

APPENDIX 1

*For inspection purposes only.
Consent of copyright owner required for any other use.*

Killarney Waste Disposal

Aughacureen, Killarney, Co Kerry
Waste Licence No. W0217-01



Report on Hydrogeological Survey

June 2010



Killarney Waste Disposal

Hydrogeological Survey

Contents

1.	Introduction	1
2.	Local Hydrogeology	2
3.	Installation of Monitoring Boreholes.....	4
	3.1 Monitoring Well 1 (MW1).....	4
	3.2 Monitoring Well 2 (MW2).....	5
	3.3 Monitoring Well 3 (MW3).....	5
	3.4 Monitoring Well 4 (MW4).....	6
4.	Water Quality	8
	4.1 Methodology.....	8
	4.2 Monitoring Results.....	8
5.	Conclusion.....	11

Attachments

Attachment A	Figure 1. Site Location Figure 2. Site Layout Figure 3. GSI Well Search Figure 4. Monitoring Well 1 Figure 5. Monitoring Well 2 Figure 6. Monitoring Well 3 Figure 7. Monitoring Well 4 Figure 8. Aerial Photograph of the Site
Attachment B	Monitoring well - Hydrochemical results
Attachment C	Photolog
Attachment D	Bund integrity Certificate

Government of Ireland inspection purposes only.
 Copyright © 2018. All rights reserved. No part of this document may be reproduced without the prior written consent of the copyright owner required for any other use.

Issue Date: 01.07.2010	KWD Hydrogeological Survey Report	No.:	Rev.:	Page 1 of 11
------------------------	-----------------------------------	------	-------	--------------

1. Introduction

OES were commissioned by Killarney Waste Disposal Ltd (KWD) to undertake a hydrogeological assessment of their facility at Aughacureen to determine if contaminating substances exist in groundwater as a result of site activities.

The overall objective of this assessment is to develop a valid hydrogeological conceptual model so that an effective groundwater monitoring programme can be developed for the site to the satisfaction of the Agency.

Killarney Waste Disposal (KWD) has operated a Material Recovery Facility (MRF) on a 2.2 hectare site at Aughacureen, approximately 4 km northwest of Killarney Town since 1987. The MRF is situated on a rural site and there is no significant residential or commercial development in its proximity; the primary landuse of the surrounding locale is agricultural with some of the land now being used for commercial forestry, some of which has recently been clear felled.

Under Condition 3.21 of Waste Licence W0217-01 the Agency required KWD to submit a proposal for the installation of groundwater monitoring boreholes at the site. OES submitted this proposal to the Agency on behalf of KWD in April 2008.

This report sets out the findings of the hydrogeological assessment as agreed by the Agency.

For inspection purposes only. Consent of copyright owner required for any other use.

2. Local Hydrogeology

Owing to the difficulty involved in obtaining an accurate reflection of groundwater regime it was necessary to undertake a review of geology and hydrogeology in the area surrounding KWD to augment the findings of the field investigations undertaken at the site.

It was found that the underlying aquifer which KWD is situated in has been classified as an LI (locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones) and the GSI Classification for this bedrock aquifer unit indicates it is capable of supplying locally important abstractions (e.g. smaller public water supplies, group schemes). Groundwater flow occurs predominantly through fractures, fissures and joints.

Primary permeability and porosity are no longer present in these formations and secondary permeability is dominant. Obtaining a good yield from these formations is dependent on intercepting major fracture zones and the interconnectivity of these fracture zones.

A GSI well search was undertaken to investigate if there was any domestic or public drinking groundwater sources in the vicinity of the site.

The search yielded results on fifteen (15) wells, these are presented in Table 3 below.

Table 3 Summary of the well details provided by the GSI

Townland	Depth to rock	Depth	Easting	Northing	Location Accuracy	Usage	Yield m ³ d
Nunstown	15.2	61	93890	92790	to 1km	Domestic use only	21.8
Knockasarnet	30.5	35.7	95000	93810	to 1km	Agri & domestic use	21.8
Knockasarnet	30.5	35.4	95000	93760	to 1km	Agri & domestic use	21.8
Scarteen	30.5	36.6	95410	94800	to 1km	Agri & domestic use	21.8
Sheans	0.6	3.1	93320	95620	to 1km	Agri & domestic use	21.8
Barleymount	30.5	36.6	92000	95000	to 1km	Agri & domestic use	21.8
Barleymount east	30.5	32.6	92460	95060	to 500m	Domestic use only	21.8
Gortna-carriga	6.1	36.6	96100	95600	to 500m	Agri & domestic use	26.2

Townland	Depth to rock	Depth	Easting	Northing	Location Accuracy	Usage	Yield m ³ d
Derreen	3.1	28.3	96400	92160	to 500m	Agri & domestic use	21.8
Lackabane			93370	91470	to 200m	Industrial use	350
Lackabane	39	91	93300	91750	to 100m	Industrial use	9
Lackabane	39	91	93300	91750	to 100m	Unknown	7

The nearest groundwater well to the site is greater than 1km up gradient with the nearest down gradient well greater than 2.7km north of the site.

Each of the monitoring boreholes installed at KWD are described in section 3 of this report.

For inspection purposes only.
Consent of copyright owner required for any other use.

3. Installation of Monitoring Boreholes

KWD engaged the services of Southern Pumps Ltd to install monitoring boreholes at their facility in early July 2009. In total four wells were constructed at locations agreed with the Agency. A map detailing the locations of each of the monitoring boreholes installed at the site is appended with this report as figure 2 in Attachment A.

Each of the borehole monitoring wells was levelled to site datum so that groundwater flow direction could be obtained. A summary of each of the wells is presented in following sections of this report.

3.1 Monitoring Well 1 (MW1)

MW 1, as can be seen in Figure 2 (Attachment A) is positioned down gradient of the MWF. This well was constructed with the use of an air rotary rig. A summary of the drilling and well installation is outlined below. A schematic log of this monitoring well is appended with this document as Figure 4 of Attachment A.

Drilling

- Drilling was initiated using a 140 millimetre hole, this was continued to a depth of 7.5 metres;
- Overburden was found to be topsoil from 0 to 0.5 metres with subsoil encountered from 0.5 to 5 metres;
- Soft black shale was encountered from 5 to 7.5 metres.
- Drilling continued to 18 metres below ground surface at a hole diameter of 120 millimetres.

Well Installation

- 10.5 metres of slotted 50 millimetre uPVC casing was installed from 7.5 metres to 18 metres;
- A gravel filter pack was installed in the annular space between the uPVC screen from 7.5m to 18 m below ground level;
- Bentonite seal was installed from 7.5m to ground level to seal the monitoring well from surface water intrusion;
- Raised headwork's were installed at this well to provide well security and groundwater protection of the well and
- A concrete plinth was placed around the top of the well for further groundwater protection.

In terms of the geological sequences encountered, the shale encountered between 5.0 and 7.5 metres was found to be a very fine black powder and slightly weathered and finely laminated.

During drilling, water strikes were recorded at 10 and 15 metres, while the well demonstrated artesian characteristics on the day of drilling.

3.2 Monitoring Well 2 (MW2)

MW2, as can be seen in Figure 2 (Attachment A) is positioned down gradient of the MWF. This well was constructed with the use of an air rotary rig. A summary of the drilling and well installation is outlined below. A schematic of this monitoring well is appended with this document as Figure 5 of Attachment A.

Drilling

- Drilling was initiated using a 150 millimetre hole, this was continued to a depth of 6 metres;
- Overburden was found to be topsoil from 0 to 1 metres with bedrock (black shale) encountered from 1 to 3 metres;
- Steel casing from 0 to 6 metres was installed to stop the hole from caving in;
- Drilling continued to 24metres below ground surface at hole diameter of 120 millimetres.

Well Installation

- Slotted uPVC casing was installed from 6 to 24 metres;
- A gravel filter pack was installed in the annular space between the uPVC screen from 6m to 24m below ground level;
- Bentonite seal was installed from 6m to ground level to seal the monitoring well from surface water intrusion;
- Raised headwork's were installed at the at this well to provide security and protection of the well; and
- A concrete plinth was placed around the top of the well for further groundwater protection.

Whilst the well was being drilled, a minor water strike was encountered at 20 metres below ground level. Similar to MW 1 the drill cuttings were reported as being fine black powder which would indicate that the shale was weathered.

3.3 Monitoring Well 3 (MW3)

MW3, as can be seen in Figure 2 (Attachment A) is positioned up gradient of the MWF. This well was constructed with the use of an air rotary rig. A summary of the drilling and well installation is outlined below. A schematic of this monitoring well is appended with this document as Figure 6 of Attachment A.

Drilling

- The monitoring borehole drilling was initiated using a 140 millimetre hole, this was continued to a depth of 6 metres;
- Overburden of topsoil and subsoil was encountered from 0 to 5 metres.

- Soft weathered black shale was encountered from 5 to 8 metres and 6 metres of steel casing was inserted from 0 to 6 metres to stop the borehole from caving in;
- Drilling continued to 18metres below ground surface at a hole diameter of 120 millimetres.

Well Installation

- 50 millimetre uPVC casing was installed from 0 metres to 7.5 metres below ground level;
- A gravel filter pack was installed around the uPVC from 6 to 18 metres;
- A Bentonite seal was installed from 6m to ground level to seal the monitoring well from surface water intrusion;
- Raised headwork's were installed at the at this well to provide security and protection of the well; and
- A concrete plinth was placed around the top of the well for further groundwater protection.

A minor water strike was encountered at 11m below ground level. Once the steel screen was installed in the upper 6 metres of the borehole the hole remained open for the duration of drilling.

3.4 Monitoring Well 4 (MW4)

MW4, as can be seen in Figure 2 (Attachment A) is positioned up gradient of the MWF. This well was constructed with the use of an air rotary rig. A summary of the drilling and well installation is outlined below. A schematic of this monitoring well is appended with this document as Figure 6 of Attachment A.

Drilling

- The monitoring borehole drilling was initiated using a 140 millimetre hole, this was continued to a depth of 6 metres;
- Overburden of topsoil and clay was encountered from 0 to 3 metres.
- Soft weathered black shale was encountered from 3 to 8 metres and 6 metres of steel casing was inserted from 0 to 6 metres to stop the borehole from caving in;
- Drilling continued to 18metres below ground surface at a hole diameter of 120 millimetres.

Well Installation

- 50 millimetre uPVC casing was installed from 6 metres to 18 metres below ground level;
- A gravel filter pack was installed in the annular space between the uPVC screen from 6m to 18m below ground level;
- A Bentonite seal was installed from 6m to ground level to seal the monitoring well from surface water intrusion;

Issue Date: 01.07.2010	KWD Hydrogeological Survey Report	No.:	Rev.:	Page 7 of 11
------------------------	--------------------------------------	------	-------	--------------

- Raised headwork's were installed at the at this well to provide security and protection of the well; and
- A concrete plinth was placed around the top of the well for further groundwater protection.

Similarly to MW3 a water strike was detected at 11 metres.

*For inspection purposes only.
Consent of copyright owner required for any other use.*

4. Water Quality

OES undertook groundwater monitoring at KWD on the 25th of November 2009. Water samples were taken from the four groundwater monitoring wells at the site and were analysed for the parameters set out in Schedule C of licence W0217-01. The parameters required to be analysed and the frequency for analysis is presented in table 1 below.

Table 1 Groundwater monitoring parameters

Parameter	Monitoring frequency	Analysis method/Technique
Total Ammonia (as N)	Biannually	Standard method
Nitrates (as N)	Biannually	Standard method
Conductivity	Biannually	Standard method
Chloride	Biannually	Standard method
Sulphates	Biannually	Standard method
Diesel range organics	Biannually	To be agreed by agency

4.1 Methodology

Sampling of the groundwater monitoring wells at KWD was undertaken by a Hydrogeologist from OES.

Separate tubing was used in each well to prevent cross contamination during sampling. Each of the groundwater monitoring wells was purged by at least 5 times its water volume; samples were taken when the electrical conductivity readings and pH of the groundwater stabilised to ensure that the sample was representative of groundwater in the area.

The water samples were preserved where necessary and sent to Alcontrol Laboratories in Dublin for analysis.

The results of analysis from the four Monitoring wells were interpreted with reference to the standards set out in EC (Drinking Water) Regulations 2000 Standards (SI 439 of 2000).

Three rounds of water sampling were undertaken in order to obtain a representative indication of the groundwater quality both upgradient, side gradient and down gradient of the facility.

Samples were taken on the 04/09/09, 26/11/2009 and on the 27/05/2010.

4.2 Monitoring Results

Hydrochemistry results returned from Alcontrol Laboratories are appended with this report as Attachment B. A breakdown of the results from the three monitoring rounds are outlined below.

Diesel Range Organics

The results for diesel range organics (DRO) were all less than the detectable limits for all 4 on site wells for the three rounds of sampling undertaken. All results for diesel range organics in all monitoring wells were non detectable.

Nitrate as (NO₃⁻)

The results for Nitrate were all less than the detectable limits for the 4 on site wells for the three monitoring rounds. All results for Nitrate were all less non detectable.

Sulphate

The results for sulphate were less than the detectable limit for the monitoring rounds undertaken in September 2009 and for November 2009. Minor amounts of sulphate were detected in both MW3 and MW4 during the May 2010 monitoring round. The levels were 4.4mg/l and 21.9mg/l respectively. This is in line with the natural background levels for sulphate for this type of bedrock. The results are well below the drinking water limits.

Chloride

The results for chloride were well below the drinking water limits. The results are in line with natural background limits. The average value for Chloride was 22.87mg/l. The drinking water standards are 250mg/l.

Electrical conductivity

The results for electrical conductivity ranged from 377µs/cm to 764µs/cm. The results were well below the drinking water limits set at 2,500µs/cm

Ammonia

The results for ammonia were elevated in MW1, MW2 and MW3 for the three sampling rounds. The result for MW4 was below the detectable limit from the three sampling rounds.

MW3 is an upgradient well and has elevated Ammonia levels. Clear felling of forestry has occurred beside MW3 (as shown in the photolog attachment C). This clear felling occurred during early 2009.

Source of Ammonia

Investigation into the source of the elevated ammonia suggests that it may be from one of three sources.

1) Leachate storage tank in the centre of the MRF

The leachate storage tank is located in the centre of the MRF and is equipped with a volume alarm (see Figure 2). This storage tank was hydrostatically tested in March 2009 to check for integrity. The storage tank passed the integrity test. The bund integrity certificate is attached in Attachment D. This proves that there is no leachate being released into the environment as a point source from the leachate storage tank.

In addition, chemical analysis results from the leachate storage tank shows elevated levels of ammonia as well as very elevated levels of sulphate and chloride in the leachate storage tank. The levels of both sulphate and chloride are found at low concentrations in the groundwater samples taken in all three monitoring rounds.

In the case of sulphate it is non detectable in MW1 and MW2 and found at natural background levels or below natural background levels in the monitoring wells MW3 and MW4. Chloride is at natural background levels in all wells. The difference in the chemical signatures suggests that possible leachate contamination from the leachate storage tank is not the cause of the elevated ammonia.

2) Wetland treatment area

The wetland area treats runoff from the site and effluent from the on site toilets and wash area. The treated effluent from this wetland is released into a surface drain to the west of the site (SW1- See Figure 2). From hydrochemistry comparison it does not appear to mix with groundwater. Chemical analysis results from the treated effluent from SW1 area show high levels of sulphate (>100mg/l) which has not been detected in the groundwater, confirming that this surface water is not interacting with the groundwater at this location. The difference in chemical signatures from the surface water samples when compared to the groundwater results show different results and suggests that the wetland treatment area is not the cause of the elevated ammonia found in the groundwater.

3) Surrounding landscape

From the discussion above it is evident that the high ammonia results could be from the surrounding landscape, due in part to the known groundwater flow direction and the activities occurring hydraulically upgradient of the facility. (See Figure 2 and 8)

The levels of Ammonia in MW1, MW2 and MW3 are likely to be a result of possible septic tank discharges, leakage from underground livestock slurry pits, the recent clear felling of forestry or the landspreading of agricultural waste material from the higher grounds to the south of the facility.

5. Conclusion

The detailed hydrochemistry results obtained from the sampling undertaken at KWD from September 2009 through to May 2010 demonstrate that groundwater quality beneath the site is well within the standards set out in the EC (Drinking Water) Regulations 2000 Standards (SI 439 of 2000) with the exception of Total Ammonia in some of the wells.

Total Ammonia, represented as N was found to be in exceedence of the drinking water standard set out in the EC (Drinking Water) Regulations 2000 Standards at monitoring points MW1, MW2 and MW3. The highest concentration recorded at the site was at MW2 and MW3 which are located close to clear felled forestry plantation and agricultural lands close to the MRF facility. Groundwater flow direction has been demonstrated to flow from south west to north east, which suggests that the source of the ammonia is from outside the site boundary.

Future monitoring of the groundwater monitoring wells at KWD undertaken in accordance with the requirements of W0217-01 will enhance understanding of the fate of ammonia in groundwater at KWD.

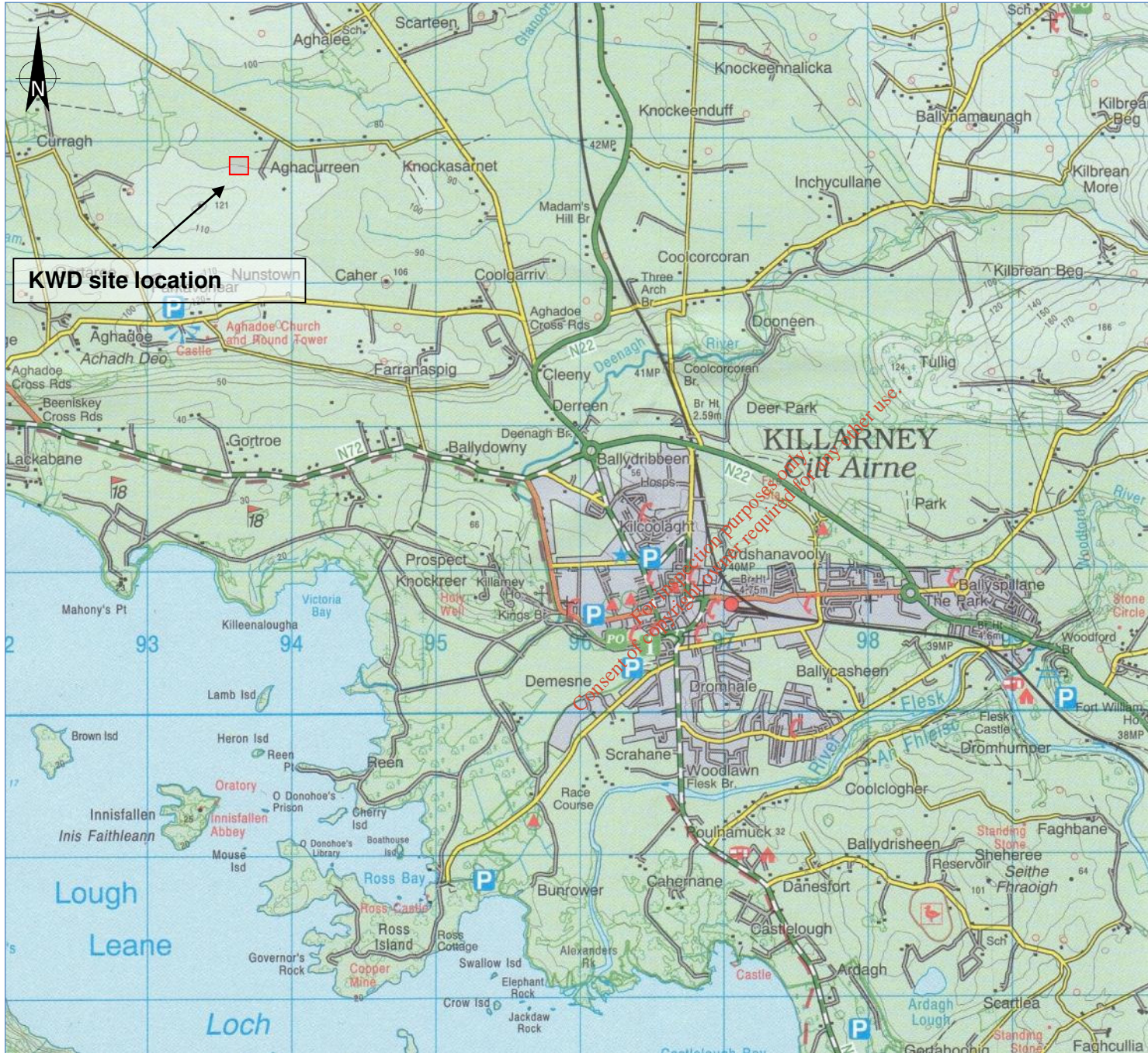
For inspection purposes only
Consent of copyright owner required for any other use

For inspection purposes only.
Consent of copyright owner required for any other use.

Attachment A

Figures





Site location

Ordnance Survey of Ireland
 Licence No. EN0059510
 Ordnance Survey of Ireland and
 Government of Ireland.

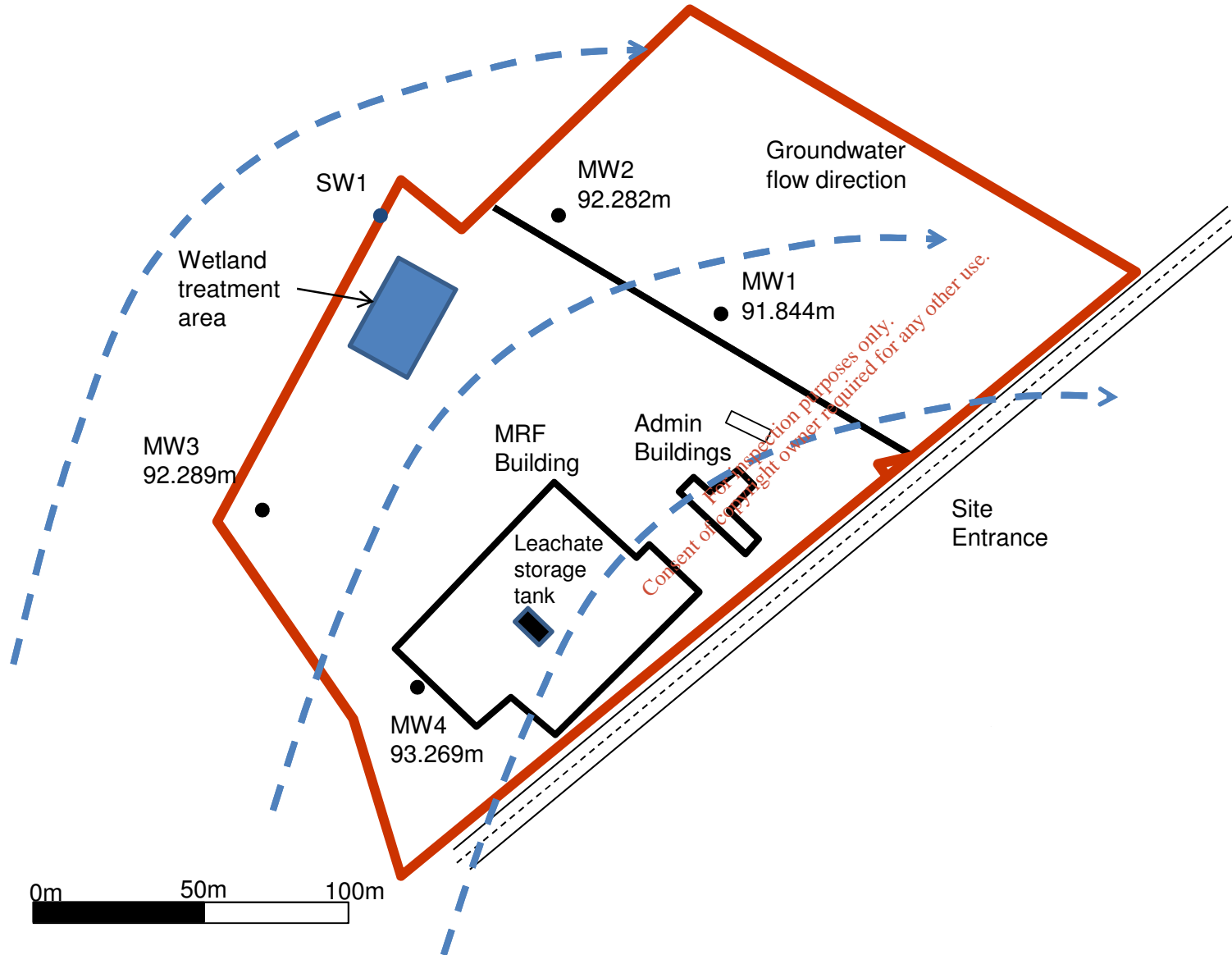
Client: Killarney Waste
 Disposal
 Project Code: 1059_08
 Title: Site Location

Drawing No: 1
 Issue Date: 30/06/10
 Revision: 1
 Scale: Not to Scale

OES
 FBD House, Fels Point,
 Tralee, Co. Kerry Ireland
 P: 066-712 83 21 W: oes.ie



Energy, Environment & Safety



- Monitoring well locations and water level
- Site Boundary
- Building
- Leachate storage tanks
- Surface water monitoring location

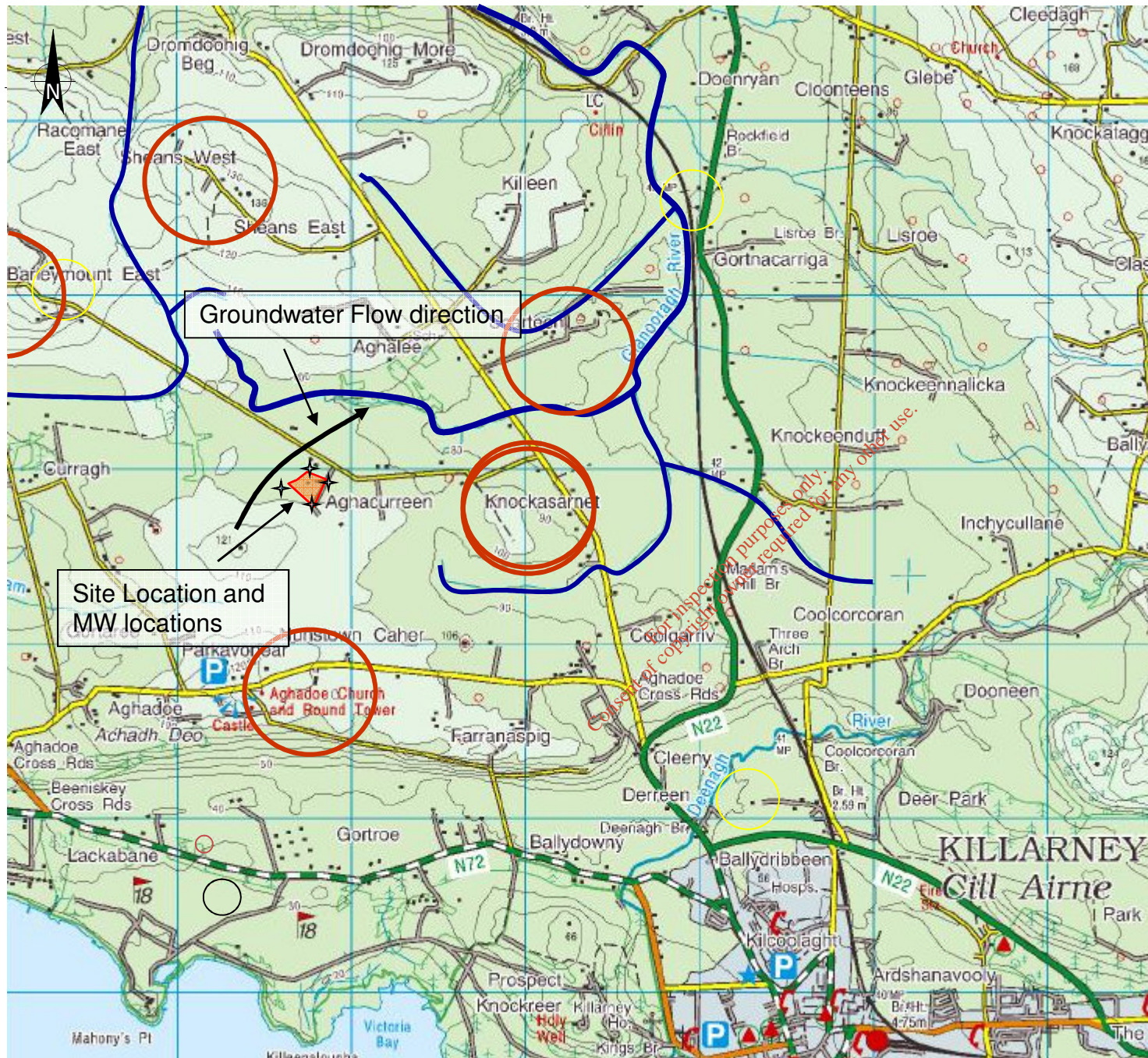
Client: Killarney Waste Disposal
Project Code: 1059_08
Title: MW Locations




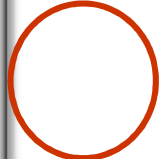




Drawing No: 2
Issue Date: 30/06/10
Revision: 1
Scale: See map

OES
FBD House, Fels Point,
Tralee, Co. Kerry Ireland
P: 066-712 83 21 W: oes.ie



Energy, Environment & Safety



-  Site Location
 -  Groundwater flow direction
 -  Glanoraigh River
 -  Well Accuracy 1KM
 -  Well Accuracy 500m
 -  Well Accuracy 200m
 -  Well Accuracy 20m
 -  Monitoring well locations
- Ordnance Survey of Ireland
Licence No. EN0059510
Ordnance Survey of Ireland and
Government of Ireland.

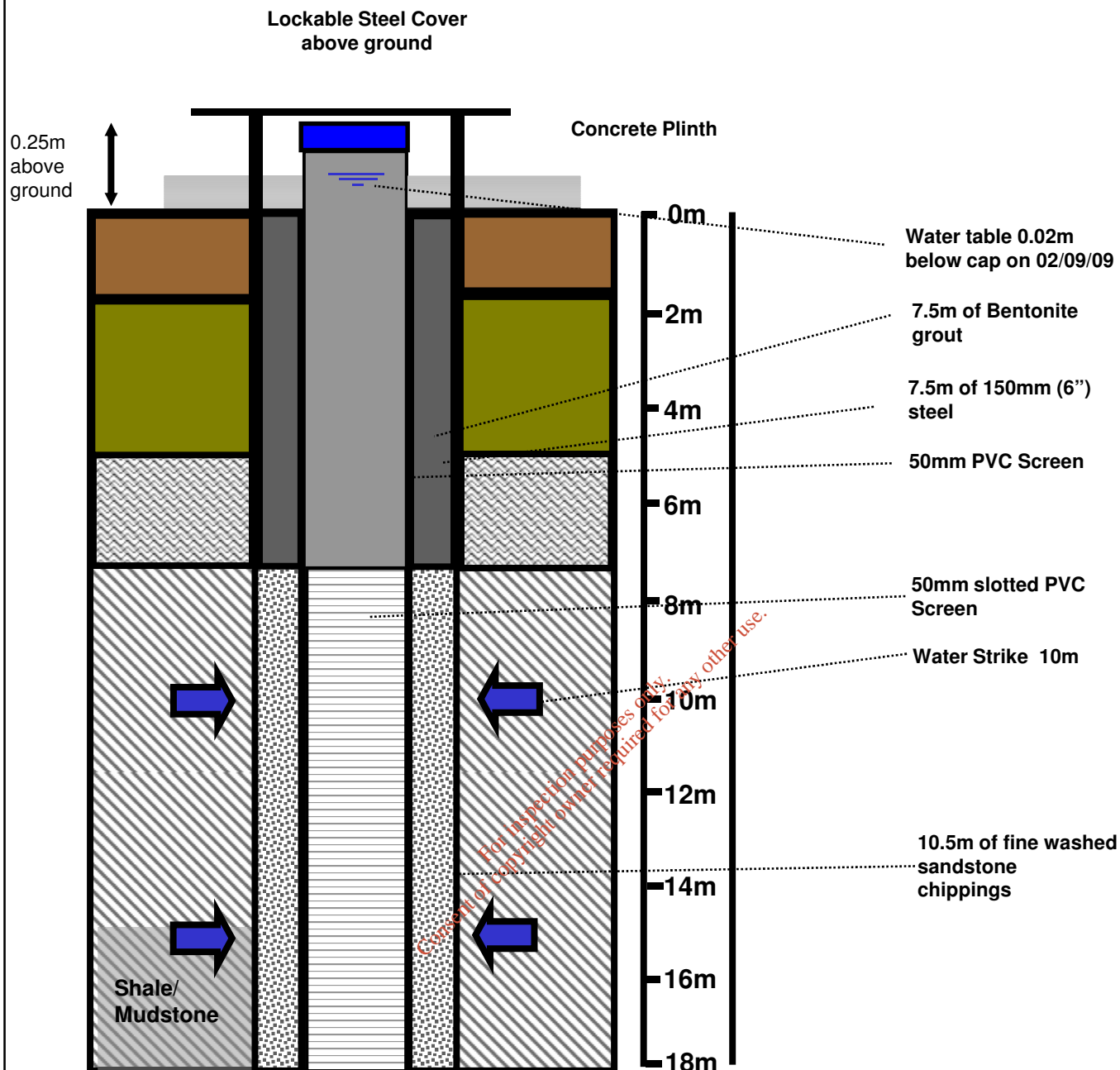
Client: Killarney Waste Disposal
Project Code: 1059_08
Title: GSI well search results

Drawing No: 3
Issue Date: 30/06/10

OES
FBD House, Fels Point,
Tralee, Co. Kerry Ireland
P: 066-712 83 21 W: oes.ie



MW1



Legend

	Bedrock		PEAT
	Weathered Bedrock		Mottled CLAY
	Bentonite		
	Concrete		

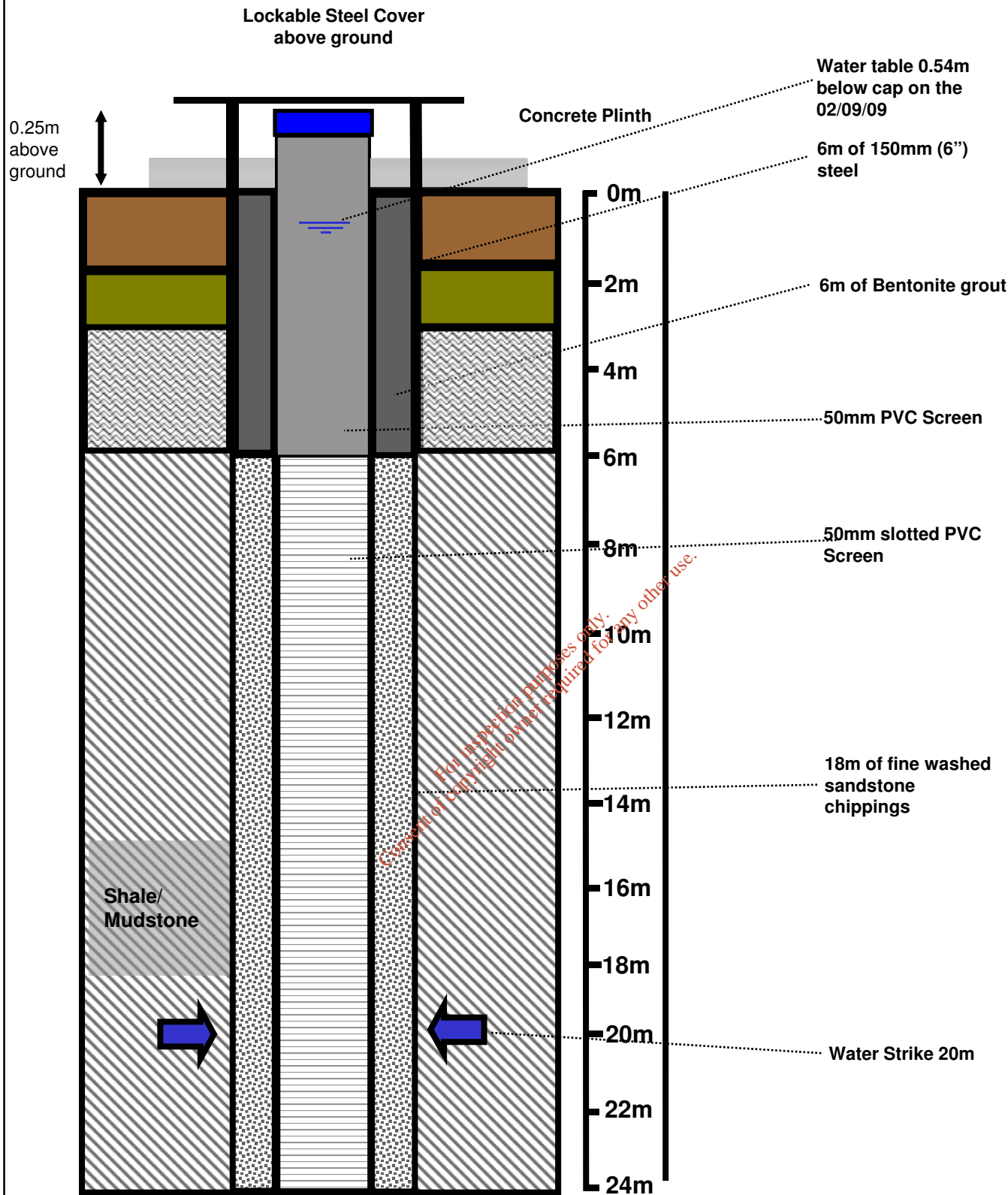


Energy, Environment & Safety
 environmental health and safety engineering project management
 © Copyright of OES Consulting, FBD House, Fels Point, Tralee, Co. Kerry,
 Tel: 353 (0)667128321 Fax: 353 (0)66 7180061 Email: info@oes.ie




Monitoring Well 1
 NGR E93688 N93994
 Drill Date : 01/07/09

Client		Killarney Waste Disposal	
Title		MW1 – Borehole Construction	
Scale:	NTS	Project No.	1059-08
Figure	Figure 4	Rev.	A

MW2



Legend

	Bedrock		PEATY Topsoil
	Weathered Bedrock		Mottled CLAY
	Bentonite		
	Concrete		

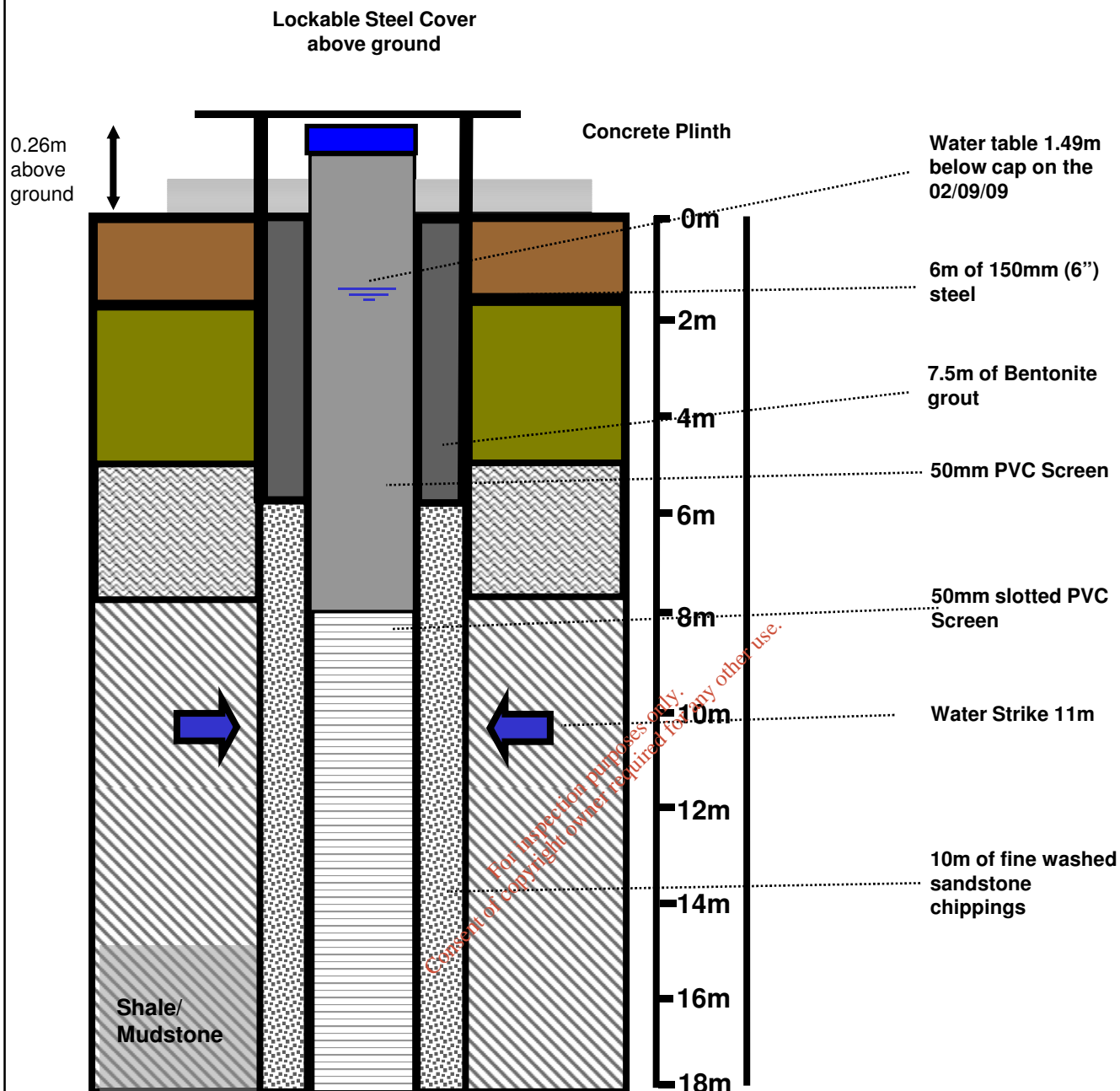


Energy, Environment & Safety
 environmental health and safety engineering project management
 © Copyright of OES Consulting, FBD House, Fels Point, Tralee, Co. Kerry,
 Tel: 353 (0)667128321 Fax: 353 (0)66 7180061 Email: info@oes.ie

Monitoring Well 2
 NGR E93639 N94024
 Drill Date : 01/07/09

Client Killarney Waste Disposal	
Title MW2 – Borehole Construction	
Scale: NTS	Project No. 1059-08
Figure Figure 5	Rev. A

MW3



Legend

	Bedrock		PEAT
	Weathered Bedrock		Mottled CLAY
	Bentonite		
	Concrete		

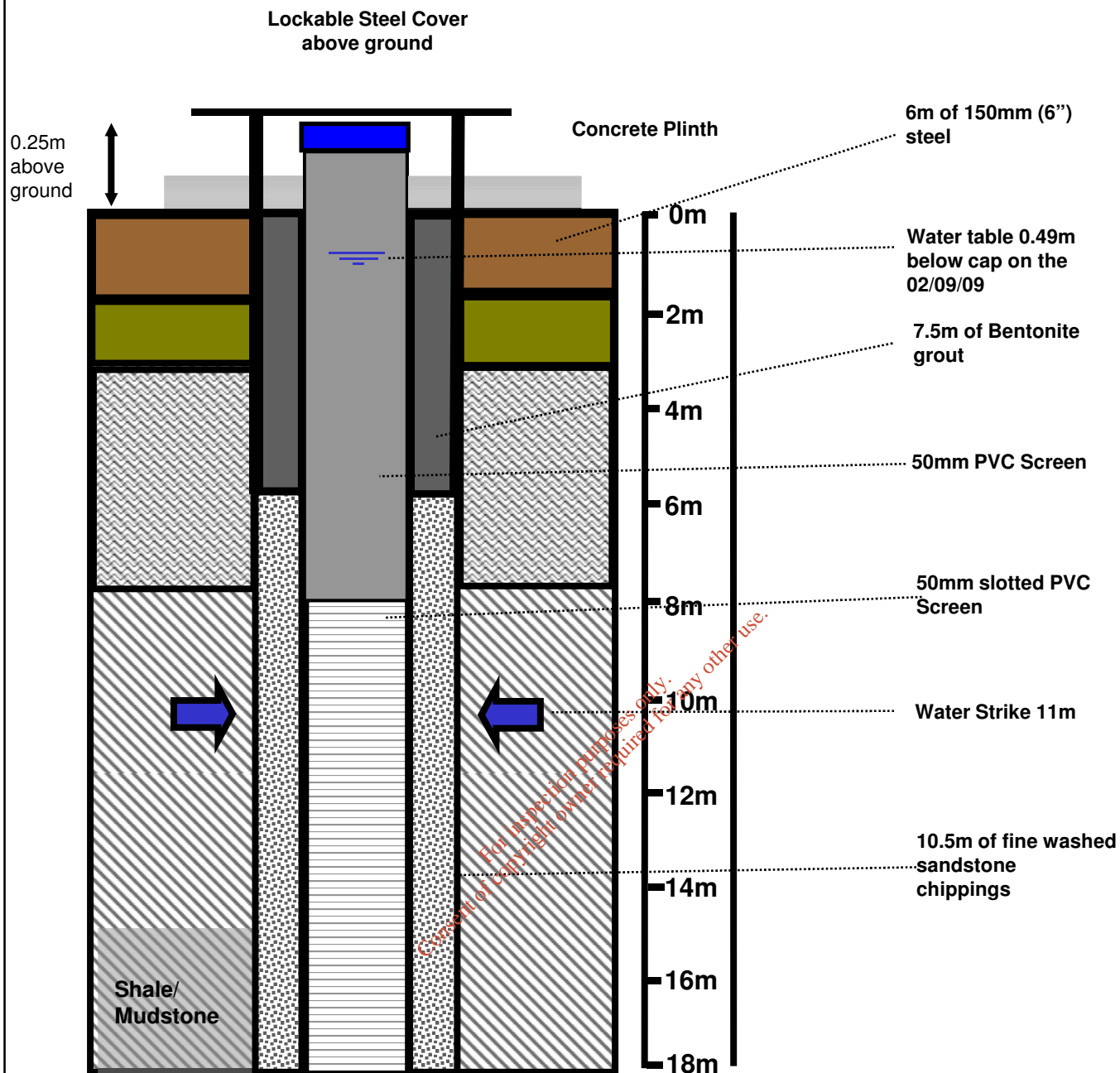


Energy, Environment & Safety
 environmental health and safety engineering project management
 © Copyright of OES Consulting, FBD House, Fels Point, Tralee, Co. Kerry,
 Tel: 353 (0)667128321 Fax: 353 (0)66 7180061 Email: info@oes.ie

Monitoring Well 3
 NGR E93546 N93931
 Drill Date : 01/07/09

Client Killarney waste Disposal .	
Title MW3- Borehole Construction	
Scale. NTS	Project No. 1059-08
Figure Figure 6	Rev. A

MW4



Legend

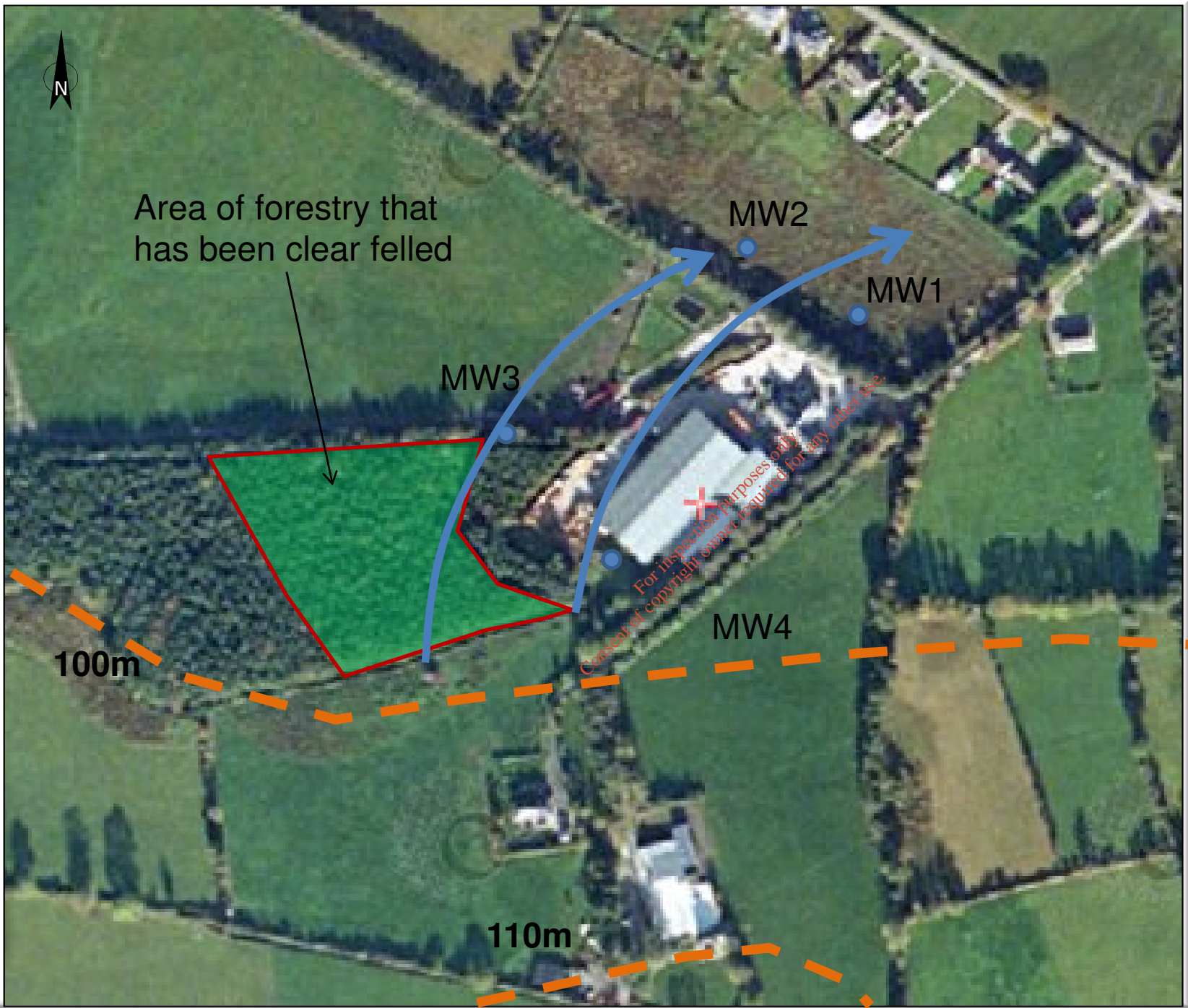
	Bedrock		PEAT
	Weathered Bedrock		Mottled CLAY
	Bentonite		
	Concrete		



Energy, Environment & Safety
 environmental health and safety engineering project management
 © Copyright of OES Consulting, FBD House, Fels Point, Tralee, Co. Kerry,
 Tel: 353 (0)667128321 Fax: 353 (0)66 7180061 Email: info@oes.ie

Monitoring Well 4
 NGR E93597 N93877
 Drill Date : 01/07/09

Client		Killarney Waste Disposal	
Title		MW4 – Borehole Construction	
Scale:	NTS	Project No.	1059-08
Figure	Figure 7	Rev.	A



- Monitoring well locations
And water level
- Contour line
- Groundwater
flow direction

Ordnance Survey of Ireland
Licence No. EN0059510
Ordnance Survey of Ireland and
Government of Ireland.

Client: Killarney Waste
Disposal
Project Code: 1059_08
Title: Aerial Photo

Drawing No: 8
Issue Date: 30/06/10
Revision: 1
Scale: See map

OES
FBD House, Fels Point,
Tralee, Co. Kerry Ireland
P: 066-712 83 21 W: oes.ie



For inspection purposes only.
Consent of copyright owner required for any other use.



Committed to your success

Attachment B

Hydrochemical results

Field parameters- 04/09/2009	Units	MW1	MW2	MW3	MW4	Drinking water limit
Depth to Water	m	0.02	0.54	1.49	0.49	
Depth of Well	m	18	19.32	18.16	19.9	
Conductivity	ug/l	649	772	544	400	2500
Total dissolved solids	ppm	325	385	272	203	
pH	pH units	7.04	7.08	7.01	6.86	6.5-9.5
Temperature	°C	10.4	10.4	10.3	10.9	
Colour	Visual inspection	Slightly milky	Slightly Milky	Milky	Black in colour	
Laboratory results						
Ammoniacal Nitrogen as (N)	mg/l	1.77	2.83	2.86	<0.2	0.3
Chloride	mg/l	22.4	24.2	20.6	24.1	250
Nitrate	mg/l	<0.0677	<0.0677	<0.0677	<0.0677	50
Sulphate	mg/l	<3.0	<3.0	<3.0	<3.0	250
Conductivity	us/cm	618	728	508	396	2500
EPH Range Organics (C10-C40) Aqueous	ug/l	<10	<10	<10	<10	

Field parameters 26/11/2009	Units	MW1	MW2	MW3	MW4	Drinking Water Limit
Depth to Water	m	0.01	0.43	1.44	0.1	
Depth of Well	m	18	19.32	18.16	19.9	
Conductivity	ug/l	649	772	556	407	2500
Total dissolved solids	ppm	325	385	278	203	
pH	pH units	7.04	7.08	6.81	6.86	6.5-9.5
Temperature	°C	10.4	10.4	10.5	10.9	
Colour	Visual inspection	Slightly milky	Slightly Milky	Milky	Black in colour	
Laboratory results						
Ammoniacal Nitrogen as (N)	mg/l	1.0	1.86	1.32	<0.2	0.3
Chloride	mg/l	23.6	24.7	21.6	24.8	250
Nitrate	mg/l	<0.0677	<0.0677	<0.0677	<0.0677	50
Sulphate	mg/l	<3.0	<3.0	<3.0	<3.0	250
Conductivity	us/cm	621	741	514	377	2500
EPH Range Organics (C10-C40) Aqueous	ug/l	<10	<10	<10	<10	

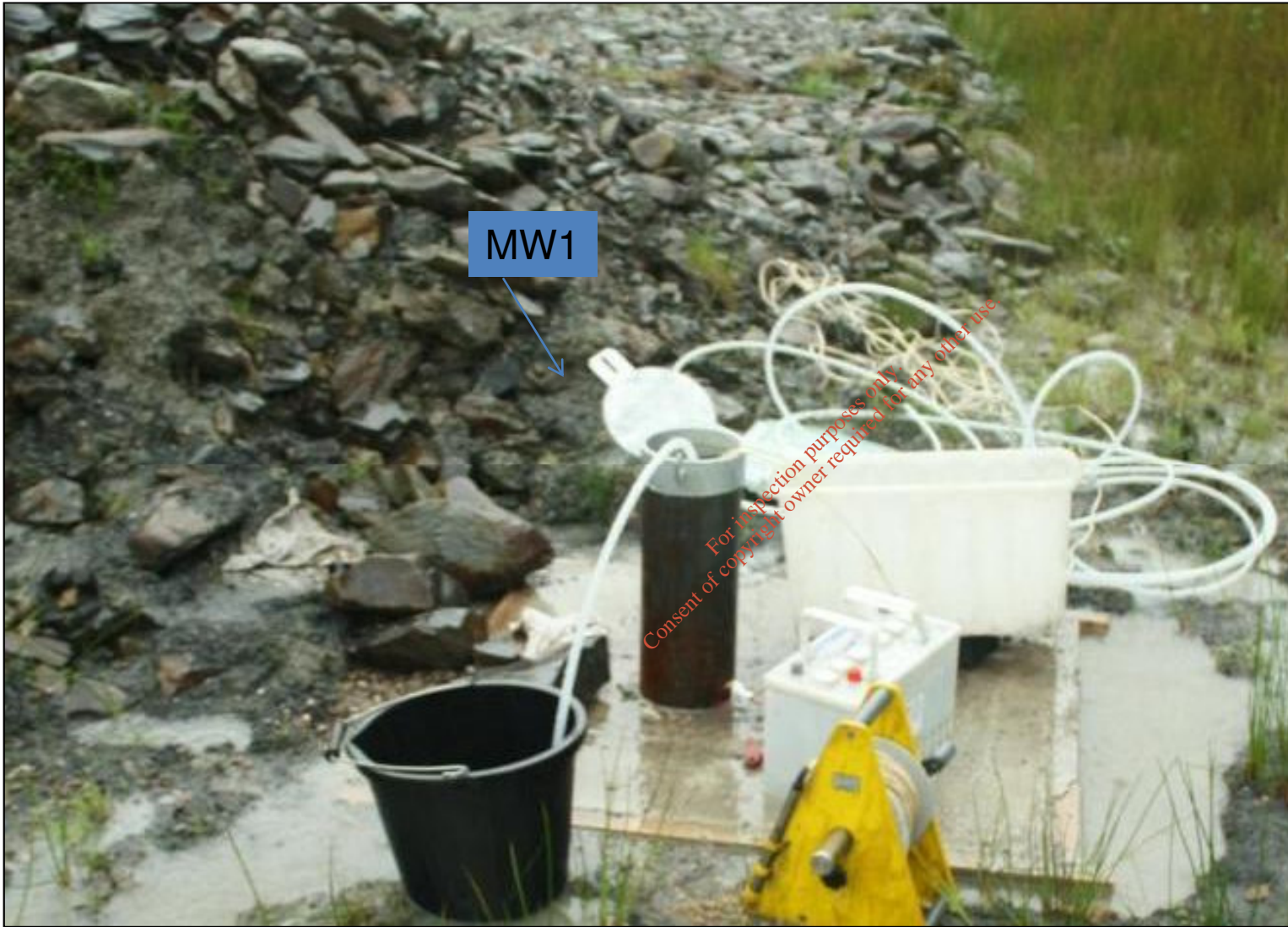
Field parameters 27/05/2010	Units	MW1	MW2	MW3	MW4	Drinking Water Limit
Depth to Water	m	0.2	0.98	1.71	0.27	
Depth of Well	m	18	19.32	18.16	19.9	
Conductivity	ug/l	663	828	583	410	2500
Total dissolved solids	ppm	336	412	286	203	
pH	pH units	6.67	6.9	6.64	6.28	6.5-9.5
Temperature	°C	10	10.5	11	11.2	
Colour	Visual inspection	Slightly milky	Slightly Milky	Milky	Milky becoming Black	
Laboratory results						
Ammoniacal Nitrogen as (N)	mg/l	0.9	0.578	2.54	<0.2	0.3
Chloride	mg/l	21.6	21.4	19.6	22.4	250
Nitrate	mg/l	<0.0677	0.0799	<0.0677	<0.0677	50
Sulphate	mg/l	<3	<3	4.4	21.9	250
Conductivity	us/cm	605	764	508	379	2500
EPH Range Organics (C10-C40) Aqueous	ug/l	<46	<46	<46	<46	

For inspection purposes only.
Consent of copyright owner required for any other use.



Attachment C

Photolog



Client: Killarney Waste Disposal
Project Code: 1059_08
Title: Photo 2

Photo No: 1
Issue Date: 03/12/09
Revision: 1

OES
FBD House, Fels Point,
Tralee, Co. Kerry Ireland
P: 066-712 83 21 W: oes.ie





Client: Killarney Waste Disposal
Project Code: 1059_08
Title: Photo 2

Photo No: 2
Issue Date: 03/12/09
Revision: 1

OES
FBD House, Fels Point,
Tralee, Co. Kerry Ireland
P: 066-712 83 21 W: oes.ie





Clear Felled forestry

MW3

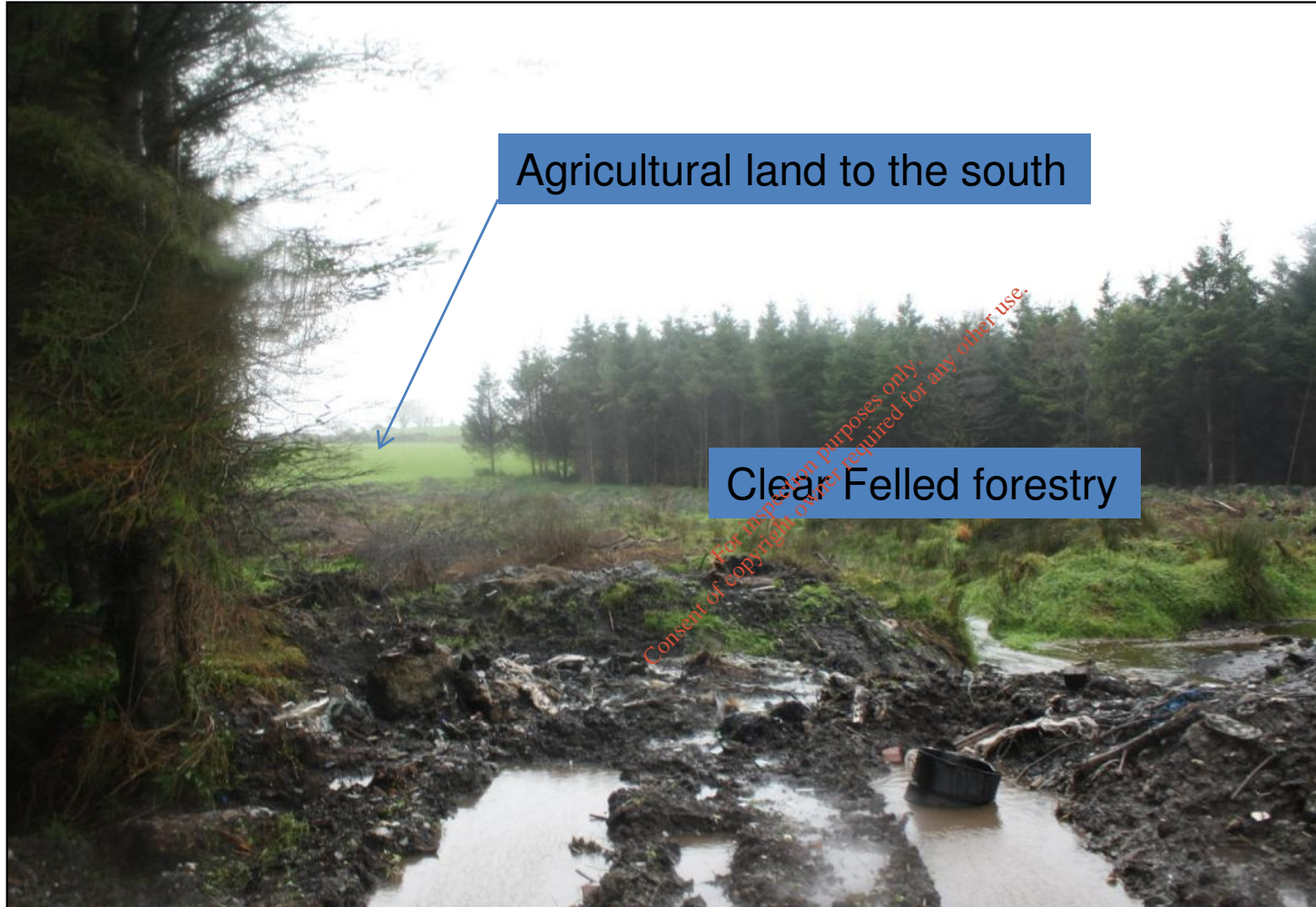
Client: Killarney Waste Disposal
Project Code: 1059_08
Title: Photo 3

Photo No: 3
Issue Date: 03/12/09
Revision: 1

OES
FBD House, Fels Point,
Tralee, Co. Kerry Ireland
P: 066-712 83 21 W: oes.ie



Energy, Environment & Safety



Agricultural land to the south

Clear Felled forestry

Client: Killarney Waste Disposal
Project Code: 1059_08
Title: Photo 4

Photo No: 4
Issue Date: 03/12/09
Revision: 1

OES
FBD House, Fels Point,
Tralee, Co. Kerry Ireland
P: 066-712 83 21 W: oes.ie



Energy, Environment & Safety



MW4

For inspection purposes only.
Content of copyright owner required for any other use.

Client: Killarney Waste Disposal
Project Code: 1059_08
Title: Photo 5

OES
FBD House, Fels Point,
Tralee, Co. Kerry Ireland
P: 066-712 83 21 W: oes.ie



For inspection purposes only.
Consent of copyright owner required for any other use.



Attachment D Bund Integrity Certificate



Energy, Environment & Safety

Bund Test Sheet- Hydrostatic and Visual Assessment

Leachate Storage Tank

Company: Killarney Waste Disposal (KWD)	Grid Reference:
Date: 02/03/09	
Bund Ref. No.: Leachate Storage Tank	Bund Type – Concrete
Bund Location: Located within the Materials recovery building	
Bund Dimensions: Unknown	Primary Vessels – Materials of Construction: N/A
Bund Materials of Construction: Bund constructed from cast concrete	Primary Vessels – Unknown- there is an active warning light that flashes once bund is nearly full. This light is working
Bund Lining Material: none- Cast Concrete Design	Primary Vessels – N/A
Bund Retention Volume (Local): 9,100L	Weather conditions- N/A
Deemed practicable/safe to conduct hydrostatic test: Yes	
If no, give reasons:	
Date of Hydrostatic test: 02/03/09	

Description and results of Hydrostatic Test:

Water was filled to 170mm of the top of the Bund. The Bund test was started at 08.00am and finished at 17.00 on the 02/03/09.

Test interval (hrs)	Depth to water	Reference depth
0-1	0.17	0.17
1-2	0.17	0.17
2-3	0.17	0.17
3-4	0.17	0.17
4-5	0.17	0.17
5-6	0.17	0.17

Pass ✓

Fail

Date of Visual Inspection: Visual inspection was undertaken on the 26/02/09

Description and Results of Visual Inspection:

The bund is located underground. The results from the bund test show that the structural integrity of the bund is sound. The warning light is working.

Recommendations: Retest in three Years and undertake regular visual assessments and inspections of the warning light.

Signed:

Eamon O'Loughlin

Title/Position:

Environmental Engineer

Date: 02/03/09

APPENDIX 2

*For inspection purposes only.
Consent of copyright owner required for any other use.*

Scartaglin GWB: Summary of Initial Characterisation.

Hydrometric Area Local Authority	Associated surface water features	Associated terrestrial ecosystem(s)	Area (km ²)
22 Kerry Co. Co.	Rivers: Fahaduff, Little Maine, Croaghane, Brown Flesk, Dogue, Quagmire, Gweestin, Laune, Deenagh, Beheenagh, Ownykeagh, Glantane, Oughreagh, Longfield, Glanateenty. Lakes: Doolig, Lockagh, Kilbrean.	Killarney National Park, Macgillycuddys Reeks and Caragh River Catchment (000365)	472
Topography	Most of this GWB is a dissected upland plateau with general elevations of 160 to 240 metres OD. Highest elevations are in the northeast at over 400 metres. Lowest elevations, in the west, are about 50 metres OD.		
Geology and Aquifers	Aquifer categories	Ll: Locally important aquifer which is moderately productive only in local zones (96%). Pu: Poor aquifer which is generally unproductive (2%). Rkd*/Pending Classification: * Where these rocks occur in other areas they are classified as Rkd. In this GWB they may be karstified but are unlikely to be regionally important due to their small size (<10km ²) – a new classification code to represent these areas is pending (2%).	
	Main aquifer lithologies	Namurian Undifferentiated (73%), Namurian Sandstones (16%), Namurian Shales (10%), Dinantian Pure Unbedded Limestones (1%) and a tiny area of Dinantian Upper Impure Limestones (<0.1%)	
	Key structures	The Namurian and Dinantian rocks have been folded by the Variscan Orogeny into a series of east-west trending anticlines and synclines, with associated systems of faults and joints which created some pathways for groundwater movement.	
	Key properties	The Namurian rocks are composed of a variety of thin sandstones, siltstones, flagstones, mudstones and shales. Hydrogeological data are poor for all formations except the Upper Namurian Beds. The sandstone beds within the rock groups have a slightly higher permeability than the shales due to their greater ability to fracture. Water levels have been recorded at depths of more than 20 m but in general the water table is close to the surface reflecting the low permeability of the rock. There are a number of artesian supplies where the sandstone beds are confined by the shales and mudstones. Wells are generally low yielding although some have recorded yields of more than 100 m ³ /d. Specific capacities are usually low being less than 5 m ³ /m.	
	Thickness	The rock units themselves are extremely thick, but the depth of active groundwater circulation is probably limited to about 120 metres. The sole exception to this is the groundwater system in the Gneevgullia limestone aquifer, where a spring water temperature of up to 17 degrees Celsius implies groundwater circulation down to at least 500 metres.	
Overlying Strata	Lithologies	<i>Subsoil Types identified in Scartaglin GWB by Teagasc Parent Material Mapping (Draft): Alluvium (A); Blanket Peat (BktPt); Karstified Limestone bedrock at surface (KaRck); Lake sediments (undifferentiated) (L); Made Ground (Made); Rock outcrop and rock close to surface (Rck); Till – Devonian Sandstone Till (TDSs), Limestone Till (TLs), Namurian Sandstone & Shale Till (TNSSs).</i> Large areas of peat occur as blanket bogs on the higher ground in the west on the poorly drained Namurian shales and sandstones.	
	Thickness	Depth to bedrock has not been mapped in this GWB.	
	% area aquifer near surface		
	Vulnerability	Vulnerability has not been mapped in this GWB. Namurian till is classed as having a low permeability as, although in some areas it has a stony matrix, there is still generally a high clay content due to the weathering of shale clasts.	
Recharge	Main recharge mechanisms	Apart from the tiny area of karstic limestone around Gneevgullia, there are no aquifers with regional flow systems which might include losing streams, so recharge will be diffuse, from rainfall percolating through the subsoil or areas of outcropping rock. The proportion of the effective rainfall that will recharge the aquifer is determined by the permeability of the soil and subsoil, and by the slope.	
	Est. recharge rates	To be assessed.	

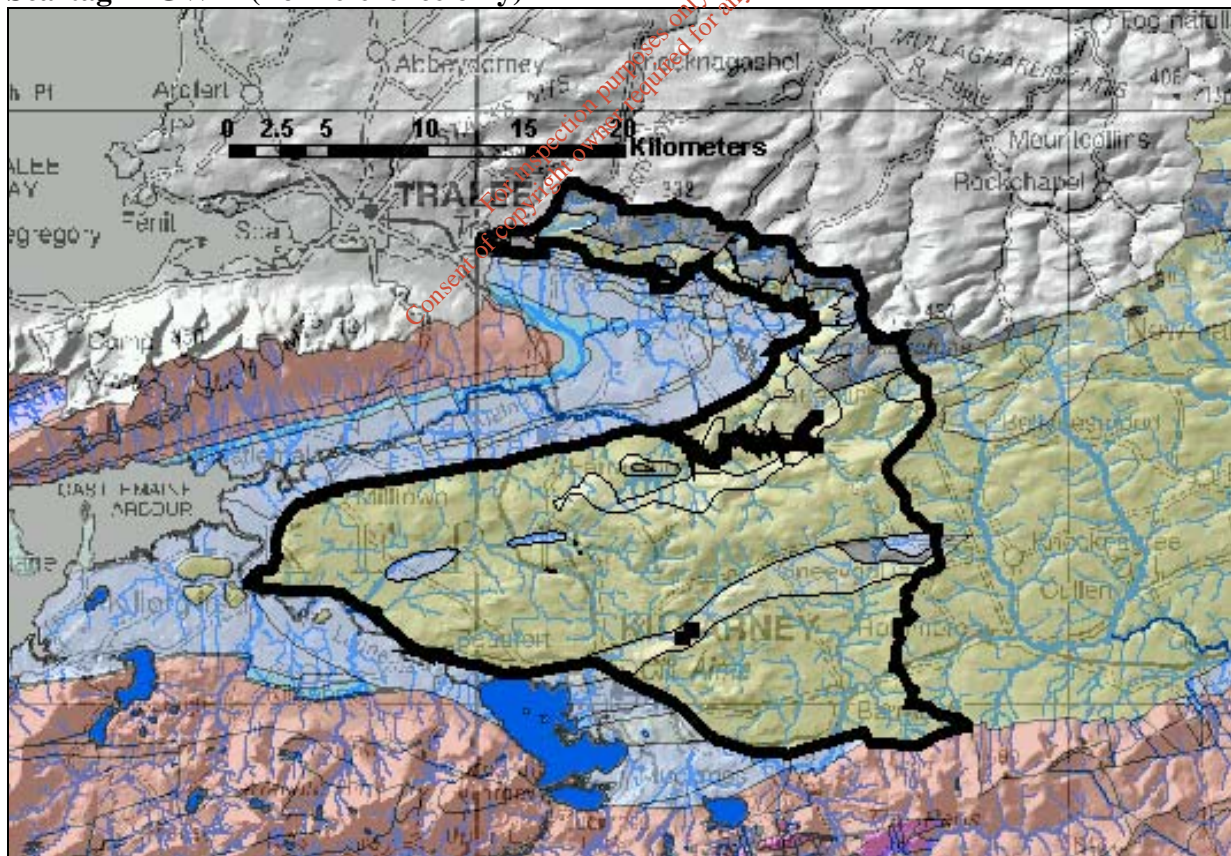
1st Draft Scartaglin GWB Description –.....2004

Discharge	Large springs and high yielding wells (m³/d)	<p><i>Note: The following data need to be checked and updated by RBD Project Consultants.</i></p> <p>Data from GSI Well Database:</p> <p>Excellent BHs: Scrahanaveal (436 m³/d) Cordal East (641 m³/d)</p> <p>Good BHs: Beheenagh (218 m³/d) Gortacappul (218 m³/d) Tullagubbeen (164 m³/d) Kilcummin GWSS (>100 m³/d) Ballyhar Creamery (190 m³/d)</p> <p>Springs: Gneevgullia WSS (545 m³/d) = abstraction rate, (intermediate yield) NB: This warm spring issues from a small karstic limestone unit and represents in part a deeper groundwater system, although at times it also includes shallow cold water. Coolcorcan Spring (455 m³/d)= abstraction rate, (intermediate yield)</p> <p>Additional data from EPA Groundwater Sources List:</p>
	Main discharge mechanisms	<p>Due to the generally low permeability of the aquifers within this GWB and the high slopes, a high proportion of the recharge will discharge rapidly to surface watercourses via the upper layers of the aquifer, effectively reducing the available groundwater resource in the aquifer.</p>
	Hydrochemical Signature	<p>The hydrochemical signature is Calcium Bicarbonate, and the water is generally soft to slightly hard (<150 mg/l as CaCO₃). The pH ranges between 5.5 and 8; low pH (<6.5) is quite a common problem. The main groundwater quality problems due to the natural conditions in the ground and the natural chemistry of groundwater are caused by iron (Fe). A high proportion of wells in the Namurian rocks have high iron concentrations and to a lesser extent manganese (Mn). Nitrate levels do not appear to be elevated much above background.</p>
Groundwater Flow Paths	<p>These rocks have no intergranular permeability; groundwater flow occurs in fractures and faults. Permeability is highest in the upper few metres but generally decreases rapidly with depth. In general, groundwater flow is concentrated in the upper 15 m of the aquifer, although deeper inflows from along fault zones or connected fractures can be encountered. Significant yields can be obtained where boreholes are drilled into known fault zones. However, yields are not necessarily sustainable, as the fracture networks are generally not extensive or well connected but primarily concentrated in the vicinity of the fault zones. Springs occur in some instances on fault zones. Groundwater levels are about 1.5-15 m below ground level, and will generally follow the topography. Close to the rivers and streams, water levels will be near ground level. Surface water features are considered to be in hydraulic continuity with the water table. Groundwater flow will be local. Groundwater flow paths are generally short, typically 30-300 m, with groundwater discharging to small springs, or to the streams and rivers that traverse the aquifer. Flow directions are expected to approximately follow the local surface water catchments. Groundwater is generally unconfined.</p>	
Groundwater & Surface water interactions	<p>Groundwater will discharge locally to streams and rivers crossing the aquifer and also to small springs and seeps. Owing to the poor productivity of the aquifers in this body it is unlikely that any major groundwater - surface water interactions occur. Baseflow to rivers and streams is likely to be relatively low.</p> <p><i>Carraundulkeen Quarry Spring (Gneevgullia WSS) is an exception to this general picture, and represents (in part) a different flow system in a karstic limestone aquifer at depth.</i></p>	

1st Draft Scartaglin GWB Description –.....2004

Conceptual model	<ul style="list-style-type: none"> • The groundwater body is bounded to the east and south by the topographic high and surface water divide which forms the boundary with Rathmore and other GWBs. • The topography of this body is mainly upland, with ground level rising from about 50 metres OD to the highest elevations of 400 metres OD on the catchment boundary. • The groundwater body is comprised of rocks with low transmissivity and storativity, although localised zones of enhanced permeability occur along fault zones. • Flow occurs along fractures, joints and major faults. Flows in the aquifer are generally concentrated in a thin zone at the top of the rock, although deeper groundwater flows along faults and major fractures. • Diffuse recharge occurs across the GWB through the subsoils and rock outcrops. Due to the generally low permeability of the aquifers within this GWB and the high slopes, a high proportion of effective rainfall will runoff, or discharge rapidly to surface water courses via interflow and shallow flow. Where water levels within the unconfined aquifer are high, potential recharge will also be rejected. • The water table can vary between a few metres up to more than 10 m below ground surface, depending upon topography. Groundwater is generally unconfined. Flow path lengths are generally short, ranging 30-300 m. Local groundwater flow directions are controlled by local topography. Overall, groundwater flows to south and east from the topographic highs. • Groundwater discharges to the numerous streams and rivers crossing the aquifer, which are gaining, and to springs. A small volume of groundwater may cross-flow into the adjacent GWBs.
Attachments	Hydrochemical Signature (Figure 1); Groundwater Hydrograph (Figure 2)
Instrumentation	Stream gauges: 22002, 22029, 22033, 22043, 22044, 22045, 22046. EPA Water Level Monitoring boreholes: Kilcummin GWS (KER 41) EPA Representative Monitoring points: Quirke's Sand Pit (Killarney) (KER 112)
Information Sources	Pracht M (1997) <i>Geology of Kerry-Cork: a geological description, to accompany bedrock geology 1:100,000 scale map, Sheet 21, Kerry - Cork</i> . Geological Survey of Ireland. 70pp
Disclaimer	Note that all calculation and interpretations presented in this report represent estimations based on the information sources described above and established hydrogeological formulae.

Scartaglin GWB (For reference only)



List of Rock units in Scartaglin GWB

Rock unit name and code	Description	Rock unit group	Aquifer Classification
<i>Ballydeenlea Formation (BL) –three tiny areas</i>	<i>White fine-grained limestone breccia</i>	<i>Cretaceous</i>	<i>Ll (as surrounding rocks)</i>
Namurian (undifferentiated) (NAM)	Black shale & sandstone	Namurian Undifferentiated	Ll
Feale Sandstone Formation (FS)	Sandstone, siltstone & shale	Namurian Sandstones	Ll
Glenoween Shale Formation (GN)	Grey silty mudstone	Namurian Shales	Ll
Cloone Flagstone Formation (CF)	Greywacke, siltstone & silty shale	Namurian Sandstones	Ll
Clare Shale Formation (CS)	Mudstone, cherty at base	Namurian Shales	Pu
Dinantian limestones (undifferentiated) (DIN)	Undifferentiated limestone	Dinantian Pure Unbedded Limestones	<i>Rk^d*/Pending Classification</i>
Dirtoge Limestone Formation (DI)	Bioclastic cherty grey limestone	Dinantian Upper Impure Limestones	Ll
Cracoean Reef Member (CLcr)	Unbedded calcilutite limestone	Dinantian Pure Unbedded Limestones	<i>Rk^d*/Pending Classification</i>

For inspection purposes only.
 Consent of copyright owner required for any other use.

APPENDIX 3

*For inspection purposes only.
Consent of copyright owner required for any other use.*



Project-information

Project name:
KWD Rcycling

Contract number:
1402

Contact:
Sean Murphy

Date:
13/05/2014

Client **KWD Rcycling**
 Contact: **Sean Murphy**
 Position: **Managing Director**
 Road
 Town **Killarney**
 County
 Telephone:
 Fax:
 Mobile:
 E-Mail:

Site **KWD Rcycling**
 Contact: **Sean Murphy**
 Position: **Managing Director**
 Road
 Town **Killarney**
 County
 Telephone:
 Fax:
 Mobile:
 E-Mail:

For inspection purposes only.
 Consent of copyright owner required for any other use.

Contractor **Irish Drain services**
 Contact: **Mary B Teehan**
 Position: **M.D**
 Road **Tralee Rd.**
 Town **Farranfore**
 County **Co.Kerry**
 Telephone: **00353669763070**
 Fax:
 Mobile: **0868290839**
 E-Mail: **info@irishdrainservices.ie**



Defect Grade Description

Project name:
KWD Recycling

Contract number:
1402

Contact:
Sean Murphy

Date:
13/05/2014

1:

Brick: No Structural Defects
 Pipe: No Structural Defects

Acceptable Structural Condition

2:

Brick: Minor cracking, Surface mortar loss, Spalling slight, wear slight
 Pipe: Circumfrential crack, Moderate joint defects, Spalling slight, Wear slight

Minor collapse risk in short term but potential for further deterioration

3:

Brick: Total mortarloss without other defects, single brick displaced, Deformation up to 5%, Spalling medium, Wear medium
 Pipe: Fractures with deformation up to 5%, Longitudinal cracking or mulitple cracking, Minor loss of level, More severe joint defects, Spalling medium, Wear medium

! Collapse unlikely in near future but future deterioration likely !

4:

Brick: Total mortarloss with deformation greater than 10%, Deformation up to 10% and fractured, Displaced/hanging brickwork, Small number of missing bricks
 Pipe: Broken, Deformation up to 10% and broken,, Fractured with deformation 5 - 10%, Multiple fractures, Serious loss of level, spalling large, wear large

!! Collapse likely in foreseeable future !!

5:

Brick: Already Collapsed, Missing invert, Deformation over 10% and fractured, Displaced/hanging brickwork and deformation over 10%, Extensive missing bricks
 Pipe: Already collapsed, Deformation over 10% and broken, Extensive areas of fabric missing, Fractured with deformation over 10%

!!! Collapsed or collapse imminent !!!



Inspection report

Date: 13/05/2014	Job N°: 1402	Weather: Showers	Operator: Danny	section number: 1	PLR: F1B X
Present:	Vehicle: Mercedes Vito	Camera: Pearpoint Crawler	Preset:	Cleaned: Yes	Grade:

Road: KWD Recycling	Division:	start MH: F1
Place: Killarney	District:	end MH: F1A
Location:	Tape No.: DVD	Total length: 2.1 m

Purpose:	Shape/Size: Circular dia 150 mm
Use: Foul	Material: Polyvinyl chloride Pipe length: 6m
Catchment:	Lining:
	Category:

Comment:
 Location details:

1:25	position	code	observation	MPEG	photo	grade
			F1			
	0.00	ST	Start of Survey	00:00:00		0
	0.00	MH	Manhole Remark: F1A	00:00:00		0
	0.00	WL	Water level, 0 % height/diameter	00:00:00	3_3a	0
	1.80	DC	Dimension of sewer changes, new dimension dia 100 mm	00:00:00	4_4a	0
	2.10	MH	Manhole Remark: F1A	00:00:00	5_5a	0
	2.10	FH	Finish Survey	00:00:00		0
			F1A			



For inspection purposes only.
 Consent of copyright owner required for any other use.



Inspection report

Date: 13/05/2014	Job N°: 1402	Weather: Showers	Operator: Danny	section number: 2	PLR: F1B X
Present:	Vehicle: Mercedes Vito	Camera: Pearpoint Crawler	Preset:	Cleaned: Yes	Grade:

Road: KWD Recycling	Division:	start MH: F1A
Place: Killarney	District:	end MH: F1B
Location:	Tape No.: DVD	Total length: 1 m

Purpose:	Shape/Size: Circular dia 150 mm
Use: Foul	Material: Polyvinyl chloride Pipe length: 6m
Catchment:	Lining:
	Category:

Comment:
 Location details:

1:25	position	code	observation	MPEG	photo	grade
	0.00	ST	Start of Survey	00:00:00		0
	0.00	MH	Manhole Remark: F1A	00:00:00		0
	0.00	WL	Water level, 0 % height/diameter	00:00:00	9_3a	0
	0.50	WL	Water level, 5 % height/diameter	00:00:00	2_4a	0
	1.00	MH	Manhole Remark: F1B	00:00:00	12_5a	0
	1.00	FH	Finish Survey	00:00:00		0

For inspection purposes only.
 Consent of copyright owner required for any other use.



Inspection report

Date: 13/05/2014	Job N°: 1402	Weather: Showers	Operator: Danny	section number: 3	PLR: F1C X
Present:	Vehicle: Mercedes Vito	Camera: Pearpoint Crawler	Preset:	Cleaned: Yes	Grade:

Road: KWD Recycling	Division:	start MH: F1B
Place: Killarney	District:	end MH: F1C
Location:	Tape No.: DVD	Total length: 0.8 m

Purpose:	Shape/Size: Circular dia 150 mm
Use: Foul	Material: Polyvinyl chloride Pipe length: 6m
Catchment:	Lining:
	Category:

Comment:
 Location details:

1:25	position	code	observation	MPEG	photo	grade
	0.00	ST	Start of Survey	00:00:00		0
	0.00	MH	Manhole Remark: F1B	00:00:00		0
	0.00	WL	Water level, 5 % height/diameter	00:00:00	16_3a	0
	0.80	MH	Manhole Remark: F1C. Top of line	00:00:00	17_4a	0
	0.80	FH	Finish Survey	00:00:00		0

For inspection purposes only.
 Consent of copyright owner required for any other use.



Inspection report

Date: 13/05/2014	Job N°: 1402	Weather: Showers	Operator: Danny	section number: 4	PLR: F1 X
Present:	Vehicle: Mercedes Vito	Camera: Pearpoint Crawler	Preset:	Cleaned: Yes	Grade:

Road: KWD Recycling	Division:	start MH: F1
Place: Killarney	District:	end MH: F2
Location:	Tape No.: DVD	Total length: 5.7 m

Purpose:	Shape/Size: Circular dia 150 mm
Use: Foul	Material: Polyvinyl chloride Pipe length: 6m
Catchment:	Lining:
	Category:

Comment:
 Location details:

1:50	position	code	observation	MPEG	photo	grade
	0.00	ST	Start of Survey	00:00:00		0
	0.00	MH	Manhole Remark: F1	00:00:00		0
	0.00	WL	Water level, 0 height/diameter	00:00:00	21_3a	0
	0.60	CN	Connection, at 02 o'clock, dia 100 mm	00:00:00	22_4a	0
	1.20	CN	Connection, at 02 o'clock, dia 100 mm	00:00:00	23_5a	0
	3.90	CN	Connection, at 02 o'clock, dia 100 mm	00:00:00	24_6a	0
	4.70	CN	Connection, at 02 o'clock, dia 100 mm	00:00:00	25_7a	0
	5.70	MH	Manhole Remark: F2	00:00:00	26_8a	0
	5.70	FH	Finish Survey	00:00:00		0

For inspection purposes only.
 Consent of copyright owner required for any other use.



Inspection report

Date: 13/05/2014	Job N°: 1402	Weather: Showers	Operator: Danny	section number: 5	PLR: F2 X
Present:	Vehicle: Mercedes Vito	Camera: Pearpoint Crawler	Preset:	Cleaned: Yes	Grade:

Road: KWD Recycling	Division:	start MH: F2
Place: Killarney	District:	end MH: F3
Location:	Tape No.: DVD	Total length: 21 m

Purpose:	Shape/Size: Circular dia 150 mm
Use: Foul	Material: Polyvinyl chloride Pipe length: 6m
Catchment:	Lining:
	Category:

Comment:
 Location details:

1:175	position	code	observation	MPEG	photo	grade
			F2			
	0.00	ST	Start of Survey	00:00:00		0
	0.00	MH	Manhole Remark: F2	00:00:00		0
	0.00	WL	Water level, 0 % height/diameter	00:00:00	30_3a	0
	1.40	WL	Water level, 5 % height/diameter	00:00:00	31_4a	0
	6.90	WL	Water level, 0 % height/diameter	00:00:00	32_5a	0
	21.00	MH	Manhole Remark: F3	00:00:00	33_6a	0
	21.00	FH	Finish Survey	00:00:00		0
			F3			

For inspection purposes only.
 Consent of copyright owner required for any other use.



Inspection report

Date: 13/05/2014	Job N°: 1402	Weather: Showers	Operator: Danny	section number: 6	PLR: F3 X
Present:	Vehicle: Mercedes Vito	Camera: Pearpoint Crawler	Preset:	Cleaned: Yes	Grade:

Road: KWD Recycling	Division:	start MH: F4
Place: Killarney	District:	end MH: F3
Location:	Tape No.: DVD	Total length: 8.9 m

Purpose:	Shape/Size: Circular dia 150 mm
Use: Foul	Material: Polyvinyl chloride Pipe length: 6m
Catchment:	Lining:
	Category:

Comment:
 Location details:

1:75	position	code	observation	MPEG	photo	grade
			F4			
	0.00	ST	Start of Survey	00:00:00		0
	0.00	MH	Manhole Remark: F4	00:00:00		0
	0.00	WL	Water level, 0 % height/diameter	00:00:00	37_3a	0
	4.70	WL	Water level, 5 % height/diameter	00:00:00	38_4a	0
	6.70	WL	Water level, 0 % height/diameter	00:00:00	39_5a	0
	8.90	MH	Manhole Remark: F3	00:00:00	40_6a	0
	8.90	FH	Finish Survey	00:00:00		0
			F3			

For inspection purposes only.
 Consent of copyright owner required for any other use.



Inspection report

Date: 13/05/2014	Job N°: 1402	Weather: Showers	Operator: Danny	section number: 7	PLR: F4 X
Present:	Vehicle: Mercedes Vito	Camera: Pearpoint Crawler	Preset:	Cleaned: Yes	Grade:

Road: KWD Recycling	Division:	start MH: F5
Place: Killarney	District:	end MH: F4
Location:	Tape No.: DVD	Total length: 10.2 m

Purpose:	Shape/Size: Circular dia 150 mm
Use: Foul	Material: Polyvinyl chloride Pipe length: 6m
Catchment:	Lining:
	Category:

Comment:
 Location details:

1:75	position	code	observation	MPEG	photo	grade
	0.00	ST	Start of Survey	00:00:00		0
	0.00	MH	Manhole Remark: F5	00:00:00		0
	0.00	WL	Water level, 0 % height/diameter	00:00:00	44_3a	0
	10.20	MH	Manhole Remark: F4	00:00:00	45_4a	0
	10.20	FH	Finish Survey	00:00:00		0

For inspection purposes only.
 Consent of copyright owner required for any other use.



Inspection report

Date: 13/05/2014	Job N°: 1402	Weather: Showers	Operator: Danny	section number: 8	PLR: F6 X
Present:	Vehicle: Mercedes Vito	Camera: Pearpoint Crawler	Preset:	Cleaned: Yes	Grade:

Road: KWD Recycling	Division:	start MH: F4
Place: Killarney	District:	end MH: F6
Location:	Tape No.: DVD	Total length: 6.3 m

Purpose:	Shape/Size: Circular dia 150 mm
Use: Foul	Material: Polyvinyl chloride Pipe length: 6m
Catchment:	Lining:
	Category:

Comment:

Location details:

1:50	position	code	observation	MPEG	photo	grade
			F4			
	0.00	ST	Start of Survey	00:00:00		0
	0.00	MH	Manhole Remark: F4	00:00:00		0
	0.00	WL	Water level, 0 % height/diameter	00:00:00	49_3a	0
			Consent of copyright owner required for any other use.			
	5.20	CN	Connection, at 03 o'clock, dia 100 mm	00:00:00	50_4a	0
	6.30	DC	Dimension of sewer changes, new dimension dia 100 mm	00:00:00	51_5a	0
	6.30	MH	Manhole Remark: F6	00:00:00	52_6a	0
	6.30	FH	Finish Survey	00:00:00		0
			F6			



Inspection report

Date: 13/05/2014	Job N°: 1402	Weather: Showers	Operator: Danny	section number: 9	PLR: INTC Line X
Present:	Vehicle: Mercedes Vito	Camera: Pearpoint Crawler	Preset:	Cleaned: Yes	Grade:

Road: KWD Recycling	Division:	start MH: INTC Line
Place: Killarney	District:	end MH: Downstream
Location:	Tape No.: DVD	Total length: 30 m

Purpose:	Shape/Size: Circular dia 150 mm
Use: Foul	Material: Polyvinyl chloride Pipe length: 6m
Catchment:	Lining:
	Category:

Comment:
 Location details:

1:225	position	code	observation	MPEG	photo	grade
			INTC Line			
	0.00	ST	Start of Survey	00:00:00		0
	0.00	MH	Manhole Remark: INTC Line	00:00:00		0
	0.00	CU	Camera Underwater	00:00:00		0
			Downstream			
	30.00	GO	Camera could not continue	00:00:00		0
	30.00	FH	Finish Survey	00:00:00		0

For inspection purposes only.
 Consent of copyright owner required for any other use.



KWD Recycling
Aghacurreen, Killarney, Co. Kerry

Bund Integrity Inspections
In compliance with condition 3.11.5 of Waste
Licence W0217-01

*For inspection purposes only.
Consent of copyright owner required for any other use.*

May 2016



Client: - KWD Recycling Ltd, Aughacurreen, Killarney, County Kerry

Address of Facility: - Aughacurreen, Killarney, County Kerry

Townland: - Aughacurreen

ITM Coordinates: - E 493640, N 593990

Date of Report: - May 2016

Revision No: - 01

Prepared by: - **Donal Moynihan BE, C. Eng, M.IEI,**
CHARTERED ENGINEER,
Donal Moynihan Consulting Engineers Ltd,
Boolacullane,
Farranfore,
Co. Kerry
V93 XN22

*For inspection purposes only.
Consent of copyright owner required for any other use.*



INTRODUCTION

Donal Moynihan Consulting Engineers Ltd has been employed by KWD Recycling to carry out visual inspections and 24 Hour Hydrostatic integrity tests on the bunded areas within the waste facility at Aughacurreen.

The tests are to be carried out to ensure compliance with condition 3.11.5 of Waste Licence W0217-01

The bunded areas which were assessed during the inspections can be identified as follows:-

- Sump 1 Leachate Sump located internally within the materials recovery facility
- Sump 2 Near Office area
- Sump 3 Near Timber Shredder
- Sump 4 Oil Bund
- Sump 5 Oil Water Interceptor near Diesel Shed

Locations of the individual Sumps are shown on enclosed site layout plan in Appendix A

*For inspection purposes only.
Consent of copyright owner required for any other use.*



METHODOLOGY

The following describes the methodology used to assess the integrity of the bunds.

The bund integrity tests were performed in accordance with the Environmental Protection Agency (EPA) guidelines '*The Storage and Transfer of Materials for Scheduled Activities*' (2004) which provides guidance for the inspection and testing of bund structures.

The main guidelines are:

- The sealed surface providing the retention must be impermeable to the liquid being retained. This applies also to any connecting elements, such as pipes, penetrating the structure, the sealing of which must provide the same level of retention as the bund itself;
- There must be no adverse chemical reaction that could occur between different liquids in a bund that would impact on the integrity of the bund or the safety of personnel in its vicinity;
- In general bund walls should not exceed 1.5 m in height so that:
 - Fire-fighting operations are not hindered
 - Egress from a bunded area in event of an emergency is relatively easy.
 - Natural ventilation of the bunded area is encouraged.
- It is important that, where practicable, pumps, valves, couplings, delivery nozzles and other items associated with the operation of a tank are located inside the bund, although health and safety implications must be taken into account where pumps and other electrical equipment operate in bunds where flammable vapours may collect.
- Items not connected with the operation of the tanks should not be located within the bunded area;
- The overflow vent from a storage tank being overfilled should be contained within the bund;
- It is strongly recommended that all pipe work leading to or from tanks within a bund is routed over the top of the bund in order to avoid the need to breach the walls;
- Bunds may be filled with liquid in event of a spillage or may be deliberately filled with liquid during testing; electrical equipment should therefore ideally be placed above the maximum liquid height or designed for submersion;
- Bulk chemical storage bunds should be designed to contain 110% of the capacity of the largest storage vessel located within the bund;
- Bund design should take into account the capture of spigot flow from ruptured tanks;
- Valved drainage from bunds should be avoided;
- Individual bunding is preferred to common bunding;

Where two or more tanks are installed within the same bund, the recommended capacity of the bund is the greater of:

- 110% of the capacity of the largest tank within the bund, or
- 25% of the total capacity of all of the tanks within the bund, except

Where tanks are hydraulically linked in which case they should be treated as if they were a single tank



SITE INSPECTION

A preliminary site visit was arranged on the 17th of May 2016 to perform a visual inspection of the bunds and to ensure the bunds were filled for a 24-hour period. Two of the bunds (Oil bund, Leachate tank) were both roofed and hence protected from rainwater ingress. The other areas were covered for the 24 hour period to ensure no rain water entered.

Photographs were taken of the bunds and are enclosed in Appendix B.

Before the bunds were filled with water to test for water tightness and any possible leaks, the following potential defects were looked for around each of the bunds:

- **Holes for Pipes:** All holes in bunds to facilitate pipes have been properly plugged.
- **Electrical Equipment:** None of the bunds on site have electric equipment devices inside the bund that need to be raised for a bund integrity assessment.
- **Tank Retention:** Care was taken that any tanks partially emerged by the test water would not float. To guard against this any tank that would be partially submerged during the test was filled.
- **Other Defects:** All debris and spillages were removed from bunds before the bund integrity assessment.

The effective capacities of the bunds, where applicable, were also calculated at this stage.

The bunds were generally filled to 150mm from the top of the bund on the 17th of May and the level of the water was monitored to allow for adsorption by the concrete of the water. The bunds were then topped up and checked after a 24 Hour period. On the 18th of May the Inspections were undertaken.

Weather conditions were good for the test, calm day with light showers. All the bunding integrity tests were carried out simultaneously over a twenty four hour period. Containers were placed near the bunds to determine the evaporation rate of the water, (i.e. four separate containers were filled with water to a level of 30mm and were monitored over the testing period to calculate relative rates of evaporation and rainfall ingress).



RESULT OF INTEGRITY TESTS

All bunds tested were found to be without defects. No leakage was observed from any of the bunds and sumps tested. Allowing for the ingress of rainfall there was no drop in water level recorded across the site.

After the test was complete all bunds were emptied. The test showed that the walls were impervious to water and could adequately retain the required volume without danger of leakage or collapse. Therefore the bunds on-site conform to Condition 3.11.5 of the Waste licence W0217-01.

A summary of the findings of the visual and hydrostatic tests are provided below. Copies of the test record sheets in Accordance with EPA Guidance Note on Storage & Transfer of Materials for Scheduled Activities are enclosed as Appendix C.

SUMMARY OF RESULTS

SUMP NUMBER	Date of Testing	Result	Comment
Sump No.1 (Leachate Sump)	17/5/2016-18/5/2016	Passed	Reinforced Concrete in good condition.
Sump No.2 (Near Office)	17/5/2016-18/5/2016	Passed	Reinforced Concrete in good condition.
Sump No.3 (Near Timber Shed)	17/5/2016-18/5/2016	Passed	Reinforced Concrete in good condition.
Sump No.4 (Oil Bund)	17/5/2016-18/5/2016	Passed	Reinforced Concrete in good condition.
Sump No.5 (Oil/Water Interceptor near Diesel Shed)	17/5/2016-18/5/2016	Passed	Reinforced Concrete in good condition.

For inspection purposes only. Consent of copyright owner required for any other use.



APPENDICES

- Appendix A** Site Layout showing positions of Bunds/Sumps tested
- Appendix B** Photographic Record
- Appendix C** Record Sheets of Bund Tests

*For inspection purposes only.
Consent of copyright owner required for any other use.*

Appendix A Site Layout showing positions of Bunds/Sumps tested

For inspection purposes only.
Consent of copyright owner required for any other use.

Appendix B Photographic Record

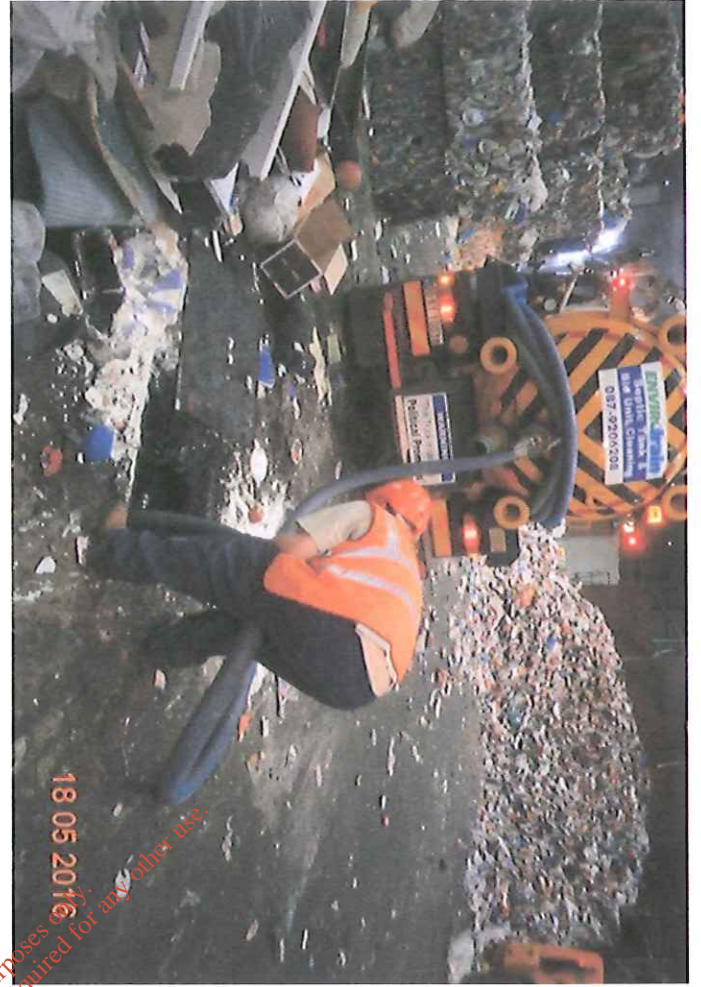
*For inspection purposes only.
Consent of copyright owner required for any other use.*

Sump 1

For inspection purposes only.
Consent of copyright owner required for any other use.



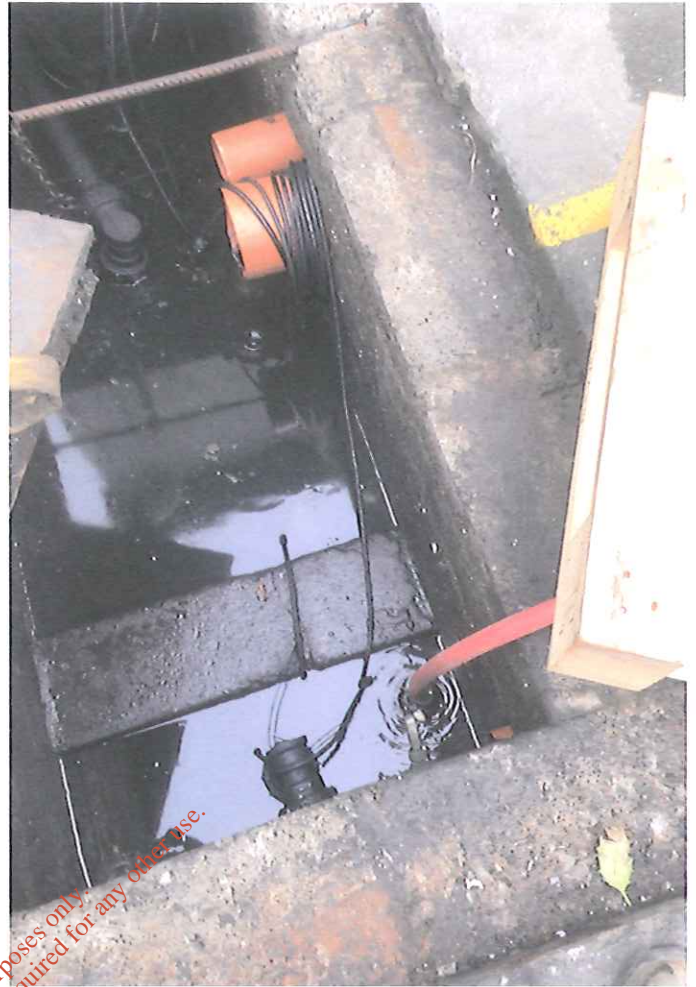
For inspection purposes only
Consent of copyright owner required for any other use



For inspection purposes
Consent of copyright owner required for any other use
18 05 2016

Sump 2

For inspection purposes only.
Consent of copyright owner required for any other use.



For inspection purposes only.
Consent of copyright owner required for any other use.



For inspection purposes only.
Consent of copyright owner required for any other use.

Sump 3

For inspection purposes only.
Consent of copyright owner required for any other use.



For inspection purposes only.
Consent of copyright owner required for any other use.

18 05 2016

Sump 4

For inspection purposes only.
Consent of copyright owner required for any other use.



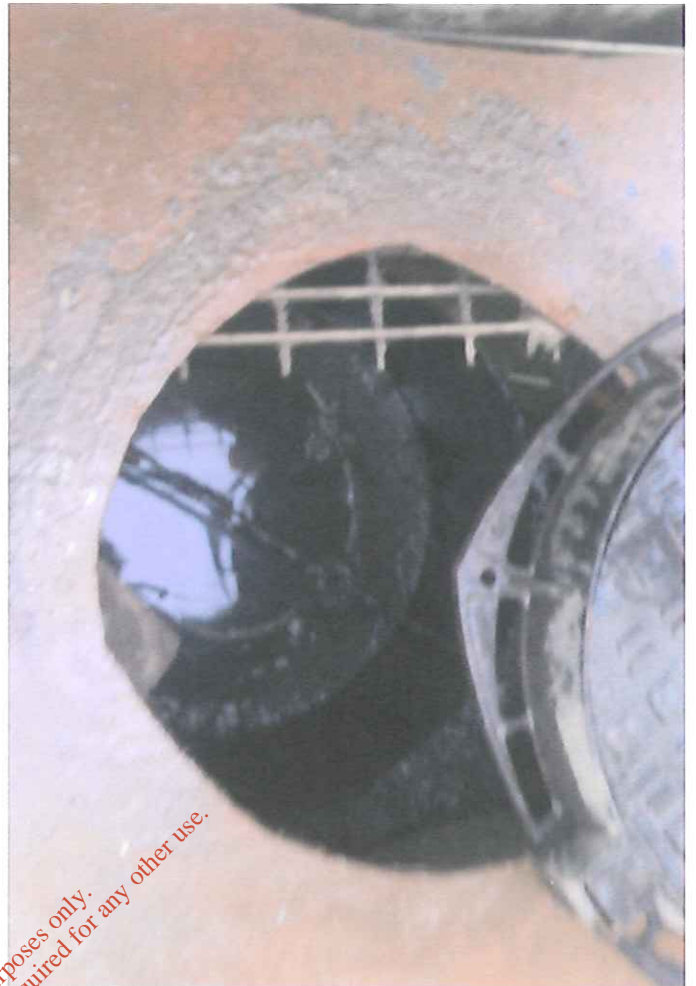
For inspection purposes only.
Consent of copyright owner required for any other use.



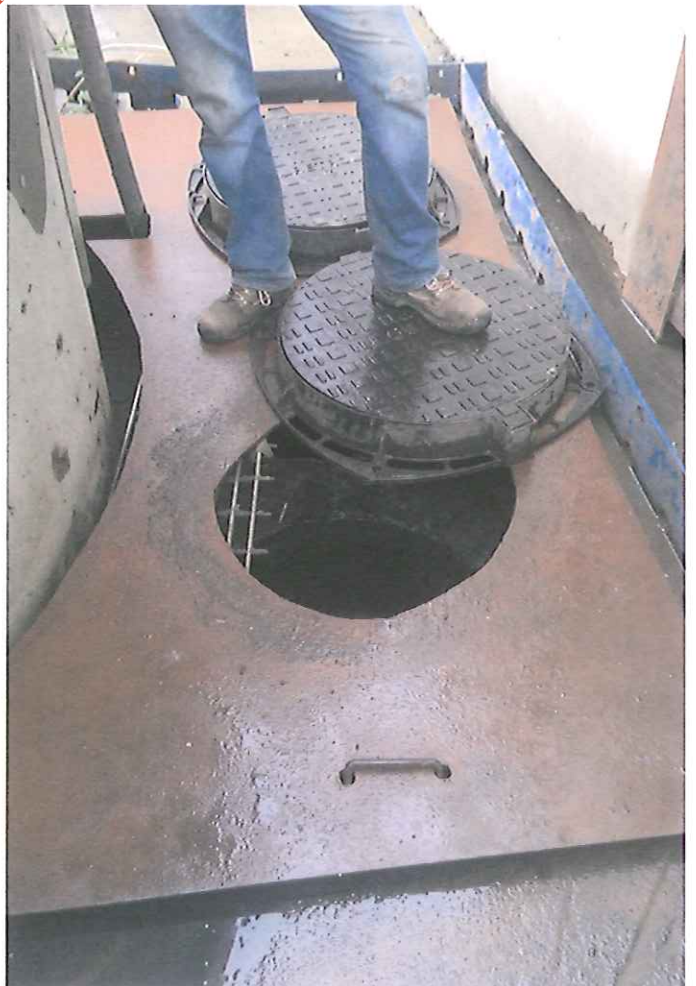
For inspection purposes only.
Consent of copyright owner required for any other use.

Sump 5

For inspection purposes only.
Consent of copyright owner required for any other use.



For inspection purposes only.
Consent of copyright owner required for any other use.



Appendix C Record Sheets of Bund Tests

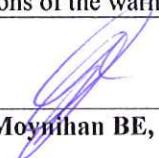
*For inspection purposes only.
Consent of copyright owner required for any other use.*

RECORD SHEET FOR BUND TESTING

(In Accordance with EPA Guidance Note on Storage & Transfer of Materials for Scheduled Activities)

Hydrostatic & Visual Assessment


Sump 1 Leachate Storage Tank

Company: KWD Recycling Ltd	IPPC Reference: W0217-01																		
Date: 17/05/2016-18/05/2016	Bund Location: Located internally within the Materials recovery Facility.																		
Bund Ref. No.: Sump 1 Leachate Storage Tank	Bund Type – Concrete																		
Bund Dimensions: Unknown	Primary Vessels – Materials of Construction: N/A																		
Bund Materials of Construction: Bund constructed from cast concrete	Primary Vessels – Unknown- there is an active warning light that flashes once bund is nearly full. This light has been tested and is currently working.																		
Bund Lining Material: None- Cast Concrete Design.	Primary Vessels – N/A																		
Bund Retention Volume (Local): 9,100L	Weather conditions- Dry Light Showers.																		
Deemed practicable/safe to conduct hydrostatic test: Yes																			
If no, give reasons: Not Applicable																			
Date of Visual Inspection:	17/05/2016-18/05/2016																		
Description & Results of Visual Inspection: The bund was constructed between 2005 and 2006. There is no evidence of cracks on the side walls of the bund. The bund is located underground. On visual inspection the structural integrity of the bund appears sound. The warning light is working.																			
Description and Results of Hydrostatic testing: 24 Hour Test: The bund was filled to a mark 150mm from the top of the bund. This was allowed to stabilise for a 24 hour period on the 18/05/2016. The Bund test was started at 09.00am on the 17/05/2016 and finished at 15.00 on the 18/05/2016.																			
There was no change in the water level in the container used to monitor evaporation and rainfall ingress. The water level was checked on the 18/05/2016 over a six hour period. The results of the test are shown below:																			
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #4F81BD; color: white;"> <th style="width: 50%;">Date & Time</th> <th style="width: 50%;">Level below top of Bund Wall</th> </tr> </thead> <tbody> <tr><td>17/05/2016 9:00</td><td>150mm</td></tr> <tr><td>18/05/2016 9:00</td><td>150mm</td></tr> <tr><td>18/05/2016 10:00</td><td>150mm</td></tr> <tr><td>18/05/2016 11:00</td><td>150mm</td></tr> <tr><td>18/05/2016 12:00</td><td>150mm</td></tr> <tr><td>18/05/2016 13:00</td><td>150mm</td></tr> <tr><td>18/05/2016 14:00</td><td>150mm</td></tr> <tr><td>18/05/2016 15:00</td><td>150mm</td></tr> </tbody> </table>		Date & Time	Level below top of Bund Wall	17/05/2016 9:00	150mm	18/05/2016 9:00	150mm	18/05/2016 10:00	150mm	18/05/2016 11:00	150mm	18/05/2016 12:00	150mm	18/05/2016 13:00	150mm	18/05/2016 14:00	150mm	18/05/2016 15:00	150mm
Date & Time	Level below top of Bund Wall																		
17/05/2016 9:00	150mm																		
18/05/2016 9:00	150mm																		
18/05/2016 10:00	150mm																		
18/05/2016 11:00	150mm																		
18/05/2016 12:00	150mm																		
18/05/2016 13:00	150mm																		
18/05/2016 14:00	150mm																		
18/05/2016 15:00	150mm																		
Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>																			
Recommendations: Re-test in three years time (2019) and undertake regular visual assessments and inspections of the warning light.																			
Signed:  <hr/> Donal Moynihan BE, C. Eng M.IEI	Title/Position: CHARTERED ENGINEER	Date: 19/05/2016																	

RECORD SHEET FOR BUND TESTING


(In Accordance with EPA Guidance Note on Storage & Transfer of Materials for Scheduled Activities)
Hydrostatic & Visual Assessment

Sump 2 near Office Area

Company: KWD Recycling Ltd		IPPC Reference: W0217-01																		
Date: 17/04/2016-18/04/2016		Bund Location: Located internally within the Materials recovery Facility.																		
Bund Ref. No.: Sump 2 Near Office Area		Bund Type – Concrete																		
Bund Dimensions: Unknown		Primary Vessels – Materials of Construction: N/A																		
Bund Materials of Construction: Bund constructed from cast concrete		Primary Vessels – Unknown- there is an active warning light that flashes once bund is nearly full. This light has been tested and is currently working.																		
Bund Lining Material: None- Cast Concrete Design.		Primary Vessels – N/A																		
Bund Retention Volume (Local): 9,100L		Weather conditions- Dry Light Showers.																		
Deemed practicable/safe to conduct hydrostatic test: Yes																				
If no, give reasons: Not Applicable																				
Date of Visual Inspection:		17/05/2016 - 18/04/2016																		
Description & Results of Visual Inspection: The bund was constructed between 2005 and 2006. There is no evidence of cracks on the side walls of the bund. The bund is located underground. On visual inspection the structural integrity of the bund appears sound. The warning light is working.																				
Description and Results of Hydrostatic testing: 24 Hour Test: The bund was filled to a mark 150mm from the top of the bund. This was allowed to stabilise for a 24 hour period on the 17/05/2016. The Bund test was started at 09.05am on the 17/05/2016 and finished at 15.05 on the 18/05/2016.																				
There was no change in the water level in the container used to monitor evaporation and rainfall ingress. The water level was checked on the 09/04/2016 over a six hour period. The results of the test are shown below:																				
<table border="1"> <thead> <tr> <th>Date & Time</th> <th>Level below top of Bund Wall</th> </tr> </thead> <tbody> <tr><td>17/05/2016 9:05</td><td>150mm</td></tr> <tr><td>18/05/2016 9:05</td><td>150mm</td></tr> <tr><td>18/05/2016 10:05</td><td>150mm</td></tr> <tr><td>18/05/2016 11:05</td><td>150mm</td></tr> <tr><td>18/05/2016 12:05</td><td>150mm</td></tr> <tr><td>18/05/2016 13:05</td><td>150mm</td></tr> <tr><td>18/05/2016 14:05</td><td>150mm</td></tr> <tr><td>18/05/2016 15:05</td><td>150mm</td></tr> </tbody> </table>			Date & Time	Level below top of Bund Wall	17/05/2016 9:05	150mm	18/05/2016 9:05	150mm	18/05/2016 10:05	150mm	18/05/2016 11:05	150mm	18/05/2016 12:05	150mm	18/05/2016 13:05	150mm	18/05/2016 14:05	150mm	18/05/2016 15:05	150mm
Date & Time	Level below top of Bund Wall																			
17/05/2016 9:05	150mm																			
18/05/2016 9:05	150mm																			
18/05/2016 10:05	150mm																			
18/05/2016 11:05	150mm																			
18/05/2016 12:05	150mm																			
18/05/2016 13:05	150mm																			
18/05/2016 14:05	150mm																			
18/05/2016 15:05	150mm																			
Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>																				
Recommendations: Re-test in three years time (2019) and undertake regular visual assessments and inspections of the warning light.																				
Signed:  Donal Moynihan BE, C. Eng M.I.EI	Title/Position: CHARTERED ENGINEER	Date: 19/05/2016																		

RECORD SHEET FOR BUND TESTING


(In Accordance with EPA Guidance Note on Storage & Transfer of Materials for Scheduled Activities)
 Hydrostatic & Visual Assessment
Sump 3 near Timber Shredder

Company: KWD Recycling Ltd	IPPC Reference: W0217-01																		
Date: 17/05/2016-18/05 /2016	Bund Location: See Appendix A / Sump located near timber shredding area.																		
Bund Ref. No.: Sump 3 near Timber Shredder	Bund Type – Concrete																		
Bund Dimensions: 2.4m x 1.5m x 2.4m Deep	Primary Vessels – Materials of Construction: N/A																		
Bund Materials of Construction: Bund constructed from cast concrete	Primary Vessels – N/A																		
Bund Lining Material: None- Cast Concrete Design.	Primary Vessels – N/A																		
Bund Retention Volume (Local): 8,640L	Weather conditions- Dry Light Showers.																		
Deemed practicable/safe to conduct hydrostatic test: Yes																			
If no, give reasons: Not Applicable																			
Date of Visual Inspection:	17/05/2016-18/05/2016																		
Description & Results of Visual Inspection: The bund was constructed between 2005 and 2006. There is no evidence of cracks on the side walls of the bund. The bund is located underground. On visual inspection the structural integrity of the bund appears sound.																			
Description and Results of Hydrostatic testing: 24 Hour Test: The bund was filled to a mark 150mm from the top of the bund. This was allowed to stabilise for a 24 hour period on the 18/05/2016. The Bund test was started at 09.10am on the 17/05/2016 and finished at 15.10 on the 18/05/2016. There was no change in the water level in the container used to monitor evaporation and rainfall ingress. The water level was checked on the 18/05/2016 over a six hour period. The results of the test are shown below:																			
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #4F81BD; color: white;"> <th style="width: 50%;">Date & Time</th> <th style="width: 50%;">Level below top of Bund Wall</th> </tr> </thead> <tbody> <tr><td>17/05/2016 9:10</td><td>150mm</td></tr> <tr><td>18/05/2016 9:10</td><td>150mm</td></tr> <tr><td>18/05/2016 10:10</td><td>150mm</td></tr> <tr><td>18/05/2016 11:10</td><td>150mm</td></tr> <tr><td>18/05/2016 12:10</td><td>150mm</td></tr> <tr><td>18/05/2016 13:10</td><td>150mm</td></tr> <tr><td>18/05/2016 14:10</td><td>150mm</td></tr> <tr><td>18/05/2016 15:10</td><td>150mm</td></tr> </tbody> </table>		Date & Time	Level below top of Bund Wall	17/05/2016 9:10	150mm	18/05/2016 9:10	150mm	18/05/2016 10:10	150mm	18/05/2016 11:10	150mm	18/05/2016 12:10	150mm	18/05/2016 13:10	150mm	18/05/2016 14:10	150mm	18/05/2016 15:10	150mm
Date & Time	Level below top of Bund Wall																		
17/05/2016 9:10	150mm																		
18/05/2016 9:10	150mm																		
18/05/2016 10:10	150mm																		
18/05/2016 11:10	150mm																		
18/05/2016 12:10	150mm																		
18/05/2016 13:10	150mm																		
18/05/2016 14:10	150mm																		
18/05/2016 15:10	150mm																		
Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>																			
Recommendations: Re-test in three years time (2019) and undertake regular visual assessments and inspections of the warning light.																			
Signed:  <hr/> Donal Moynihan BE, C. Eng M.I.EI	Title/Position: CHARTERED ENGINEER	Date: 19/05/2016																	

RECORD SHEET FOR BUND TESTING

(In Accordance with EPA Guidance Note on Storage & Transfer of Materials for Scheduled Activities)
Hydrostatic & Visual Assessment


Sump 4 Oil Bund

Company: KWD Recycling Ltd	IPPC Reference: W0217-01																			
Date: 17/05/2016-18/05/2016	Bund Location: Located as shown on Site Layout Plan Appendix A / To North of the site/ located internally.																			
Bund Ref. No.: Sump 4 Oil Bund	Bund Type – Concrete																			
Bund Dimensions: 5.25m x 3.3m x 0.9m High	Primary Vessels – Materials of Construction: Plastic Storage Tank																			
Bund Materials of Construction: Bund constructed from cast concrete	Primary Vessels – Main Diesel Tank 5,000L and smaller Tank is 1,000L.																			
Bund Lining Material: None- Cast Concrete Design.	Primary Vessels – 110% of the volume of the largest vessel.																			
Bund Retention Volume (Local): 15,600L	Weather conditions- Dry Light Showers.																			
Deemed practicable/safe to conduct hydrostatic test: Yes																				
If no, give reasons: Not Applicable																				
Date of Visual Inspection:	17/05/2016-18/05/2016																			
Description & Results of Visual Inspection: The bund was constructed in 2007. There is no evidence of cracks on the side walls of the bund. The bund is located underground. On visual inspection the structural integrity of the bund appears sound.																				
Description and Results of Hydrostatic testing: 24 Hour Test: The bund was filled to a mark 150mm from the top of the bund. This was allowed to stabilise for a 24 hour period on the 17/05/2016. The Bund test was started at 09.15am on the 17/05/2016 and finished at 15.15 on the 18/05/2016. There was no change in the water level in the container used to monitor evaporation and rainfall ingress. The water level was checked on the 18/05/2016 over a six hour period. The results of the test are shown below:																				
<table border="1" style="width: 100%; border-collapse: collapse; background-color: #e6f2ff;"> <thead> <tr> <th style="width: 50%;">Date & Time</th> <th style="width: 50%;">Level below top of Bund Wall</th> </tr> </thead> <tbody> <tr><td>17/05/2016 9:15</td><td>150mm</td></tr> <tr><td>18/05/2016 9:15</td><td>150mm</td></tr> <tr><td>18/05/2016 10:15</td><td>150mm</td></tr> <tr><td>18/05/2016 11:15</td><td>150mm</td></tr> <tr><td>18/05/2016 12:15</td><td>150mm</td></tr> <tr><td>18/05/2016 13:15</td><td>150mm</td></tr> <tr><td>18/05/2016 14:15</td><td>150mm</td></tr> <tr><td>18/05/2016 15:15</td><td>150mm</td></tr> </tbody> </table>			Date & Time	Level below top of Bund Wall	17/05/2016 9:15	150mm	18/05/2016 9:15	150mm	18/05/2016 10:15	150mm	18/05/2016 11:15	150mm	18/05/2016 12:15	150mm	18/05/2016 13:15	150mm	18/05/2016 14:15	150mm	18/05/2016 15:15	150mm
Date & Time	Level below top of Bund Wall																			
17/05/2016 9:15	150mm																			
18/05/2016 9:15	150mm																			
18/05/2016 10:15	150mm																			
18/05/2016 11:15	150mm																			
18/05/2016 12:15	150mm																			
18/05/2016 13:15	150mm																			
18/05/2016 14:15	150mm																			
18/05/2016 15:15	150mm																			
Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>																				
Recommendations: Re-test in three years time (2019) and undertake regular visual assessments and inspections of the warning light.																				
Signed:  Donal Moynihan BE, C. Eng M.IEI	Title/Position: CHARTERED ENGINEER	Date: 19/05/2016																		

RECORD SHEET FOR BUND TESTING

(In Accordance with EPA Guidance Note on Storage & Transfer of Materials for Scheduled Activities)
Hydrostatic & Visual Assessment

Sump 5 Oil/Water Interceptor near Diesel Tank

Company: KWD Recycling Ltd		IPPC Reference: W0217-01																		
Date: 08/04/2016-09/04/2016		Bund Location: See Appendix A.																		
Bund Ref. No.: Sump 5 Oil/Water Interceptor near Diesel Tank		Bund Type – Concrete																		
Bund Dimensions: 0.9m Diameter x 1.0m deep x 2 number		Primary Vessels – Materials of Construction: N/A																		
Bund Materials of Construction: Bund constructed from cast concrete		Primary Vessels – N/A																		
Bund Lining Material: None- Cast Concrete Design.		Primary Vessels – N/A																		
Bund Retention Volume (Local): 1,271L		Weather conditions- Dry Light Showers.																		
Deemed practicable/safe to conduct hydrostatic test: Yes																				
If no, give reasons: Not Applicable																				
Date of Visual Inspection:		17/05/2016- 18/05/2016																		
Description & Results of Visual Inspection: The bund was constructed between 2005 and 2006. There is no evidence of cracks on the side walls of the bund. The bund is located underground. On visual inspection the structural integrity of the bund appears sound.																				
Description and Results of Hydrostatic testing: 24 Hour Test: The bund was filled to a mark 50mm from the top of the bund. This was allowed to stabilise for a 24 hour period on the 17/05/2016. The Bund test was started at 09.20am on the 17/05/2016 and finished at 15.20 on the 18/05/2016. There was no change in the water level in the container used to monitor evaporation and rainfall ingress. The water level was checked on the 18/05/2016 over a six hour period. The results of the test are shown below:																				
<table border="1"> <thead> <tr> <th>Date & Time</th> <th>Level below top of Bund Wall</th> </tr> </thead> <tbody> <tr> <td>17/05/2016 9:20</td> <td>50mm</td> </tr> <tr> <td>18/05/2016 9:20</td> <td>50mm</td> </tr> <tr> <td>18/05/2016 10:20</td> <td>50mm</td> </tr> <tr> <td>18/05/2016 11:20</td> <td>50mm</td> </tr> <tr> <td>18/05/2016 12:20</td> <td>50mm</td> </tr> <tr> <td>18/05/2016 13:20</td> <td>50mm</td> </tr> <tr> <td>18/05/2016 14:20</td> <td>50mm</td> </tr> <tr> <td>18/05/2016 15:20</td> <td>50mm</td> </tr> </tbody> </table>			Date & Time	Level below top of Bund Wall	17/05/2016 9:20	50mm	18/05/2016 9:20	50mm	18/05/2016 10:20	50mm	18/05/2016 11:20	50mm	18/05/2016 12:20	50mm	18/05/2016 13:20	50mm	18/05/2016 14:20	50mm	18/05/2016 15:20	50mm
Date & Time	Level below top of Bund Wall																			
17/05/2016 9:20	50mm																			
18/05/2016 9:20	50mm																			
18/05/2016 10:20	50mm																			
18/05/2016 11:20	50mm																			
18/05/2016 12:20	50mm																			
18/05/2016 13:20	50mm																			
18/05/2016 14:20	50mm																			
18/05/2016 15:20	50mm																			
Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>																				
Recommendations: Re-test in three years time (2019) and undertake regular visual assessments and inspections of the warning light.																				
Signed:  Donal Moynihan BE, C. Eng M.I.EI	Title/Position: CHARTERED ENGINEER	Date: 19/05/2016																		

APPENDIX 4

*For inspection purposes only.
Consent of copyright owner required for any other use.*



ANALYSIS REPORT

CUSTOMER:	KILLARNEY WASTE DISPOSAL	SAMPLE TYPE:	GROUND WATER
ADDRESS:	Aughacureen, Killarney, County Kerry	CONDITION OF SAMPLE ON RECEIPT:	Satisfactory
REPORT TO:	BRIAN BRUTON	DATE SAMPLED:	17 January 2017
SAMPLED BY:	Danny O Leary, Southern Scientific Services Ltd	DATE RECEIVED:	17 January 2017
SAMPLING PT:	BH 1 – BH 4	DATE ANALYSED:	17 January – 07 February 2017
ORDER NO:	N/A	DATE REPORTED:	07 February 2017
		WORK NO.:	36986 C 11P-043

TABLE OF RESULTS

Method:	Parameter	Units	C17-Jan 332	C17-Jan 333	C17-Jan 334	C17-Jan 335
			BH 1	BH 2	BH 3	BH 4
Chemical Analysis: (F)						
SCP 052	pH	pH Units	7.0	7.2	7.1	7.2
SCP 052	Conductivity	µS/cm @ 20°C	645	751	548	405
SCP 027a	Total Ammonia	mg/L as N	1.99	1.76	2.80	0.06
SCP 027g	Nitrate	mg/L N	<0.25	<0.25	<0.25	<0.25
SCP 027c	Orthophosphate	mg/L P	0.03	0.01	0.03	0.01
SCP 027i	Total Hardness	mg/L CaCO ₃	363	421	289	190
SCP 027h	Alkalinity	mg/L CaCO ₃	369	440	311	1405 ^{Note 5}
SCP 027b	Chloride	mg/L	24.2	23.3	22.7	67.8
SCP 027d	Sulphate	mg/L SO ₄	<0.5	<0.5	<0.5	63.9
SCP 038	Iron, Dissolved	mg/L	2.01	4.19	3.64	0.13
SCP 038	Manganese, Dissolved	mg/L	0.10	0.15	0.13	0.07
**5520F	* DRO	µg/L	<10	<10	<10	<10
Microbiological Analysis: (D)						
SMP 019	Coliforms	MPN/100 mL	<1	<1	11	2
SMP 124	* Faecal Coliforms	MPN/100 mL	<1	<1	1	64
On site Monitoring:						
-	* Depth to Water	m	0.35	0.08	1.7	1.0
-	* Redox Potential	mV	-86.0	-119.1	-79.6	-41.6
-	* DO	mg/L	1.55	3.35	3.0	2.7
-	* Temperature	°C	11.5	10.7	10.9	11.3

Ruth Murphy
Ruth Murphy
Chemistry Laboratory Manager

Index to symbols used:

*	Analysis is not INAB accredited.
**	Adapted from Standard Methods for the Examination of Water and Wastewater.
(F)	Analysis carried out at our Farranfore Laboratory.
(D)	Analysis carried out at our Dunrine Laboratory.
Note 5	Result outside scope of accreditation for Alkalinity (5-800 mg/L CaCO ₃)

- The results relate only to the items tested.
- Opinions and interpretations expressed herein are outside the scope of INAB accreditation.
- The analysis report shall not be reproduced except in full without written approval of the laboratory.

(registered office)

4 park business centre | farranfore | county kerry | ireland | telephone +353 66 976 3588 | fax +353 66 976 3589
dunrine | killarney | county kerry | ireland | telephone +353 64 66 33922 | fax +353 64 66 39022

web site www.southernscientificireland.com | e-mail info@southernscientificireland.com

directors: K. Murphy, M. Murphy & C. Murphy
registered in ireland no 323196 | vat reg no IE 6343196 M



ANALYSIS REPORT

CUSTOMER:	KILLARNEY WASTE DISPOSAL	SAMPLE TYPE:	GROUND WATER
ADDRESS:	Aughacureen, Killarney, County Kerry	CONDITION OF SAMPLE ON RECEIPT:	Satisfactory
REPORT TO:	BRIAN BRUTON	DATE SAMPLED:	23 September 2016
SAMPLED BY:	Danny O Leary Southern Scientific Services Ltd	DATE RECEIVED:	23 September 2016
SAMPLING PT:	BH 3	DATE ANALYSED:	23 - 29 September 2016
ORDER NO:	N/A	DATE REPORTED:	03 October 2016
		WORK NO.:	36151 C

TABLE OF RESULTS

Method:	Parameter	Units	C16-Sep 473 After Well Volume	C16-Sep 474 1 Hr After Well Volume	C16-Sep 475 2 Hr After Well Volume	C16-Sep 476 3 Hr After Well Volume	C16-Sep 477 3 Hr 45 Min After Well Volume
	Chemical Analysis: (F)						
SCP 027a	Total Ammonia	mg/L as N	3.04	3.13	3.22	3.28	3.28
SCP 016	COD	mg/L	<10	<10	<10	<10	<10
SCP 027g	Nitrate	mg/L N	<0.25	<0.25	<0.25	<0.25	<0.25
SCP 027f	Nitrite	mg/L N	<0.005	<0.005	<0.005	<0.005	<0.005
Note 6	TOC	mg/L					
SCP 038	Ferrous Irons	mg/L	4.18	4.60	4.26	4.20	4.20
SCP 038	Ferric Iron	mg/L	4.77	4.94	5.17	5.32	5.29
Hach 8131	* Sulphide	µg/L	<5	<5	<5	<5	<5
	On Site Monitoring:						
-	* DO	mg/L	1.5	2.1	2.9	2.9	3.4
	* Redox	mV	-132.8	-78.0	-93.5	-115.9	-106.4

Conor Murphy
Dr Conor Murphy
Deputy Chemistry Laboratory Manager

Index to symbols used:

*	Analysis is not INAB accredited.
(F)	Analysis carried out at our Farranfore Laboratory.

- The results relate only to the items tested.
- Opinions and interpretations expressed herein are outside the scope of INAB accreditation.
- The analysis report shall not be reproduced except in full without written approval of the laboratory.

(registered office)

4 park business centre | farranfore | county kerry | ireland | telephone +353 66 976 3588 | fax +353 66 976 3589
dunrine | killarney | county kerry | ireland | telephone +353 64 66 33922 | fax +353 64 66 39022

web site www.southernscientificireland.com | e-mail info@southernscientificireland.com

directors: K. Murphy, M. Murphy & C. Murphy
registered in ireland no 323196 | vat reg no IE 6343196 M

