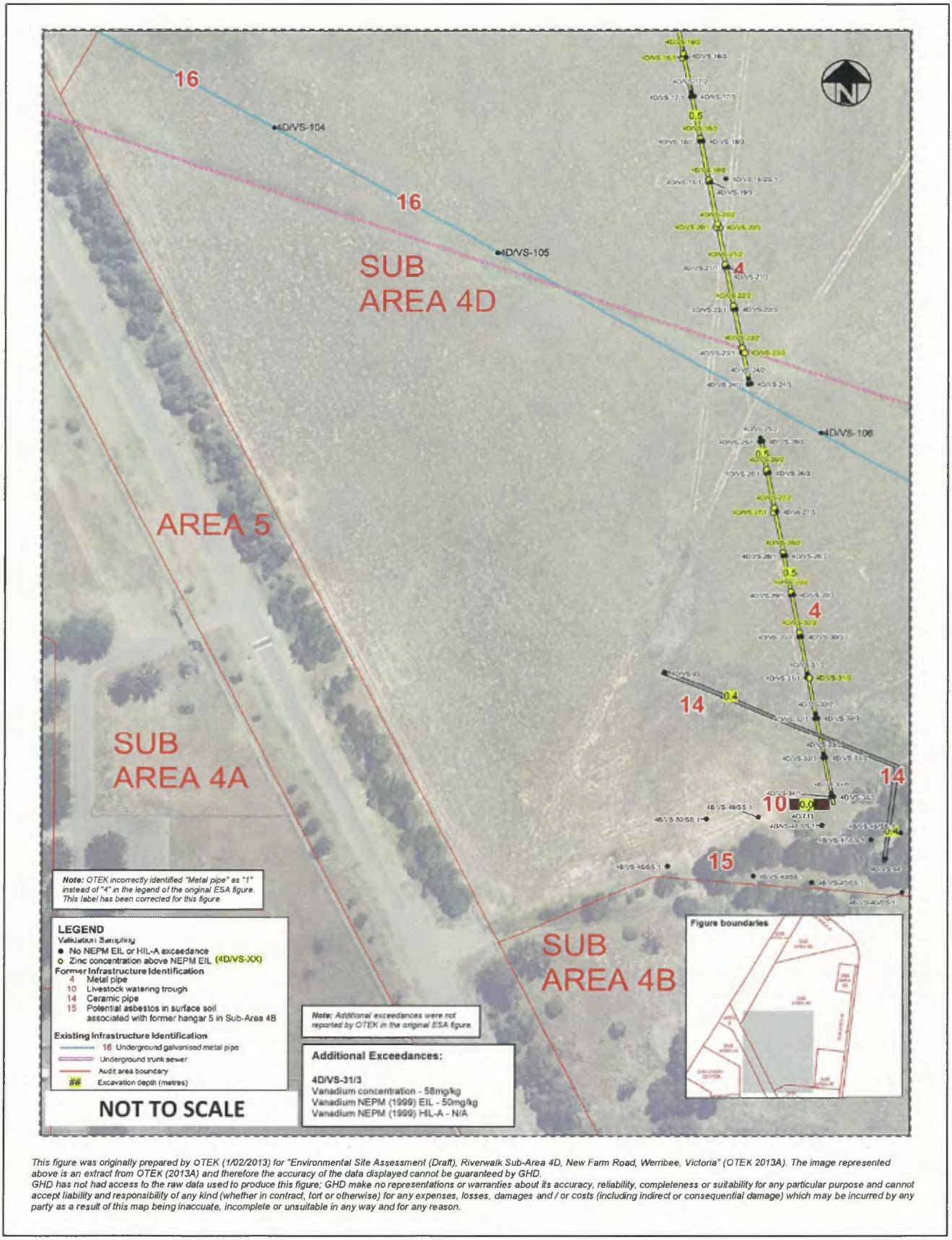

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Figure 11
OTEK Sampling Locations - (Southwest Quadrant)

scale: Not to Scale date: 30 May 2014

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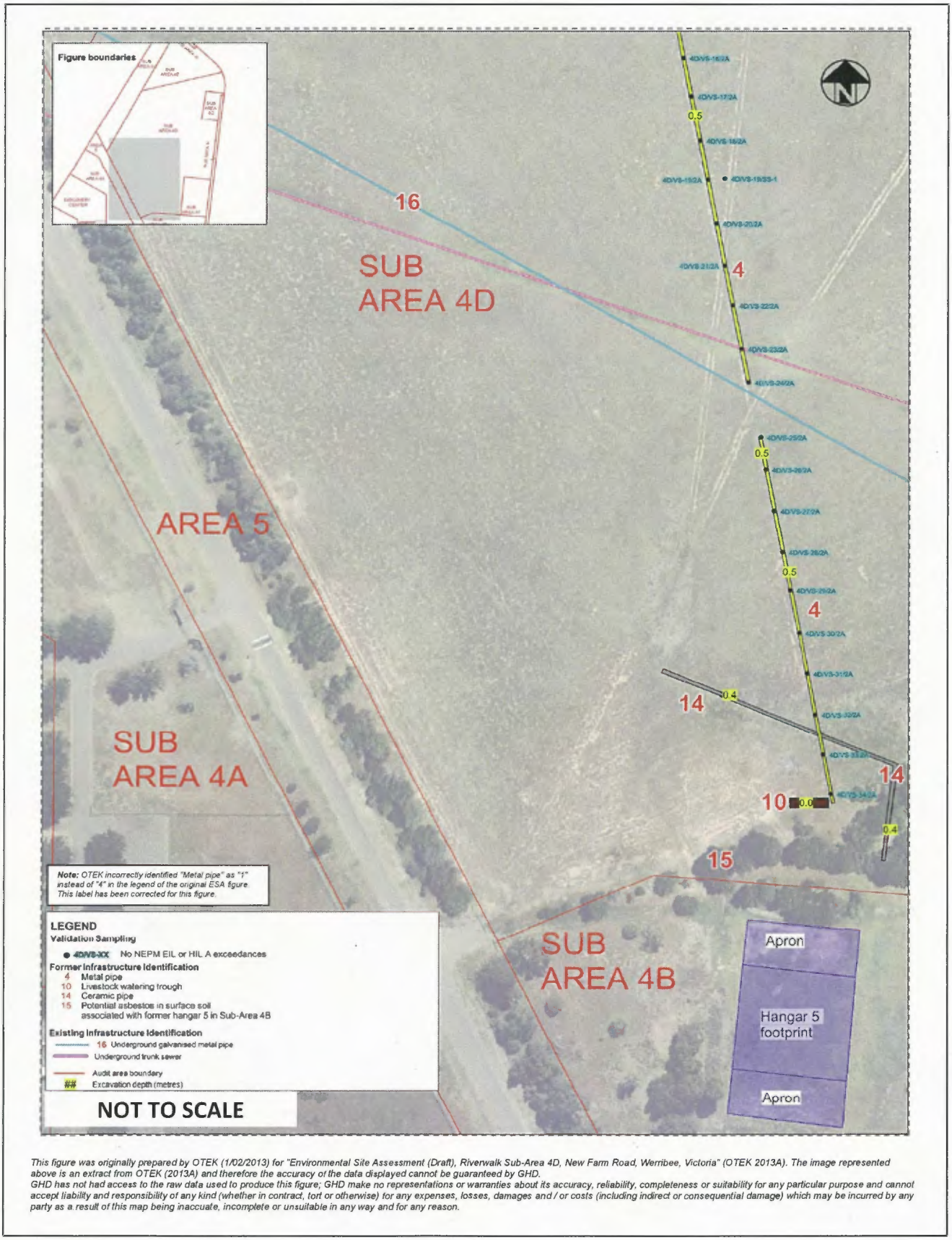

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Project: Environmental Audit of Area 4D, Riverwalk Estate, Princes Highway, Werribee
Source: Environmental Site Assessment (Draft), Riverwalk Sub-Area 4D, New Farm Road, Werribee, Victoria (OTEK 2013A)

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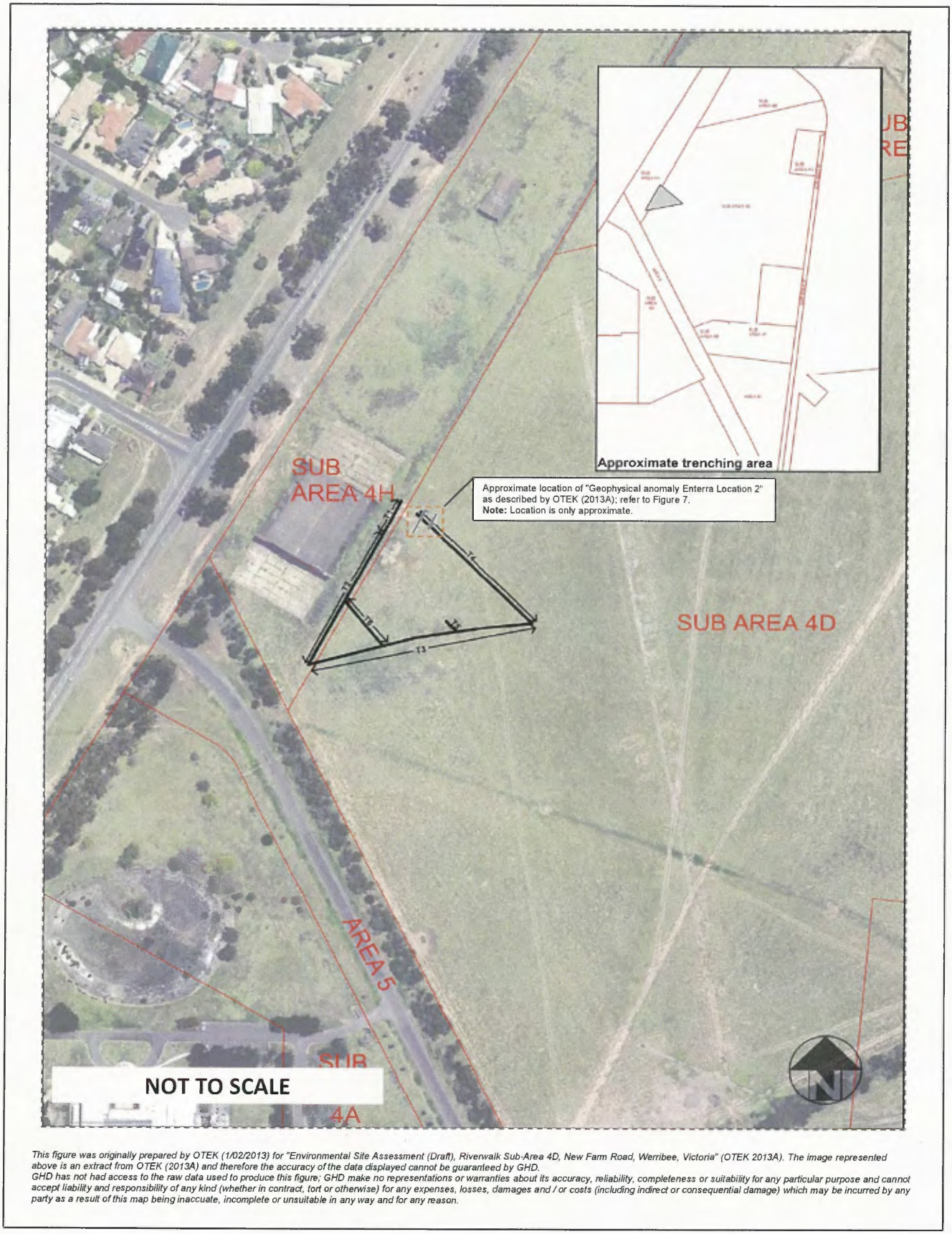
Figure 12
OTEK Sampling Locations
Final Site Condition - (Southwest Quadrant)

scale: Not to Scale | date: 30 May 2014

Level 8, 180 Lonsdale Street, Melbourne VIC 3000 T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com.au



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Note: Image (above) was extracted from OTEK 2013A and is not represented to scale.

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Source: Environmental Site Assessment (Draft), Riverwalk Sub-Area 4D, New Farm Road, Werribee, Victoria (OTEK 2013A)

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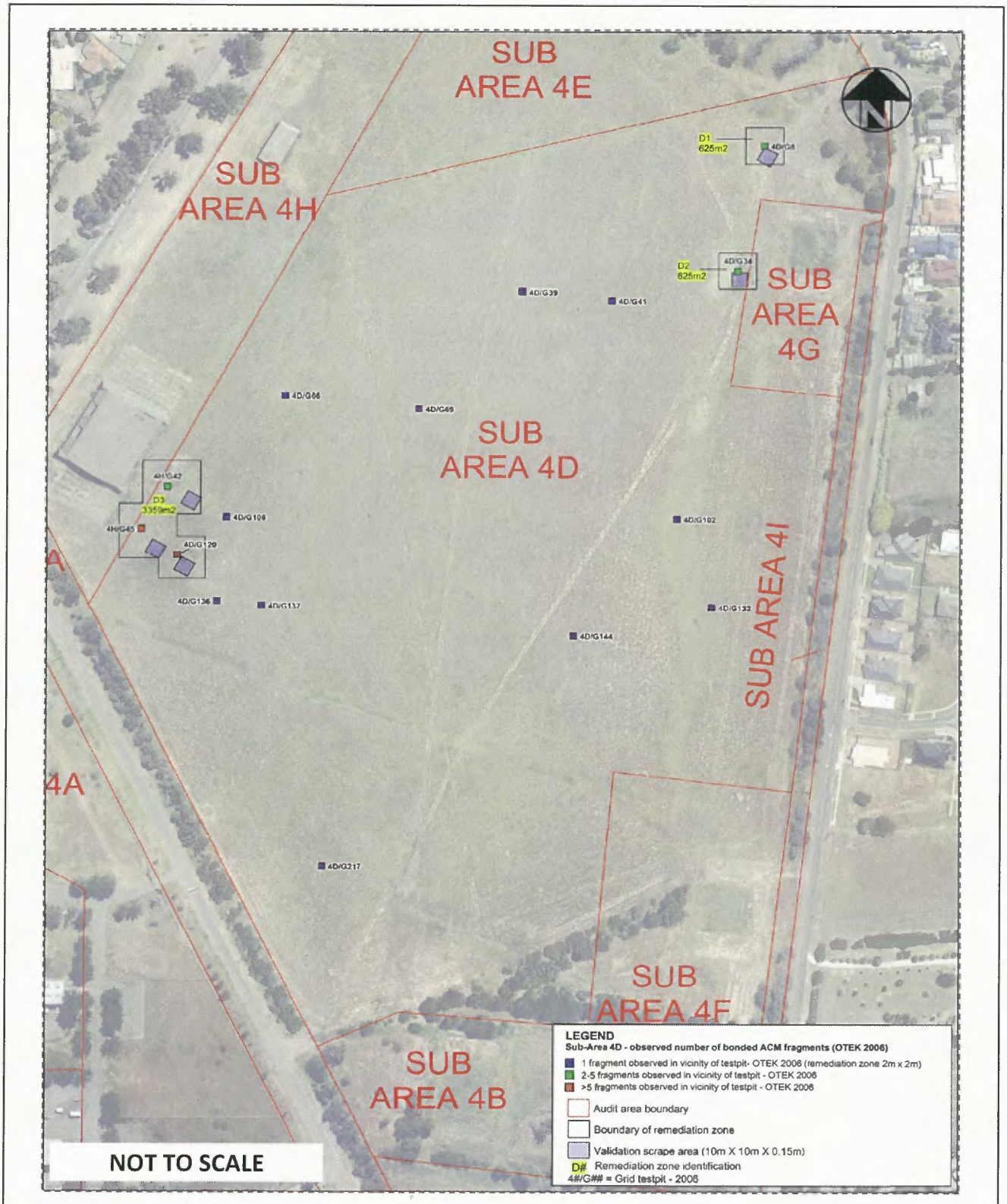
Figure 13
OTEK Investigation Trenches

scale: Not to Scale date: 30 May 2014

Level 8, 180 Lonsdale Street, Melbourne VIC 3000 T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com.au



This figure was originally prepared by OTEK (1/02/2013) for "Environmental Site Assessment (Draft), Riverwalk Sub-Area 4D, New Farm Road, Werribee, Victoria" (OTEK 2013A). The image represented above is an extract from OTEK (2013A) and therefore the accuracy of the data displayed cannot be guaranteed by GHD.
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Source: Environmental Site Assessment (Draft), Riverwalk Sub-Area 4D, New Farm Road, Werribee, Victoria (OTEK 2013A)

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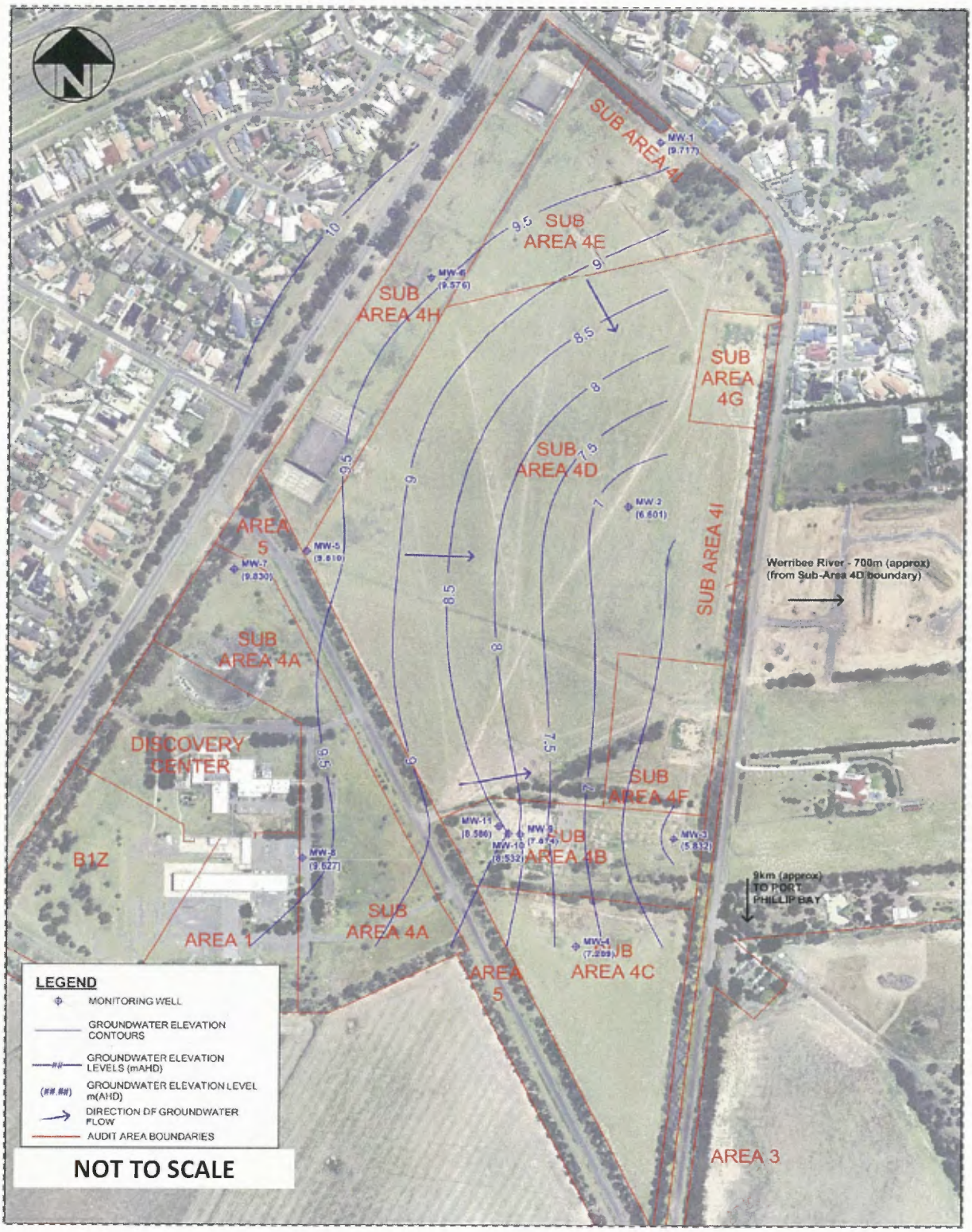
Figure 14
Asbestos Fragment Locations & Remediation Zones

scale: Not to Scale date: 30 May 2014

Level 8, 180 Lonsdale Street, Melbourne VIC 3000 T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com.au



This figure was originally prepared by OTEK (1/02/2013) for "Environmental Site Assessment (Draft), Riverwalk Sub-Area 4D, New Farm Road, Werribee, Victoria" (OTEK 2013A). The image represented above is an extract from OTEK (2013A) and therefore the accuracy of the data displayed cannot be guaranteed by GHD.
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Figure 15
Riverwalk Area 4 - Groundwater Contour Map (December 2011)

scale: Not to Scale | date: 30 May 2014

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Trench Dimensions			
Location	Trench	Length	Depth
4D_V1	West	16m	1.5mbgl
4D_V1	East	11m	0.5mbgl
4D_V1	North	15m	0.5mbgl
4D_V2	North-South	6m	0.5mbgl
4D_V2	East-West	6m	0.5mbgl
4D_V3	North-South	6m	1.0mbgl
4D_V3	East-West	6m	1.0mbgl

Scrape Dimensions			
Location	Length	Width	Depth
4D_V4	5m	5m	0.1mbgl
4D_V5	5m	5m	0.1mbgl
4D_V6	5m	5m	0.1mbgl
4D_V7	5m	5m	0.1mbgl
4D_V8	8m	8m	0.1mbgl

LEGEND

- Audit Areas
- Auditor Verification Trench
- Verification Trench Location
- Verification Surface Scrape (5x5m)
- Verification Surface Scrape (8x8m)

Main Map - 1:2,000 at A3
0 20 40 60 80
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

Inset Maps - 1:1,000 at A3
0 10 20 30 40
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Melbourne Water
Environmental Audit of Area 4D,
Riverwalk Estate, Princes Highway, Werribee

Job Number 31 / 1157500
Revision 0
Date 01 Nov 2013

Auditor Verification (October 2013)

Figure 16

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Data source: Validation Locations & Trenches, GHD 2013. Audit Boundaries, OTEK 2012. Background Imagery (2009), Google Earth Pro (16/5/2013). Created by bcoughlan

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	F Abo / P Flukes	F Abo		F Abo		05/06/2014

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