Attachment F.1

Treatment, Abatement and Control System Changes

Recent WWTP System Upgrades:

Following the substantial modifications to the wwtp in 2006 and 2007 a marked improvement was noted in the wwtp. A summary of these changes include:

- Installation of storage tanks at front end of plant to provide more consistent hydraulic loading to wwtp feed
- Installation of aeration mixing in front end storage tanks to provide homogeneous fresh feed to wwtp
- Diversion of uncontaminated roof water away from wwtp to reduce impact of wet weather periods (ongoing project)
- Installation of new grease trap for the foul sewer/canteen discharge
- Review and segregation of yard drainage system to optimise discharges to wwtp and eliminate contaminated discharges to the oil interceptor
- Diversion of wwtp effluent off-site for further treatment until emission limit values can be met consistently

Further changes(proposed or ongoing) to improve groundwater protection:

In order to further improve groundwater protection :

- A new oil/silt interceptor has been installed for emission point FE2. The interceptor is a Klargester NS200 Class 1 full retention separator and is the best available unit on the market with a built in silt trap. The unit has a flow rate capacity of 200litre/second, a capacity of 53,500 litres with an oil intercept capacity of 2000litres and a silt capacity of 20,000 litres. It also has a built in oil alarm tube. This type of separator is designed for use in applications such as fuel distribution depots and vehicle workshops. Separation of the drainage systems and installation of the new oil interceptor will ensure discharges of environmental significance will not occur from this emission point. Full details of the unit are attached in Attachment D.1.
- Develop an environmental laboratory and recruit an environmental analyst in 2008. The primary benefit will be to provide more frequent and improved measurement data to identify trends and changes in wwtp in order to optimise control in the current wwtp and ultimately ensure consistent effluent discharges.
- If, following optimisation of the current wwtp system, tertiary treatment of the effluent is required, Mr Binman will install the most appropriate technology to ensure compliance. Please find attached a suitability assessment report for installation of reed bed technology for treatment of discharges from the facility. Further assessment of this

option will be made pending the outcome of the data provided for the primary and secondary treatment systems already in place.

- Complete diversion of uncontaminated roof water
- Seal all joints on hard-standing areas

These projects combined with the projects already completed in the previous two years will ensure optimum operation of the drainage system and the wwtp at the facility.

All waste water discharges from the facility will be sent off-site for further treatment until the efficient operation of the wwtp can be demonstrated and the emission limit values can be achieved on a consistent basis.

Mr. Binman Ltd

Proposed constructed wetland for polishing surface water runoff.

DRAFT

Luddenmore, Grange, Kilmallock, Co. Limerick.

June 2008.

VESI Environmental Ltd.

3013 Innovation Park, Euro Business Park, Little Island, Cork.
Telephone 086 8092003 Email ailacarty@mac.com

1. Introduction

A constructed wetland is being proposed at the Mr. Binman site, Luddenmore, Grange, Kilmallock, Co. Limerick for polishing surface water run-off from the recycling facility. A site has been located to the east of the facility for the development of a constructed wetland. Information obtained from Mr. Binman Ltd and site assessments have been used in assessing the suitability of the site and in providing data necessary for the design of the proposed wetland system.

Constructed wetlands are effective in treating different types of contaminated runoff through various physical, chemical and biological processes involving plants, algae, micro-organisms, water, soil, wind and sun. The constructed wetland design endeavours to optimize the natural biological, chemical and physical processes of pollutant removal in a way that is compatible with the local aquatic and terrestrial communities and that does not incur negative impact on adjacent aquatic and terrestrial ecosystems.

2. Site assessment

The location, topography, geology and soils and subsoils, surface water and groundwater hydrology, ecology, social and planning aspects, archaeological and architectural features and natural interest need to be considered when assessing the suitability of a site for a constructed wetland.

A preliminary site assessment was undertaken in March 2008 to assess the proposed development site. As part of the assessment ground conditions were examined by excavating trial holes to a depth of 3m to determine the nature, thickness and permeability of the underlying soil and subsoil. Soil samples were taken for analysis. The results of the soil sample from trial pit 01 indicate soils that are ‘brown slightly gravelly CLAY’, with a clay content of 13% and a total fines content of 30%. Results from trial pit 02 indicate ‘brown clayey very sandy GRAVEL’, with a clay content of 9% and a total fines content of 18% (see appendix 1). Further trial holes will need to be excavated to determine the height of the water table.

A site suitability assessment undertaken by hydrogeologist Jerome Keohane (GES Ltd) in December 2006 directly adjacent to the proposed development site concluded from he’s findings that the site was suitable for the development of a constructed wetland to polish surface water run-off, provided that a minimum of 1.5 m of low permeable material is provided above the bedrock. The material excavated from trial pit 01 would be suitable material to form the wetland soil liner. This type of material would need to be provided throughout the site to the minimum depth requirement.

The proposed wetland site is steeply sloping, therefore there will be greater depth of excavation required and a need for larger land uptake.

The wetland is being designed for the treatment of 26m^3/day of effluent derived from surface water runoff from the preceding yards, which is currently being treated through the existing Wastewater Treatment Plant (WWTP). The quality of the effluent discharging from the WWTP has a BOD concentration of 20 mg/l and a suspended solids concentration of 30 mg/l. Following treatment through the WWTP the effluent would be pumped to the constructed wetland for further treatment through a series of ponds, before discharging to ground.

3. Proposed constructed wetland size and layout

A series of constructed ponds covering a surface water area of approximately 1500m^2 is being proposed, with a total wetland area of 2200m^2. The wetland would need to be constructed using suitable soil material, ideally sourced in-situ. The soil used will be for the creation of the embankments and the wetland (soil) liner to ensure stability and sufficient low permeability (<1x10^{-8}m/s) for groundwater protection. A tickness of 1.5m of low permeability material must be provided over the underlying bedrock.

The proposed wetland is located adjacent to lands sloping toward the system (preceding yards and new entrance road (proposed)), therefore a drain or an embankment would be constructed around the ponds to prevent/divert potentially large volumes of runoff entering the system that should be treated/discharged separately.

The embankments created for each pond should ideally be gently sloping, however due to the steepness of the site embankments for the Mr. Binman wetland may need to be more steeply sloping (1:1 or 1:2) to maximise wetland area. The embankment height should be at least 1 m to ensure containment of water and allow for accumulation of sediments. The crest/top of the embankment should be 2-3 m wide at the top to provide for structural stability and allow access to the wetland.

Each wetland pond is connected with 150 mm diameter ducting, placed within the embankment at the outlet/inlet point of each pond. Pipes are positioned in places that are accessible and as close as possible to the pond base of the exit point to ensure that complete drainage is possible if required in the future. Piping is placed so as to ensure that the movement of water in each segment is across the maximum distance from inflowing point to exit.

All ponds are planted with a variety of suitable native & ideally locally sourced plants. Planting is recommended using bare root species and at a density of 2 plants per meter squared to

provide reasonable cover within one full growing season. Typical plant species used include common sedge, bulrush, water grass, iris and reedmace.

The water depth within each treatment pond will be between 150mm-200mm, with a maximum depth of 300mm. A wetland area of 1500m^2 would have holding capacity of at least 450m^3, providing a nominal residence time of 17 days.

Discharge

The final effluent from the wetland will discharge to ground adjacent to the wetland site. The c. 1500m^2 wetland is expected to reduce BOD and suspended soilds to a concentration of < 10 mg/l and <10 mg/l respectively. It is recommended that a monitoring chamber is installed at the outlet point of the final pond before discharging to ground to allow for the sampling of the final effluent water quality and flow rates.

4. Operation and maintenance of a constructed wetland.

An operation and maintenance programme will need to be implemented once the wetland has been constructed to assist on-site personnel for the daily and weekly management of the ICW.

The operation and maintenance programme would include details on some of the following procedures:

1. Flow monitoring to and from the wetland.
2. Surface water quality monitoring of the final effluent
3. Vegetation monitoring – vigour and growth
4. Maintenance of access – fencing
5. Maintenance of embankments
6. Maintenance of inlet and outlet pipes
7. Water level management
8. Maintenance of flow
9. Visual monitoring of final effluent - colour, odour, foaming, sediments.
10. Sediment/sludge management

5. Conclusion

The site at Luddenmore is suitable for a constructed wetland site, provided that the minimum soil depths can be provided throughout the site. While the proposed wetland area should provide reasonable treatment of BOD and suspended solids, reduction in phosphates, nitrates, ammonia etc have not been assessed as their influent rates are unknown at this stage.

Further information is required on the water table height and on whether suitable local material can be sourced to develop the wetland if sufficient quanities of soil are not found on site.

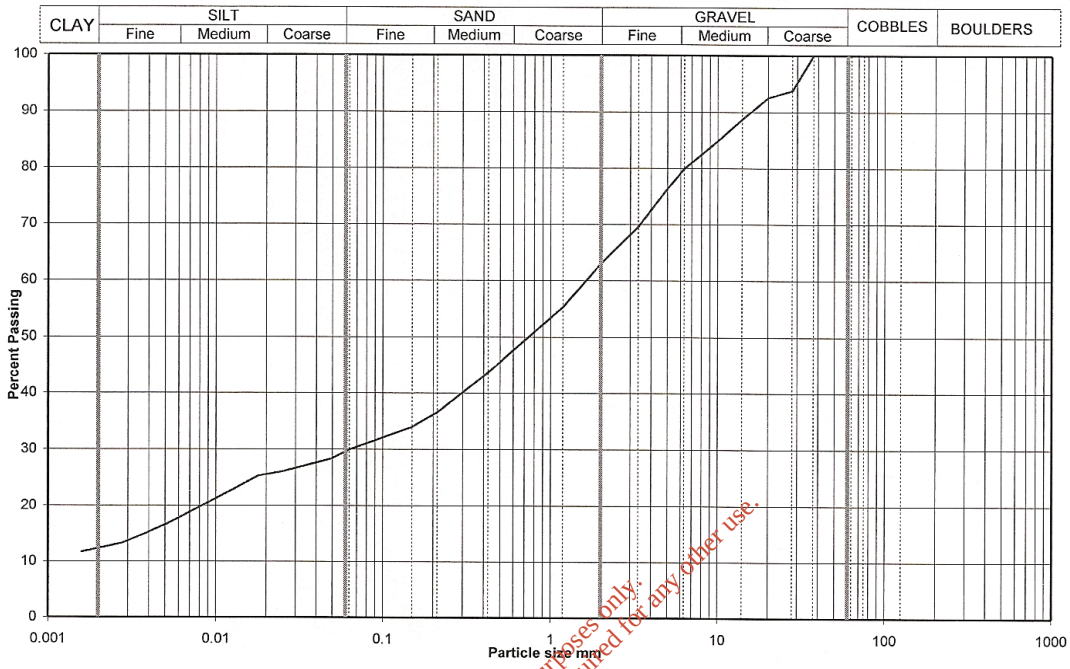
A preliminary wetland layout is presently being prepared and will be available shortly, detailing pond layout, flows and access.

APPENDIX 1

Soil analysis Trial Pit 01 & 02

Particle Size Distribution Analysis

Project No	KC8038	Sample Details:	Hole No	TP01		
Project Name	Binman		Depth (m BGL)	0.50		
			Samp No		Type	B
			ID	ESGK42231		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	30
90	100	0.0491	28
75	100	0.0352	27
63	100	0.0252	26
50	100	0.0180	25
37.5	100	0.0097	21
28	94	0.0051	17
20	92	0.0037	15
14	89	0.0028	13
10	85	0.0016	12
6.3	80		
5.0	76		
3.35	70		
2.00	63		
1.18	55	Particle density, Mg/m3	
0.600	48	2.65	assumed
0.425	44		
0.300	40	Dry mass of sample, kg	
0.212	37		
0.150	34	1.5	
0.063	30		

Soil description	Brown slightly sandy gravelly CLAY		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	37	37
	Sand	33	33
	Silt	17	17
	Clay	13	13

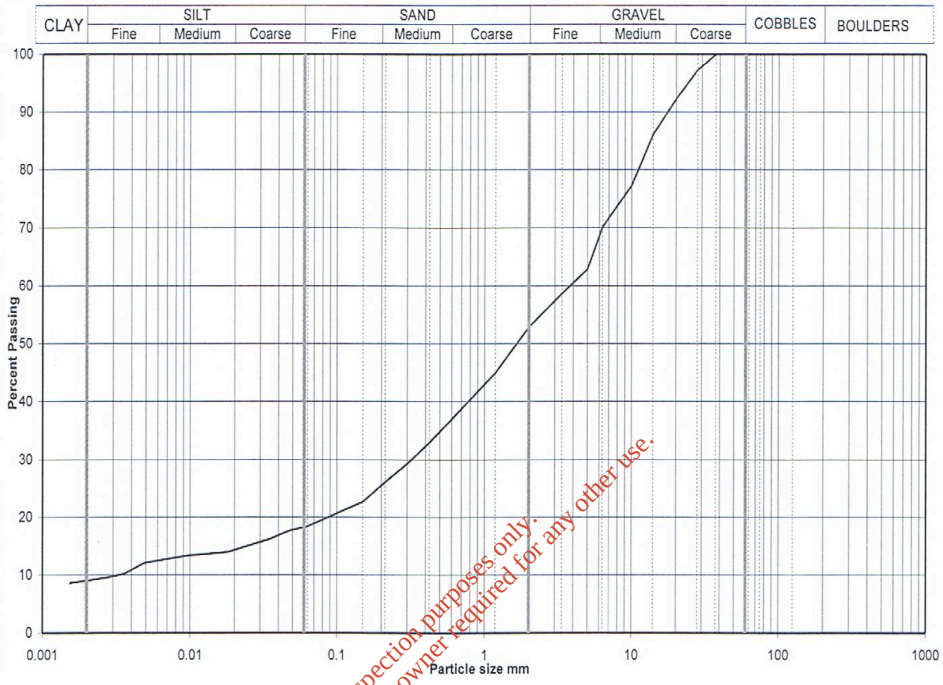
Uniformity Coefficient	D_{60} / D_{10}	#N/A

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2.9 Rev 78 Jan 08	GEOTECH	Printed:20/03/2008 11:40	**Figure** PSD 1

Particle Size Distribution Analysis

Project No	KC8038	Sample Details:	Hole No	TP02		
Project Name	Binman		Depth (m BGL)	0.50		
			Samp No		Type	B
			ID	ESGK42232		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	18
90	100	0.0475	18
75	100	0.0347	16
63	100	0.0251	15
50	100	0.0182	14
37.5	100	0.0095	13
28	97	0.0049	12
20	92	0.0036	10
14	86	0.0027	10
10	77	0.0015	9
6.3	70		
5.0	63		
3.35	59		
2.00	53		
1.18	45	Particle density, Mg/m3	
0.600	37	2.65 assumed	
0.425	33		
0.300	29	Dry mass of sample, kg	
0.212	26	1.5	
0.150	23		
0.063	18		

Soil description	Brown clayey very sandy GRAVEL
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377
Remarks	

Sample Proportions		Whole	*<60mm
*<60mm values to aid description only	Cobbles / boulders	0	0
	Gravel	47	47
	Sand	35	35
	Silt	9	9
	Clay	9	9

Uniformity Coefficient	D_{60} / D_{10}	1141

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2.9 Rev 78 Jan 08	GEOTECH	Printed:20/03/2008 11:40	Figure PSD 2

Attachment F.2

Air Monitoring Point Changes

Dust Monitoring

The operation is currently monitored at monthly intervals for dust. There are currently three monitoring points located on site.

It is proposed to relocate dust monitoring point C to an alternative location on the new site boundary to the east site of the site to ensure there is no impact off-site. Please find attached an assessment by our Consultants regarding the current position of this monitoring point. A drawing is attached with the proposed location of the new dust monitoring point.

No other changes are proposed for Air monitoring points.

Analysing
Testing
Consulting
Calibrating

BHP
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Ireland
Tel +353 61 455399
Fax + 353 61 455447
E Mail bhpcem2@bhp.ie

Mairead Wilkinson
Mr. Binman
Luddenmore
Grange
Kilmallock
Co. Limerick

1st July 2004

Dear Mairead,

Further to my recent site visit to view dust deposition monitoring locations I would like to make the following observation in relation to the location of dust monitoring gauge C. According to the German Standard VDI 2119 Part 2

> *'care shall be taken that the site is not affected by emissions from immediately adjacent sources (for example, trees, building sites) which could limit the representative nature of the measurements required by the measurement task'*

Location C is unsuitable as it is directly adjacent to a waste management process (the stock piling of wood chippings and saw dust) as can be seen in photograph 1. Dust deposition at this location is not representative of dust deposition due to overall site activity. Deposition measurements will more than likely lead to erroneously high values due to large dust particles depositing very close to their source.

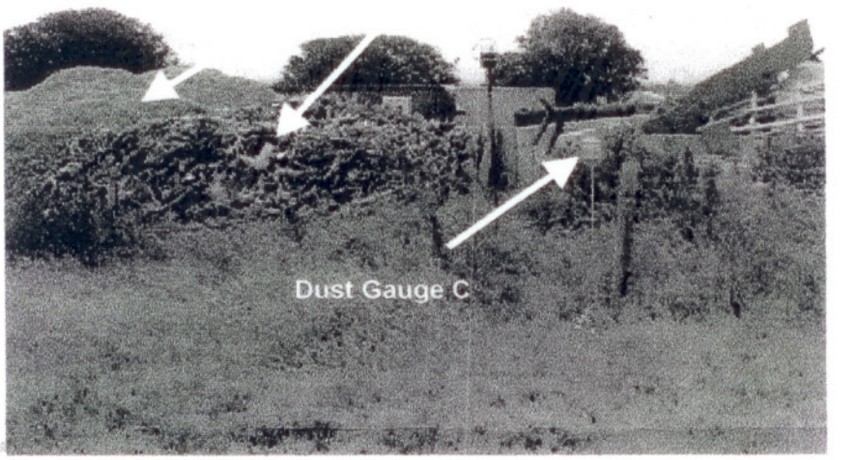
It is my recommendation that dust deposition gauges be relocated to a position further removed from the wood chippings pile as indicated in photograph 2

If you wish to discuss this or any other matter further please do not hesitate to contact me.

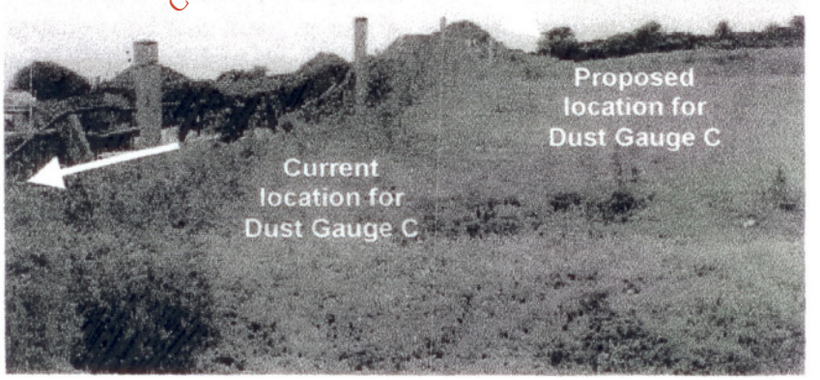
Yours sincerely,

Paul O'Sullivan
Technical Manager, CEM Department
BHP Laboratories

Saw dust and wood chippings



Current dust deposition location C



Proposed location for dust gauge C away from wood chippings pile

GW1
X = 164605
Y = 147209

Vitric-lithic tuff & agglomerate

GW2
X = 164754
Y = 146985

GW08-2
X = 164785
Y = 146975

Basaltic lava flows

LEGEND

Ground Surface Contours

Existing Groundwater Monitoring Points

Proposed Groundwater Monitoring Location

Bedrock Geology

Knockroe Basalt Lava Flow Member

Knockroe Vitric-Lithic Tuff Member

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
XX	dd/mm/yyyy	xxxxxxx	xx	XX

0 10 20 30 40
Meters

Client:
Mr. Binman

Project:
Mr. Binman
Environmental Monitoring

Title:
Relocation of
Groundwater Monitoring Well GW2

Scale @ A3: 1:1,000

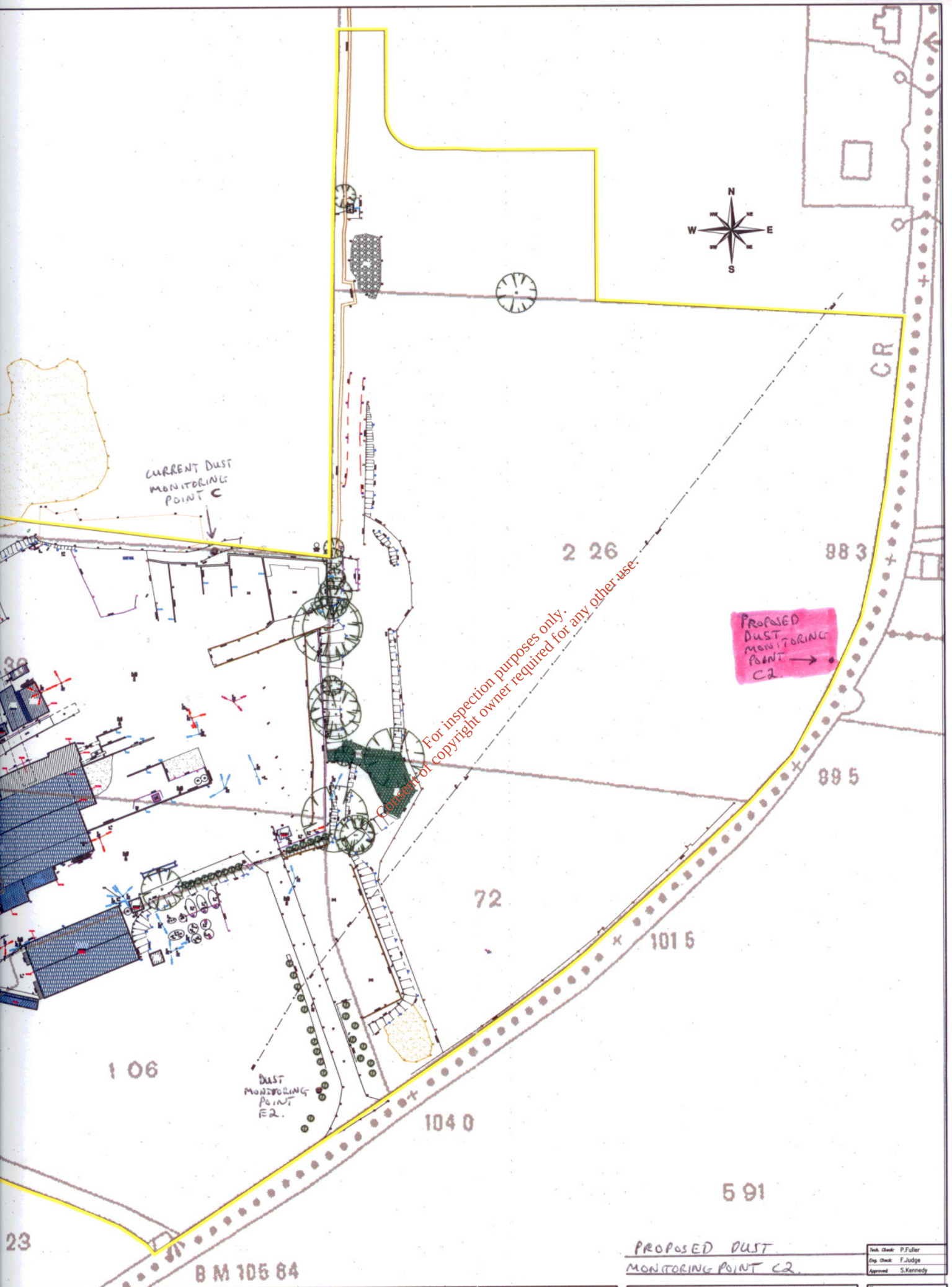
Prepared by:	Checked:	Date:
PC	PC	JUL 2008

Project Director: B.Downes

TOBIN
Patrick J. Tobin & Co. Ltd.
TOBIN Consulting Engineers,
Northpoint House, Northpoint Business Park,
New Mallow Road, Cork, Ireland.
tel: +353-(0)21-4308624
fax:+353-(0)21-4308625
e-mail: cork@tobin.ie
www.tobin.ie

Drawing No.: 3076-2500

Issue: A



PROPOSED DUST MONITORING POINT C2.

ND
D NEW WASTE BOUNDARY
EPA WASTE LICENCE BOUNDARY

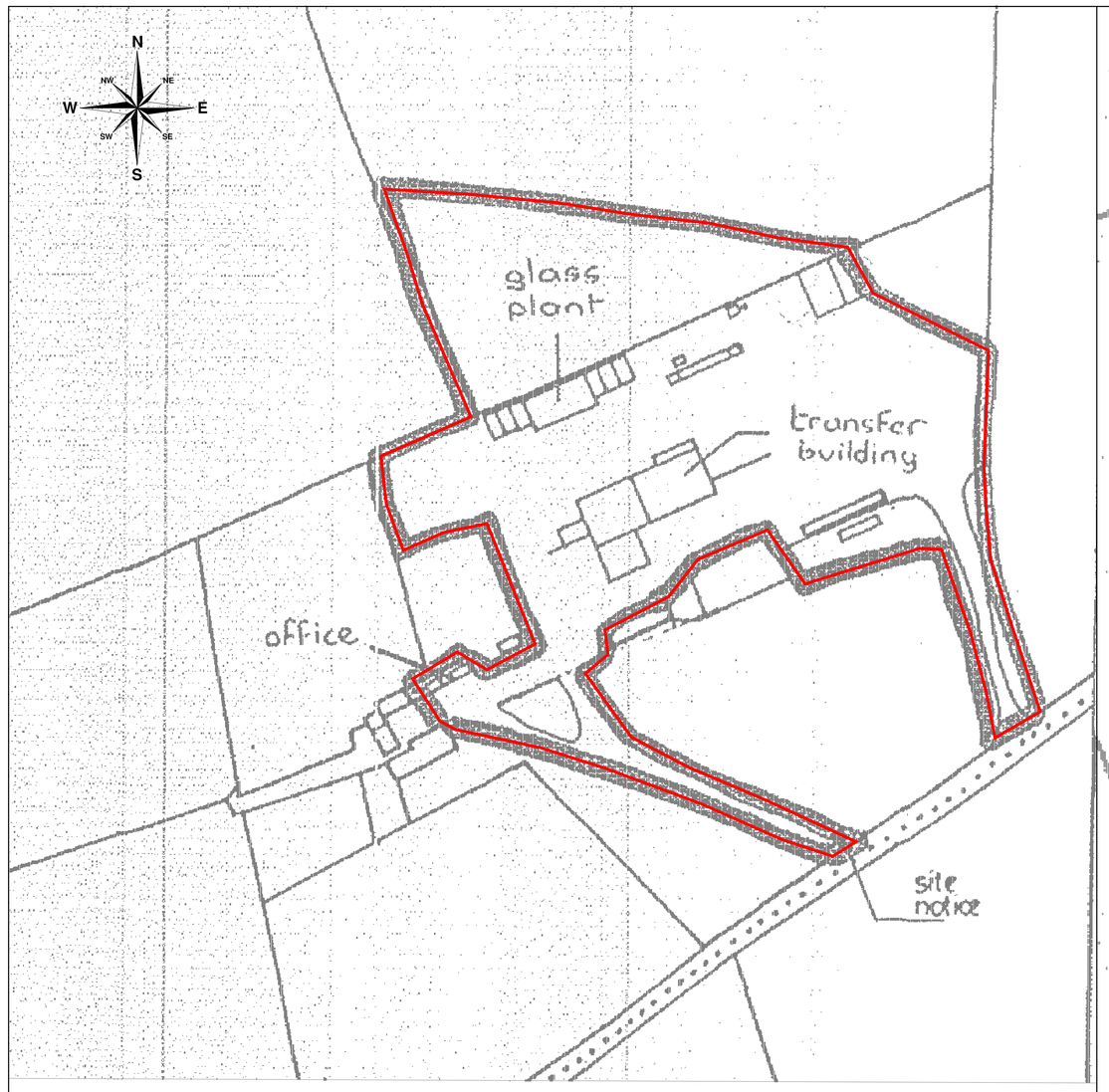
REV.	AMENDMENT	BY	DATE

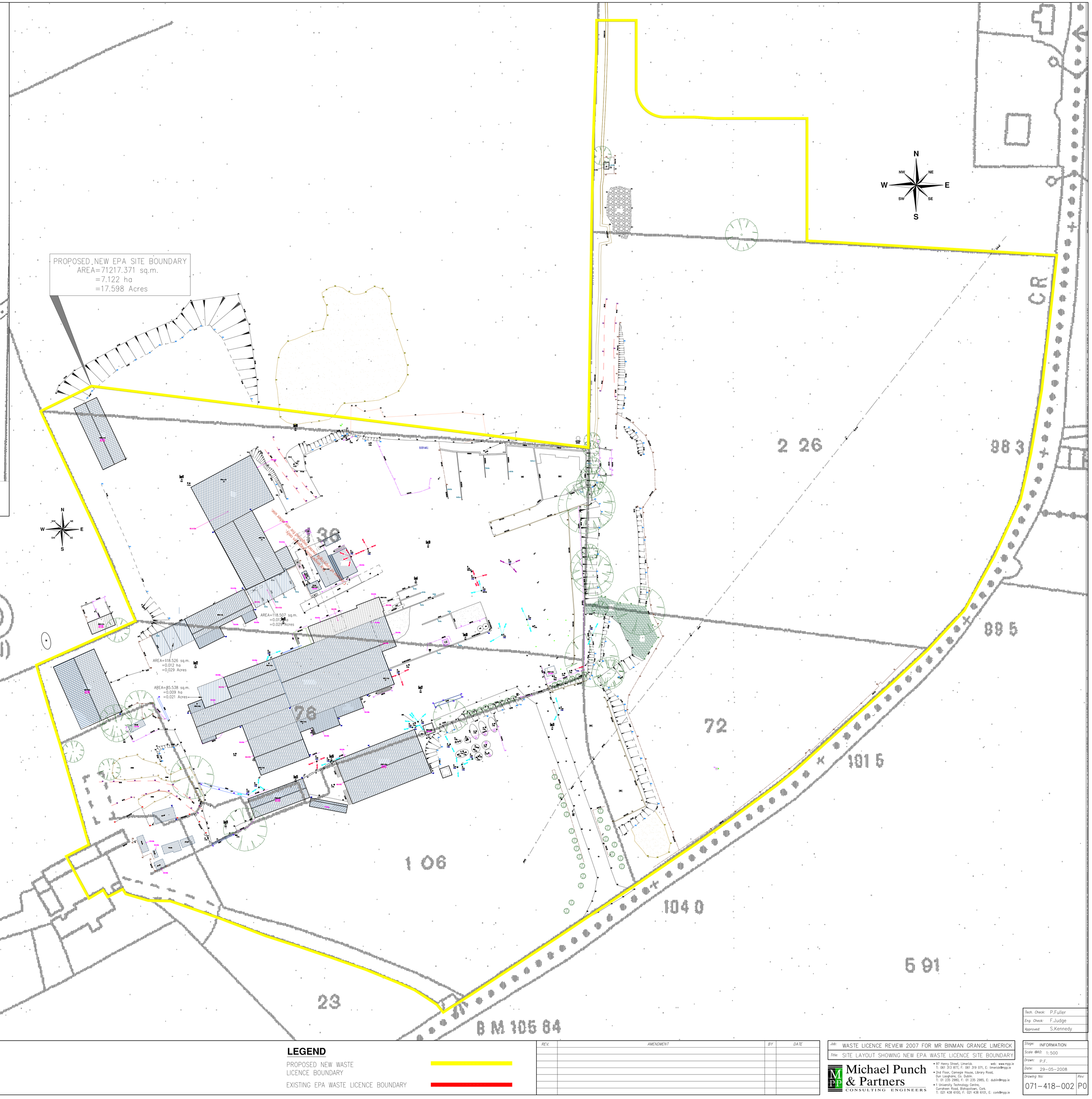
Job: WASTE LICENCE REVIEW 2007 FOR MR BINMAN GRANGE LIMERICK
Title: SITE LAYOUT SHOWING NEW EPA WASTE LICENCE SITE BOUNDARY

Michael Punch & Partners
CONSULTING ENGINEERS

Tech. Check: P.Fuller
Eng. Check: F.Judge
Approved: S.Kennedy

Stage: INFORMATION
Scale @A2: 1:500
Drawn: P.F.
Date: 29-05-2008
Drawing No: 071-418-002
Rev: P0





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4868-C
4929-B
4930-A

LEGEND

PROPOSED NEW WASTE LICENCE BOUNDARY

EXISTING EPA WASTE LICENCE BOUNDARY

REV.	AMENDMENT	BY	DATE

Job: WASTE LICENCE REVIEW 2007 FOR MR BINMAN GRANGE LIMERICK
Title: SITE LAYOUT SHOWING NEW EPA WASTE LICENCE SITE BOUNDARY

Michael Punch & Partners CONSULTING ENGINEERS
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web: www.mpp.ie

Stage: INFORMATION
Scale @A0: 1:500
Drawn: P.F.
Date: 29-05-2008
Drawing No.: 071-418-002 | Rev: P0

Tech. Check: P.Fuller
Eng. Check: F.Judge
Approved: S.Kennedy

Attachment F.5

Groundwater Well Monitoring Point Change

There are two existing groundwater monitoring wells associated with the facility, GW1 (upstream) and GW2 (downstream). Ongoing monitoring of these wells has clearly demonstrated that there has been no impact on the groundwater quality from the facility.

Due to construction of the new road for access/egress to/from the facility it will be necessary to relocate the downstream monitoring well to a point adjacent to the existing well location. Following consultation with the Consultants that conduct the groundwater monitoring , the most appropriate relocation point for the well was recommended and is marked in the attached drawing. The new monitoring point will be called GW08-2.

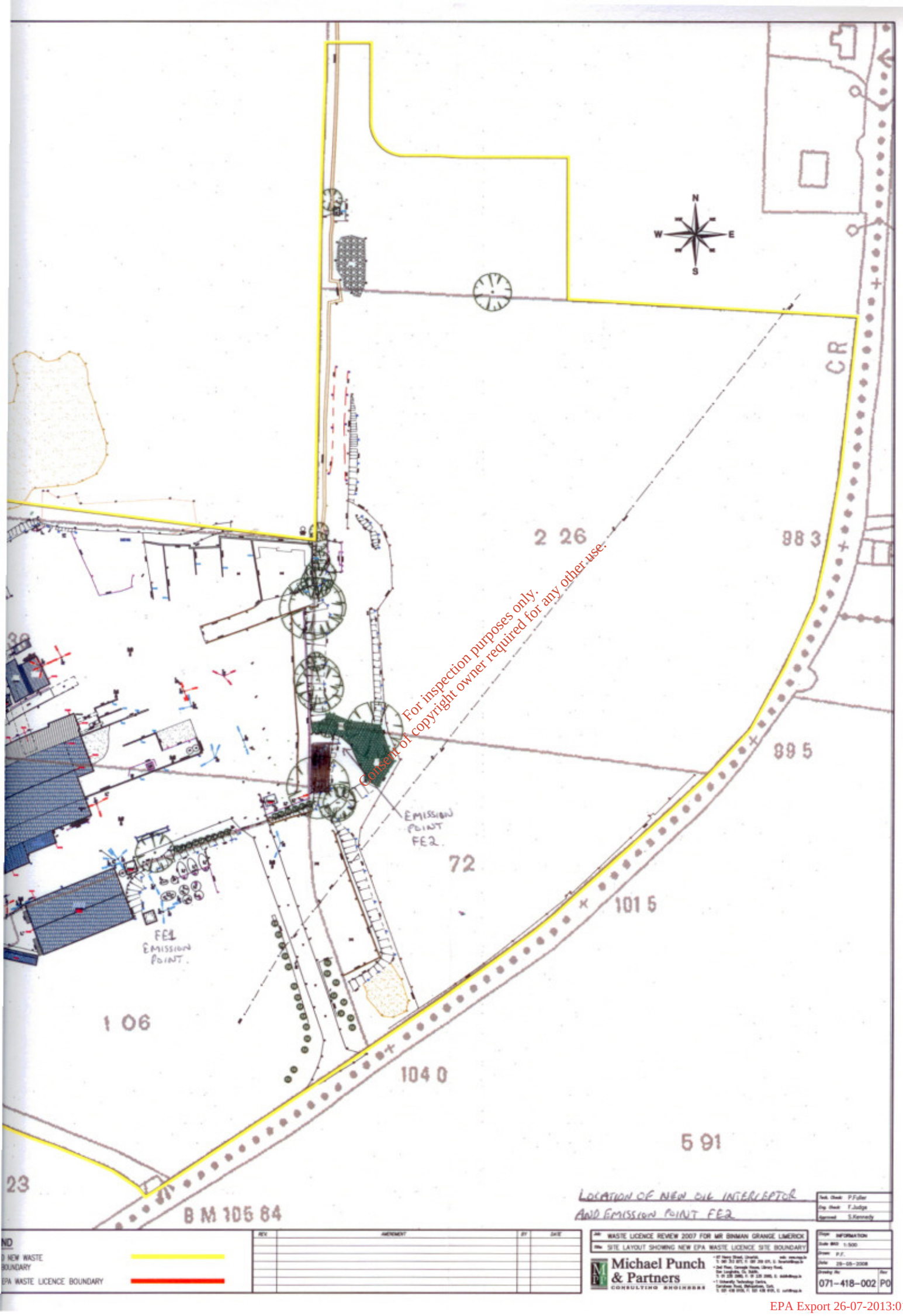
Oil Interceptor Discharge Monitoring Point

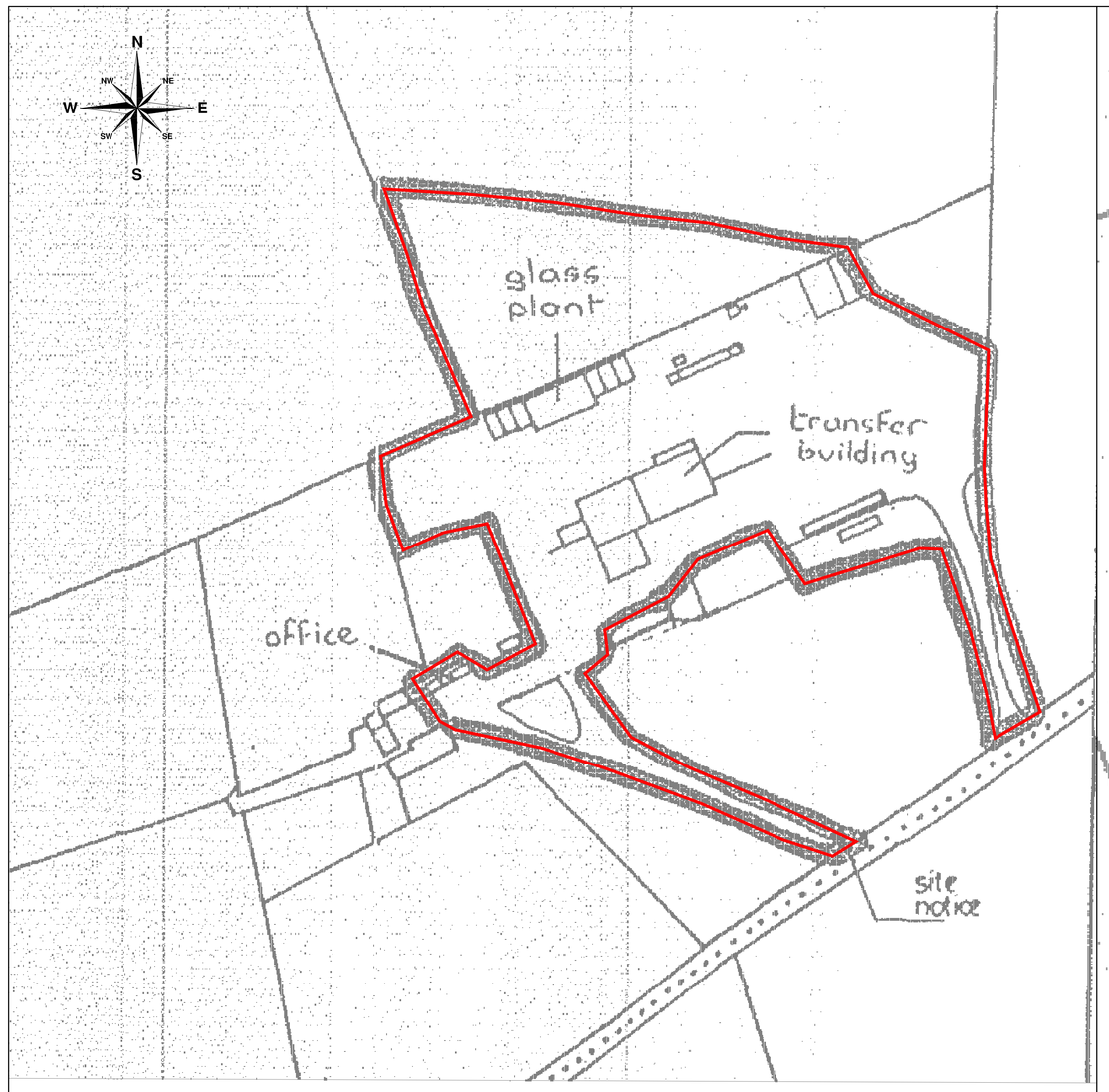
For emission point FE2, the discharge from the oil interceptor, it is proposed to replace the existing oil interceptor with an NS200 Klargester Class1 Oil Interceptor. Please find attached a drawing detailing the proposed location of the oil interceptor and the emission point FE2.

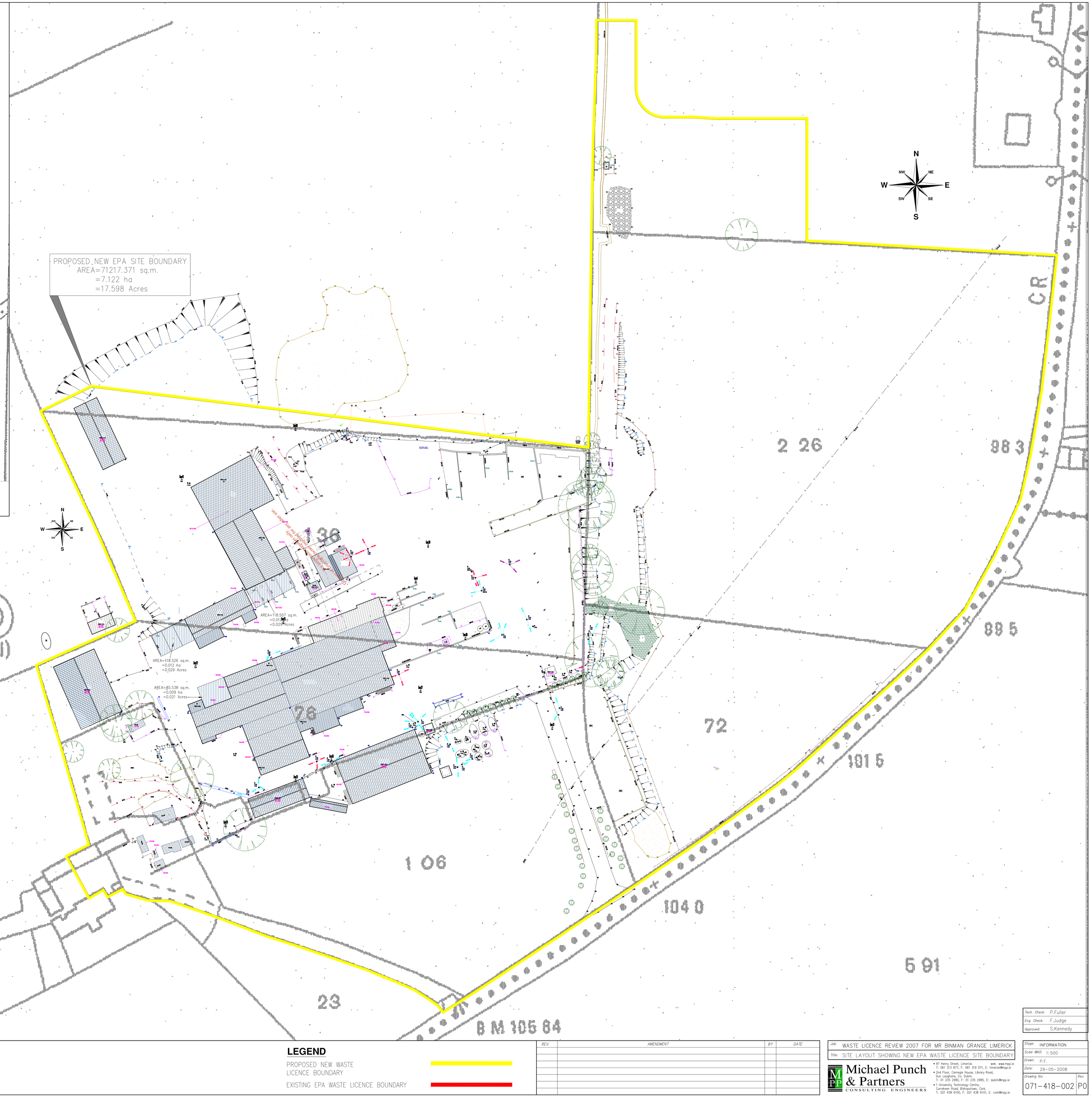
TABLE E.4(i): EMISSIONS TO GROUNDWATER (1 Page for each emission point)

Emission Point or Area: Stormwater Discharge from Oil Interceptor

Emission Point/Area Ref. N^{o}:	FE2
Emission Pathway: (borehole, well, percolation area, soakaway, landspreading, etc.)	Soakaway (proposed) adjacent to soakaway for current oil interceptor
Location :	South East corner of existing site boundary (See drawing)
Grid Ref. (10 digit, 5E,5N):	(164635E, 147221N)
Elevation of discharge: (relative to Ordnance Datum)	113.6m
Aquifer classification for receiving groundwater body:	Refer to original EIS Report, Section 5
Groundwater vulnerability assessment (including vulnerability rating):	Refer to original EIS Report, Section 5
Identity and proximity of groundwater sources at risk (wells, springs, etc):	Refer to original EIS Report, Section 5
Identity and proximity of surface water bodies at risk:	Refer to original EIS Report, Section 5







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LEGEND

PROPOSED NEW WASTE LICENCE BOUNDARY

EXISTING EPA WASTE LICENCE BOUNDARY

REV.	AMENDMENT	BY	DATE

Job: WASTE LICENCE REVIEW 2007 FOR MR BINMAN GRANGE LIMERICK
Title: SITE LAYOUT SHOWING NEW EPA WASTE LICENCE SITE BOUNDARY

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web: www.mpp.ie

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Drawn: P.F.
Date: 29-05-2008
Drawing No.: 071-418-002 | Rev: P0

Tech. Check: P.Fuller
Eng. Check: F.Judge
Approved: S.Kennedy

Attachment F.6

Noise

a) See attached drawing for the current noise sensitive location monitoring points. There are no proposed changes to the existing noise monitoring conditions.

N
NW
NE
W
E
SW
SE
S

NOISE MONITORING POINT 03
NSL-3 RYAN'S RESIDENCE

NOISE MONITORING POINT 01
NSL-1 POWER'S RESIDENCE

NOISE MONITORING POINT 02
NSL-2 HENNESSY'S RESIDENCE

NOISE MONITORING POINT 04
NSL-4 MAGUIRE'S RESIDENCE

Reservoir
(Limerick Co Council)

BM 105.64

BALLYBRICKEN NORTH
BAILE UÍ BHRICÍN THUAIDH

Leagaun
(Site 0129

5 77 · 3 60 · 2 84 · 3 91 · 3 63 · 2 26 · 98 3 · 89 5 · 72 · 101 5 · 1 06 · 104 0 · 5 91 · 97 · 51 · 23 · 1 07 · 1 40 · 103 0 · 4 07 · 3 36 · 99 2 · 2 37 · 94 3 · 39 · 93 6 · 4 71 · 1.14 · 0.64 · 0.23 · 0.24 · 4.17 · 4.40 · 5.91 · 3.68 · 2.40 · 3.94 · 0.20 · 3.78 · 1.43 · 2.71 · 3.38 · 8.68 · 0.39 · 4.42 · 3.13 · 1.94 · 0.47 · 0.49 · 0.75 · 1.80 · 1.44 · 1.02 · 1.02 · 0.51

CR · CE

Tech. Check:	P.Fuller
Eng. Check:	F.Judge
Approved:	S.Kennedy

Stage:	INFORMATION
Scale @A0:	1:1250
Drawn:	P.F.
Date:	23-05-2008
Drawing No:	071-418-004
Rev:	P1

Job: WASTE LICENCE REVIEW 2007 FOR MR BINMAN GRANGE LIMERICK

Title: SITE LAYOUT SHOWING NOISE MONITORING POINTS

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REV.	AMENDMENT	BY	DATE
P1	NOISE MONITORING POINTS GIVEN OFFICIAL TITLES/NAMES	P.F.	12-06-2008

ORDNANCE SURVEY REFERENCE:

4867-D	
4867-C	
4929-B	4929
4930-A	4930