

# Appendix H

## Hydrology



## Appendix H1

Hydrological features recorded during site walkovers  
and can be seen in the photographs

Site: Ballynakill

Reference Number: 1

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Localised depression at Turbine 5 location

Notes: Depression 80m length by 20 m wide (Pic 1283) looking north at marsh depression.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 2

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Turbine

Turbine No.:	T5
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Notes: (Pic1284) looking north to T5 in grassland, localised depression. Located on drain also (Feature 3)

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 3

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Drainage Ditch

Channel width (m):	1.5
Channel height (m):	0.5
Channel flow direction:	NW - SE

Notes: Ditch connecting to Feature 4. Drainage ditch drains land where turbine T5 is located.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 4

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Agricultural Drain Crossing

Channel width (m):	1
Channel height (m):	1

Notes:

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo.



D/S Photo.

View D/S Photo - No photo taken.





Site: Ballynakill

Reference Number: 5

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Drainage Ditch

Channel width (m):	2
Channel height (m):	1
Channel flow direction:	W - E

Notes:

**Photos**



**Photo Notes**

U/S Photo - No photo taken.

View U/S Photo - No photo taken.

D/S Photo.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 6

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : High point in field where T4 is located.

Notes: (Pic 1291) East at high point (60m length by 20 m wide)

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

<p>Site: Ballynakill</p> <p>Reference Number: 7</p> <p>Survey date: 02/07/2013</p> <p><b><u>Survey Info:</u></b></p> <p>Weather: Slightly Overcast;</p> <p>Ground Conditions: Grassland (Firm);</p> <p>Vegetation: Dry; Firm</p> <p>Feature Type : Turbine T4</p> <p>Notes: (Pic 1292) Looking south at Turbine T4 location. Located in grassland with drainage ditch.</p>	<p><b><u>Photos</u></b></p> 	<p><b><u>Photo Notes</u></b></p> <p>U/S Photo.</p> <p>View U/S Photo - No photo taken.</p> <p>D/S Photo - No photo taken.</p> <p>View D/S Photo - No photo taken.</p>
<p>Site: Ballynakill</p> <p>Reference Number: 8</p> <p>Survey date: 02/07/2013</p> <p><b><u>Survey Info:</u></b></p> <p>Weather: Slightly Overcast;</p> <p>Ground Conditions: Grassland (Firm);</p> <p>Vegetation: Dry; Firm</p> <p>Feature Type : Other</p> <p>Notes: Potential development noted 500m south of turbine T4 location as tower crane lane.</p>	<p><b><u>Photos</u></b></p>	<p><b><u>Photo Notes</u></b></p> <p>U/S Photo - No photo taken.</p> <p>View U/S Photo - No photo taken.</p> <p>D/S Photo - No photo taken.</p> <p>View D/S Photo - No photo taken.</p>

Site: Ballynakill

Reference Number: 9

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Drainage Ditch

Channel width (m):	3
Channel height (m):	2
Channel flow direction:	E - W

Notes: Drainage ditch at Turbine T4 location

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 10

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Crossing in field

Notes: Crossing in field, 5m wide. Channel 3.5m wide by 2.5m deep, flowing west to east. Pipe 500mm

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo.



D/S Photo.

View D/S Photo.



Site: Ballynakill

Reference Number: 11

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Stream

Channel width (m):	3.5
Channel height (m):	2.5
Channel flow direction:	S - N

Notes: Stream flowing from Feature 10

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 12

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Turbine

Turbine No.:	T3
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Notes: (Pic1302) Located in well drained grassland, draining to Feature 11)

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 13

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Agricultural Crossing

Channel width (m):	3
Channel height (m):	2
Crossing width (m):	4

Notes: Pipe 700mm

**Photos**



**Photo Notes**

U/S Photo.



View U/S Photo.



D/S Photo.



View D/S Photo.

Site: Ballynakill

Reference Number: 14

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : unknown Feature

Notes: Possible water well on proposed access track

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 15

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Stream

Channel flow direction:	S - N
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Notes: Stream T junction. Track 4.5m wide.

**Photos**



**Photo Notes**

U/S Photo - No photo taken.

View U/S Photo - No photo taken.

D/S Photo.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 16

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

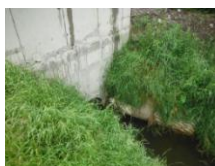
Vegetation: Dry; Firm

Feature Type : Agricultural Crossing

Channel width (m):	8
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Notes: Pipe 1.2m

**Photos**





**Photo Notes**

U/S Photo.

View U/S Photo.

D/S Photo.

View D/S Photo.

<p>Site: Ballynakill</p> <p>Reference Number: 17</p> <p>Survey date: 02/07/2013</p> <p><b><u>Survey Info:</u></b></p> <p>Weather: Slightly Overcast;</p> <p>Ground Conditions: Grassland (Firm);</p> <p>Vegetation: Dry; Firm</p> <p>Feature Type : Turbine</p> <table border="1" data-bbox="105 801 667 855"> <tr> <td>Turbine No.:</td> <td>T6</td> </tr> </table> <p>Notes: (Pic1313) Looking south east to T6. Located in well drained well managed grassland. Open field with no cattle grazing.</p>	Turbine No.:	T6	<p><b><u>Photos</u></b></p> 	<p><b><u>Photo Notes</u></b></p> <p>U/S Photo.</p> <p>View U/S Photo - No photo taken.</p> <p>D/S Photo - No photo taken.</p> <p>View D/S Photo - No photo taken.</p>
Turbine No.:	T6			
<p>Site: Ballynakill</p> <p>Reference Number: 18</p> <p>Survey date: 02/07/2013</p> <p><b><u>Survey Info:</u></b></p> <p>Weather: Slightly Overcast;</p> <p>Ground Conditions: Grassland (Firm);</p> <p>Vegetation: Dry; Firm</p> <p>Feature Type : Possible pluvial depression in field where T6 is proposed to be located.</p> <p>Notes: (Pic 1314) Shows ponding evident here (30x20m wide). Gradient of land flowing to this point</p>	<p><b><u>Photos</u></b></p> 	<p><b><u>Photo Notes</u></b></p> <p>U/S Photo.</p> <p>View U/S Photo - No photo taken.</p> <p>D/S Photo - No photo taken.</p> <p>View D/S Photo - No photo taken.</p>		

Site: Ballynakill

Reference Number: 19

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Marsh land zone, with cattle grazing

Notes: (Pic 1315) At marsh area

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 20

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Drainage Ditch

Channel width (m):	2
Channel height (m):	1
Channel flow direction:	W - E

Notes: Beginning of the drainage ditch near T7. Land drains, s 200mm plastic pipes, flowing to drainage ditch

**Photos**



**Photo Notes**

U/S Photo - No photo taken.

View U/S Photo - No photo taken.

D/S Photo.

View D/S Photo - No photo taken.



Site: Ballynakill

Reference Number: 21

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Turbine

Turbine No.:	T7
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Notes: (Pic 1317) Photograph taken at T7 location. Located in grassland - cattle grazing. T7 location draining to Feature 20 as land drains evident.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 22

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Turbine

Turbine No.:	T8
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Notes: Located in grassland area. Well drained, managed. No drainage evident. Railway line running approx. 200m from T8.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 23

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Drainage Ditch

Channel width (m):	2.5
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Channel height (m):	1
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Notes: Drainage ditch at site boundary with railway line near T8

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 24

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Turbine

Turbine No.:	T10
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Notes: (Pic 1321) looking west to T10. Located in grassland. No drainage apparent but well drained.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 25

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Road

Road width (m):	3
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Notes: Existing track running N-S (Pic 1322)  
Photograph taken looking south.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 26

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Turbine

Turbine No.:	T9
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Notes: (Pic 1323) Looking NW to T9. Located in general depression, low point of surrounding fields. Grassland area, well managed.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 27

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Turbine

Turbine No.:	T2
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Notes: (Pic 1324) Looking NE at T2. Located in grassland, in undulating land. Cattle grazing.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 28

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Other

Channel width (m):	3
Channel height (m):	0.8
Crossing width (m):	4.2

Notes: Concrete Pipe 900mm. Flowing SE-W

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo.

D/S Photo.

View D/S Photo.

Site: Ballynakill

Reference Number: 29

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Marsh bog area - very wet zone

Notes: (Pic 1329) Looking East. Located next to the railway line

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 30

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Stream

Channel width (m):	2
Channel height (m):	1.5

Notes: Stream T junction. Near T1

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 31

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Turbine

Turbine No.:	T1
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Notes: (Pic 1332) Looking west at T1. T1 located in localised depression in field. Evidence of marsh area.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 32

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Bridge

Channel width (m):	8
Channel height (m):	3
Road width (m):	6
Bridge width (m):	6.5

Notes: Bridge crossing - single stone Arch.3m square section, 3m to arch, 8m wide.channel. Flowing SW-NE

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo.

D/S Photo.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 33

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Bridge

Channel width (m):	12
Channel height (m):	5
Road width (m):	4.6
Bridge width (m):	5

Notes: Bridge crossing. Single stone arch

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 34

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Bridge

Road width (m):	4
Bridge width (m):	5

Notes: Bridge crossing. Stone arch bridge spanning onto floodplain area.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo.



D/S Photo.



View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 35

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Bridge

Road width (m):	5
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Bridge width (m):	6
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Notes: Bridge crossing. Single stone Arch bridge. Pipe 1.5m

**Photos**



U/S Photo.



View U/S Photo.



D/S Photo.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 36

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Bridge

Culvert width (m):	1
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Culvert height (m):	1.5
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Bridge width (m):	6
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Notes: Conveying stream which drains the site

**Photos**

**Photo Notes**

U/S Photo - No photo taken.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.





# Hydrology Survey Information

Site: Ballynakill

Reference Number: 37

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Bridge

Culvert width (m):	2
Culvert height (m):	2
Road width (m):	9
Bridge width (m):	12

Notes:

**Photos**

**Photo Notes**

U/S Photo - No photo taken.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 38

Survey date: 02/07/2013

**Survey Info:**

Weather: Slightly Overcast;

Ground Conditions: Grassland (Firm);

Vegetation: Dry; Firm

Feature Type : Road crossing

Notes: Road crossing north of T2 (north of canal); Culvert inaccessible

**Photos**

**Photo Notes**

U/S Photo - No photo taken.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 39

Survey date: 11/11/2014

**Survey Info:**

Weather: Wet;

Ground Conditions: Agricultural Land;

Vegetation: Wet;

Feature Type : Bridge

Channel width (m):	3.6
Channel height (m):	3
Flow depth (m):	0.1
Diameter (m):	0.6
Road width (m):	3

Notes: Deep agricultural field drain. Farm abstractions evident.

**Photos**



**Photo Notes**

U/S Photo.



View U/S Photo.



D/S Photo.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 40

Survey date: 11/11/2014

**Survey Info:**

Weather: Wet;

Ground Conditions: Agricultural Land;

Vegetation: Wet;

Feature Type : Drainage Ditch

Channel width (m):	3
Channel height (m):	3
Channel flow direction:	S - N

Notes: Junction where road crosses to T2. Drain runs alongside road on LHS on approach to T2 and joins stream here. Existing road width 3 m with large passing bay

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.



View D/S Photo.

Site: Ballynakill

Reference Number: 41

Survey date: 11/11/2014

**Survey Info:**

Weather: Wet;

Ground Conditions: Agricultural Land;

Vegetation: Wet;

Feature Type : Bridge

Channel width (m):	3.7
Channel height (m):	4
Flow depth (m):	0.1
Diameter (m):	1.2
Road width (m):	6
Bridge width (m):	3.7

Notes: 1.1 m high concrete parapet wall at bridge. Culvert size is approx.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 42

Survey date: 11/11/2014

**Survey Info:**

Weather: Wet;

Ground Conditions: Agricultural Land;

Vegetation: Wet;

Feature Type : Road

Road width (m):	3
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Notes: Existing road at proposed borrow pit location. Stagnant pool in existing borrow pit.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo. Existing road to location of T10



D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 43

Survey date: 11/11/2014

**Survey Info:**

Weather: Wet;

Ground Conditions: Agricultural Land;

Vegetation: Wet;

Feature Type : Culvert

Diameter (m):	0.8
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Length (m):	9
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Notes: Road width 5 m. Depth of water in channel 0.4 m. Channel width 4.5 m

**Photos**



**Photo Notes**

U/S Photo. Looking towards the canal. Field slopes towards drain from both sides



View U/S Photo.



D/S Photo.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 44

Survey date: 11/11/2014

**Survey Info:**

Weather: Wet;

Ground Conditions: Agricultural Land;

Vegetation: Wet;

Feature Type : Stream

Channel width (m):	3
Channel height (m):	3
Channel flow direction:	SE - NW

Notes: Depth of flow 0.3 m. Field draining from east is waterlogged

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Ballynakill

Reference Number: 45

Survey date: 11/11/2014

**Survey Info:**

Weather: Wet;

Ground Conditions: Agricultural Land;

Vegetation: Wet;

Feature Type : Bridge

Channel width (m):	3
Channel height (m):	2.5
Flow depth (m):	0.6
Diameter (m):	0.8
Road width (m):	3
Bridge width (m):	3

Notes: Concrete headwall over circular culvert at field entrance crossing near T1. Land adjacent is undulating

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.



View D/S Photo.

Site: Cloncumber

Reference Number: 1

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Mature Forest; Woodland / scrub;

Vegetation: firm

Feature Type : Drainage Ditch

Channel width (m):	1.5
Channel height (m):	1
Channel flow direction:	SE - NW

Notes: Existing road width is 3m.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Cloncumber

Reference Number: 2

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Mature Forest; Woodland / scrub;

Vegetation: firm

Feature Type : Woodland scrub

Notes:

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Cloncumber

Reference Number: 3

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Mature Forest; Woodland / scrub;

Vegetation: firm

Feature Type : Bridge

Road width (m):	3
Bridge width (m):	5

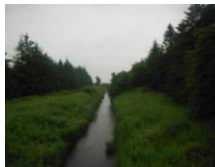
Notes: masonry arch, 4 m high, 5m wide

**Photos**



U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.



View D/S Photo.

Site: Cloncumber

Reference Number: 4

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Mature Forest; Woodland / scrub;

Vegetation: firm

Feature Type : Track east of turbine

Turbine No.:	31
--------------	----

Notes: Track draining to drainage ditch, 1m wide by 1m deep (pic 1107) looking west, flowing west

**Photos**



U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Cloncumber

Reference Number: 5

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Mature Forest; Woodland / scrub;

Vegetation: firm

Feature Type : Mature coniferous forest

Notes: North east corner of the site (pic 1110)

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Cloncumber

Reference Number: 6

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Mature Forest; Woodland / scrub;

Vegetation: firm

Feature Type : Drainage Ditch

Channel width (m):	1.5
Channel height (m):	1
Channel flow direction:	E - W

Notes:

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.



Site: Cloncumber

Reference Number: 7

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Mature Forest; Woodland / scrub;

Vegetation: firm

Feature Type : Turbine

Turbine No.:	32
--------------	----

Notes: Turbine in mixed forestry (Pic 1113)

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Cloncumber

Reference Number: 8

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Mature Forest; Woodland / scrub;

Vegetation: firm

Feature Type : Road

Notes: Over the edge drainage to 1m wide by 1m deep drains

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Cloncumber

Reference Number: 9

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Mature Forest; Woodland / scrub;

Vegetation: firm

Feature Type : Road

Notes: Start of access track to Turbines T31 and T32

**Photos**

**Photo Notes**

U/S Photo - No photo taken.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Cloncumber

Reference Number: 10

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Tillage Field

Vegetation: firm

Feature Type : Turbine

Turbine No.:	33
--------------	----

Notes: Turbine 33 located in tillage field draining west (Picture 1115 looking SE)

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Cloncumber

Reference Number: 11

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Tillage Field

Vegetation: firm

Feature Type : Bridge

Channel width (m):	8
Channel height (m):	3.5
Road width (m):	3.5

Notes: Concrete bridge and steel RSJ

**Photos**



U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.



View D/S Photo.

Site: Cloncumber

Reference Number: 12

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Mature Forest; Woodland / scrub;

Vegetation: firm

Feature Type : Berm

Notes: Berm to North of river 1m high

**Photos**



U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Cloncumber

Reference Number: 13

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Firm

Vegetation: Grassland

Feature Type : Drainage Ditch

Channel width (m):	2.5
Channel height (m):	1.5
Channel flow direction:	S - N

Notes: Drainage ditch draining T35

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Cloncumber

Reference Number: 14

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Firm

Vegetation: Grassland

Feature Type : Turbine

Turbine No.:	35
--------------	----

Notes: Turbine located in grassland draining to Feature 13 (Picture 1123)

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Cloncumber

Reference Number: 15

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Firm

Vegetation: Grassland

Feature Type : Berm

Notes: Berm on river south side.- 2m high but breached by streams entering river (Picture 1124)

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Cloncumber

Reference Number: 16

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Firm

Vegetation: Grassland

Feature Type : Pipe

Diameter (m):	0.6
---------------	-----

Notes: Drain crossing on track (Road 2m wide). Channel 1.5m wide by 1m deep, flowing east

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.



View D/S Photo.

Site: Cloncumber

Reference Number: 17

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Firm

Vegetation: Grassland

Feature Type : Pipe

Diameter (m):	0.6
---------------	-----

Notes: Crossing on existing track. Concrete pipe

**Photos**



U/S Photo.



View U/S Photo.



D/S Photo.

View D/S Photo - No photo taken.

Site: Cloncumber

Reference Number: 18

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Firm

Vegetation: Grassland

Feature Type : Drainage ditch east of Turbine

Turbine No.:	34
--------------	----

Notes: Turbine located west of drainage ditch (1m x 1m) in grassland (Pic 1131). Photograph taken looking south along drainage ditch. Approximately 80m from canal.

**Photos**





U/S Photo - No photo taken.

View U/S Photo.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

<p>Site: Cloncumber</p> <p>Reference Number: 19</p> <p>Survey date: 02/07/2013</p> <p><b><u>Survey Info:</u></b></p> <p>Weather: Wet;</p> <p>Ground Conditions: Firm</p> <p>Vegetation: Grassland</p> <p>Feature Type : Canal bank</p> <p>Notes: 3m high canal embankment, looking south west from Turbine T34</p>	<p><b><u>Photos</u></b></p> 	<p><b><u>Photo Notes</u></b></p> <p>U/S Photo.</p> <p>View U/S Photo - No photo taken.</p> <p>D/S Photo - No photo taken.</p> <p>View D/S Photo - No photo taken.</p>
<p>Site: Cloncumber</p> <p>Reference Number: 20</p> <p>Survey date: 02/07/2013</p> <p><b><u>Survey Info:</u></b></p> <p>Weather: Wet;</p> <p>Ground Conditions: Firm</p> <p>Vegetation: Grassland</p> <p>Feature Type : Canal</p> <p>Notes: Photograph taken of canal at this location showing 5m high berm</p>	<p><b><u>Photos</u></b></p> 	<p><b><u>Photo Notes</u></b></p> <p>U/S Photo.</p> <p>View U/S Photo - No photo taken.</p> <p>D/S Photo - No photo taken.</p> <p>View D/S Photo - No photo taken.</p>

Site: Cloncumber

Reference Number: 21

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Firm

Vegetation: Grassland

Feature Type : Canal berm and track

Notes: 5m high berm visible to right of photograph (Pic 1134)

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Cloncumber

Reference Number: 22

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Firm

Vegetation: Grassland

Feature Type : Drainage Ditch

Channel width (m):	2
Channel height (m):	1
Channel flow direction:	S - N

Notes:

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.



Site: Cloncumber

Reference Number: 23

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Firm

Vegetation: Grassland

Feature Type : Grassland to south of Turbine T36, at end of proposed track

Turbine No.:	South of Turbine T36
--------------	----------------------

Notes: South of Turbine 36, in grassland, draining to Drainage ditch (Feature 22), 150m from canal (Pic1137).

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Cloncumber

Reference Number: 24

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Firm

Vegetation: Grassland

Feature Type : Turbine

Turbine No.:	37
--------------	----

Notes: Turbine 37, located in grassland draining to Drainage Ditch (Feature 25) (Pic 1138)

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Cloncumber

Reference Number: 25

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Firm

Vegetation: Grassland

Feature Type : Drainage Ditch

Channel width (m):	1.5
Channel height (m):	1
Channel flow direction:	E - W

Notes: Draining land at location of Turbine T37

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Cloncumber

Reference Number: 26

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Soft

Vegetation: Grassland

Feature Type : Canal Access



Notes: Canal access area (Pics 1141, 1145, 1146).

**Photos**



**Photo Notes**

U/S Photo.



View U/S Photo.



D/S Photo.

View D/S Photo.

Site: Cloncumber

Reference Number: 27

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Soft

Vegetation: Grassland

Feature Type : Drain at spur to Turbine T38

Turbine No.:	West of T38
--------------	-------------

Notes: Soft grassland, rushes evident (Pic 1142) Photograph taken looking east

**Photos**

**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo.



View D/S Photo.

Site: Cloncumber

Reference Number: 28

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Soft

Vegetation: Grassland

Feature Type : Drainage Ditch

Channel width (m):	2
Channel height (m):	1
Channel flow direction:	SW - NE

Notes:

**Photos**

**Photo Notes**



U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Cloncumber

Reference Number: 29

Survey date: 02/07/2013

**Survey Info:**

Weather: Wet;

Ground Conditions: Soft

Vegetation: Grassland

Feature Type : Bridge

Channel width (m):	9
Channel height (m):	2.5
Road width (m):	4
Bridge width (m):	7

Notes: Agar Bridge. Masonry arch bridge, 3m high and 7 m wide. River is flowing west

**Photos**



**Photo Notes**

U/S Photo.



View U/S Photo.



D/S Photo.

View D/S Photo - No photo taken.

Site: Cloncumber

Reference Number: 30

Survey date:

**Photos**



**Photo Notes**

U/S Photo.

12/11/2014

**Survey Info:**

Weather: Dry;  
Ground Conditions: Grassland (Firm);  
Vegetation: Dry;

Feature Type : Bridge

Channel width (m):	7
Channel height (m):	2
Flow depth (m):	0.5
Culvert Type:	Box Culvert
Culvert width (m):	7
Culvert height (m):	1.5
Road width (m):	5
Bridge width (m):	7

Notes: Cloncumber. Bridge crossing Slate River. Culvert is supported with a steel beam. Existing tracks running parallel to the river to the south of the river.



View U/S Photo.



D/S Photo.



View D/S Photo.

Site: Cloncumber

Reference Number: 31

Survey date: 12/11/2014

**Survey Info:**

Weather: Wet;

Ground Conditions: Grassland (Soft);

Vegetation: Wet;

Feature Type : Stream

Channel width (m):	2
Channel height (m):	1.8
Channel flow direction:	SE - NW

Notes: Water depth 0.1 m. Turn in stream flowing towards Slate River

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Cloncumber

Reference Number: 32

Survey date: 12/11/2014

**Survey Info:**

Weather: Wet;

Ground Conditions: Grassland (Soft);

Vegetation: Wet;

Feature Type : Road

Road width (m):	3
-----------------	---

Notes: Existing road near proposed location for temporary compound

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Derrybrennan

Reference Number: 1

Survey date: 07/06/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm);

Vegetation: good

Feature Type : Grassland

Turbine No.:	South of turbine T27
--------------	----------------------

Notes: South of T27 location, well drained grassland.

**Photos**



**Photo Notes**

U/S Photo.

[View U/S Photo.](#)

D/S Photo.

[View D/S Photo.](#)

Site: Derrybrennan

Reference Number: 2

Survey date: 07/06/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm);

Vegetation: good

Feature Type : Turbine

Turbine No.:	T28
--------------	-----

Notes: T28 location, well drained grassland

**Photos**



**Photo Notes**

U/S Photo - No photo taken.

[View U/S Photo.](#)

D/S Photo - No photo taken.

[View D/S Photo - No photo taken.](#)

Site: Derrybrennan

Reference Number: 3

Survey date: 07/06/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm);

Vegetation: good

Feature Type : Drainage Ditch

Channel width (m):	2
Channel height (m):	2

Notes: Field drainage

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Derrybrennan

Reference Number: 4

Survey date: 07/06/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm);

Vegetation: good

Feature Type : Drainage Ditch

Channel width (m):	2
Channel height (m):	2

Notes: Field drainage

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.



Site: Derrybrennan

Reference Number: 5

Survey date: 07/06/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm);

Vegetation: good

Feature Type : Bridge

Channel width (m):	4.1
Channel height (m):	3
Flow depth (m):	0.1
Road width (m):	6.3

Notes: Road crossing, twin arch, both 4.1m wide, 3m high, 6.3m crossing width, 0.1 flow depth. River is flowing East-West

**Photos**



U/S Photo.



View U/S Photo.



D/S Photo.



View D/S Photo.

Site: Derrybrennan

Reference Number: 6

Survey date: 18/07/2013

**Survey Info:**

Weather: Dry; Warm

Ground Conditions: Worked Bog; Mature Forest;

Vegetation: Firm

Feature Type : Bridge

Culvert width (m):	2.5
Culvert height (m):	1.6
Bridge width (m):	3.9

Notes: Stream crossing 3.9m wide. Weir on downstream side. 0.3 m deep. Box culvert as described above. Stream flowing North to South

**Photos**



U/S Photo.



View U/S Photo.



D/S Photo.



View D/S Photo.

Site: Derrybrennan

Reference Number: 7

Survey date: 18/07/2013

**Survey Info:**

Weather: Dry; Warm; Other;

Ground Conditions: Worked Bog; Mature Forest;

Vegetation: Firm

Feature Type : Culvert

Notes: Stream crossing (5m wide). Channel 4m wide by 3m deep. 3 pipes: 2 by 1m diameter, 1 by 0.4m diameter.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Derrybrennan

Reference Number: 8

Survey date: 12/11/2014

**Survey Info:**

Weather: Wet;

Ground Conditions: Grassland (Firm);

Vegetation: Dry;

Feature Type : Drainage Ditch

Channel width (m):	1.7
Channel height (m):	1
Channel flow direction:	S - N

Notes: Derrybrennan, Ditch blocked up at crossing into field. No culvert evident

**Photos**



U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Derrybrennan

Reference Number: 9

Survey date: 12/11/2014

**Survey Info:**

Weather: Wet;

Ground Conditions: Grassland (Firm);

Vegetation: Dry;

Feature Type : Drainage Ditch

Channel width (m):	2
Channel height (m):	2
Channel flow direction:	W - E

Notes: Derrybrennan. Ditch to the north east of T27 location.

**Photos**



U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Derrybrennan

Reference Number: 10

Survey date: 12/11/2014

**Survey Info:**

Weather: Wet;

Ground Conditions: Grassland (Firm);

Vegetation: Dry;

Feature Type : Turbine

Turbine No.:	27
--------------	----

Notes: Looking East from 200 m at proposed turbine location for T27 in mature and felled forested area.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 1  
 Survey date: 05/06/2013

**Survey Info:**

Weather: Dry; Slightly Overcast;  
 Ground Conditions: Natural Bog; Young Forest;  
 Vegetation:

Feature Type : Bridge

Channel width (m):	3
Channel height (m):	2
Flow depth (m):	0.3
Road width (m):	3.5

Notes: Bridge crossing, 3m wide, 2m high, 0.3m flow depth, Flow west to east. Drainage ditch 3m wide by 2m high. Crossing width 3.5m

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.



View D/S Photo.

Site: Drehid  
 Reference Number: 2  
 Survey date: 05/06/2013

**Survey Info:**

Weather: Dry; Slightly Overcast;  
 Ground Conditions: Natural Bog; Young Forest;  
 Vegetation:

Feature Type : Road crossing

Notes: Flow through bog, 2 m crossing, drainage ditch, 1.5 m wide by 1 m high

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 3  
 Survey date: 05/06/2013

**Survey Info:**

Weather: Dry; Slightly Overcast;  
 Ground Conditions: Natural Bog; Young Forest;  
 Vegetation:  
 Feature Type : Other

Notes: Young forest and natural bog. Drainage ditch with dimensions 1 m wide x 1 m high, and flowing from west to east.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 4  
 Survey date: 05/06/2013

**Survey Info:**

Weather: Dry; Slightly Overcast;  
 Ground Conditions: Natural Bog; Young Forest;  
 Vegetation:  
 Feature Type : Road

Road width (m):	4
-----------------	---

Notes: existing access track 4m road width

**Photos**

**Photo Notes**

U/S Photo - No photo taken.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 5  
 Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Natural Bog;  
 Vegetation:

Feature Type : Drainage Ditch

Channel width (m):	0.5
Channel height (m):	2
Channel flow direction:	S - N

Notes:

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 6  
 Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Natural Bog;  
 Vegetation:

Feature Type : Bog Pool

Notes: 10 m wide and 200 m long

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 7  
 Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Natural Bog;  
 Vegetation:

Feature Type : Drainage Ditch

Channel width (m):	1
Channel height (m):	2

Notes:

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 8  
 Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Natural Bog;  
 Vegetation:

Feature Type : Bog Pool

Notes: Natural bog, drainage ditch 0.5 m wide by 1 m high, flowing from west to east

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.



Site: Drehid  
 Reference Number: 9  
 Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Marshland; Natural Bog;  
 Vegetation:

Feature Type : Drainage Ditch

Channel width (m):	1
Channel height (m):	2
Channel flow direction:	NW - SE

Notes:

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 10  
 Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Marshland; Natural Bog;  
 Vegetation:

Feature Type : Marshland

--

Notes: South west of T13 turbine location, bog marsh land, no apparent drainage.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Drehid

Reference Number: 11

Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Marshland; Natural Bog;

Vegetation:

Feature Type : Drainage Ditch

Channel width (m):	0.5
Channel height (m):	0.5
Channel flow direction:	E - W

Notes: standing water

**Photos**

**Photo Notes**

U/S Photo - No photo taken.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Drehid

Reference Number: 12

Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Marshland; Natural Bog;

Vegetation:

Feature Type : Drainage Ditch

Channel width (m):	0.5
Channel height (m):	0.5
Channel flow direction:	E - W

Notes: standing water

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 13  
 Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Young Forest;  
 Vegetation:

Feature Type : Drainage Ditch

Channel width (m):	0.5
Channel height (m):	0.5

Notes:

**Photos**



**Photo Notes**

U/S Photo.  
  
 View U/S Photo - No photo taken.  
  
  
 D/S Photo - No photo taken.  
  
  
 View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 14  
 Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Young Forest;  
 Vegetation:

Feature Type : Turbine

Turbine No.:	T11
--------------	-----

Notes: Young forest

**Photos**



**Photo Notes**

U/S Photo.  
  
 View U/S Photo - No photo taken.  
  
  
 D/S Photo - No photo taken.  
  
  
 View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 15  
 Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Young Forest;  
 Vegetation:

Feature Type : Stream

Channel width (m):	4
Channel height (m):	4
Channel flow direction:	N - S

Notes:

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 16  
 Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Young Forest;  
 Vegetation:

Feature Type : Drainage Ditch

Channel width (m):	3
Channel height (m):	1
Channel flow direction:	E - W

Notes:

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 17  
 Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Young Forest;  
 Vegetation:

Feature Type : Turbine

Turbine No.:	T16
--------------	-----

Notes: Young deciduous forest

**Photos**



**Photo Notes**

U/S Photo.  
  
 View U/S Photo - No photo taken.  
  
  
 D/S Photo - No photo taken.  
  
  
 View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 18  
 Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Young Forest;  
 Vegetation:

Feature Type : Turbine

Turbine No.:	East of T15
--------------	-------------

Notes: Wild mixed forest

**Photos**



**Photo Notes**

U/S Photo.  
  
 View U/S Photo - No photo taken.  
  
  
 D/S Photo - No photo taken.  
  
  
 View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 19  
 Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Young Forest;  
 Vegetation:

Feature Type : Pipe

Diameter (m):	1.1
---------------	-----

Notes: Road crossing, culvert pipe, 1.1m of diameter, 45° headwalls. Drainage Ditch 2m wide and 3m high. 5.7m road crossing

**Photos**

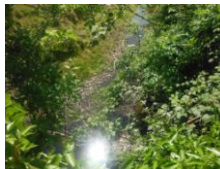


**Photo Notes**

U/S Photo.



View U/S Photo.



D/S Photo.

View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 20  
 Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Young Forest;  
 Vegetation:

Feature Type : Agricultural Crossing

Crossing width (m):	4
---------------------	---

Notes: Culvert pipe, 450mm diameter. Stream flowing from East to West

**Photos**



**Photo Notes**

U/S Photo.



View U/S Photo.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 21  
 Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Grassland (Firm);  
 Vegetation:

Feature Type : Drainage Ditch

Channel width (m):	2.5
Channel height (m):	2
Channel flow direction:	N - S

Notes:

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 22  
 Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Grassland (Firm);  
 Vegetation:

Feature Type : Turbine

Turbine No.:	East of T18
--------------	-------------

Notes: Firm grassland with cattle grazing.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 23  
 Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Grassland (Firm);  
 Vegetation:

Feature Type : Agricultural Crossing

Crossing width (m):	4.5
---------------------	-----

Notes: Pipe Culvert 650mm in diameter. Stream flowing east to west

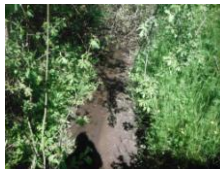
**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 24  
 Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Grassland (Firm);  
 Vegetation:

Feature Type : Drainage Ditch

Channel width (m):	3
Channel height (m):	3
Channel flow direction:	W - E

Notes: Stream crossing

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.



Site: Drehid  
 Reference Number: 25  
 Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Grassland (Firm); Young Forest;

Vegetation:

Feature Type : Turbine

Turbine No.:	T17
--------------	-----

Notes: Young forest, New grassland

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 26  
 Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Grassland (Firm); Young Forest;

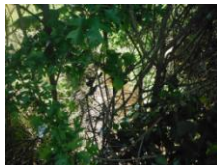
Vegetation:

Feature Type : Bridge

Channel width (m):	1
Channel height (m):	0.5
Road width (m):	5.5

Notes: Bridge crossing, stone Arch

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.



View D/S Photo.

Site: Drehid

Reference Number: 27

Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm); Young Forest;

Vegetation:

Feature Type : Road

Road width (m):	4
-----------------	---

Notes: Road crossing, along proposed track to substation, 4 m crossing width

**Photos**



**Photo Notes**

U/S Photo

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Drehid

Reference Number: 28

Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm); Young Forest;

Vegetation:

Feature Type : Pipe

Diameter (m):	1
---------------	---

Notes: Road crossing, pipe culvert 1m in diameter. Drainage ditch 2.5m wide and 4m high. 4m crossing width

**Photos**



**Photo Notes**

U/S Photo

View U/S Photo

D/S Photo

View D/S Photo - No photo taken.

Site: Drehid

Reference Number: 29

Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Mature Forest;  
 Vegetation:

Feature Type : Pipe

Diameter (m):	0.3
---------------	-----

Notes: Road crossing, concrete pipe culvert, 300mm diameter

**Photos**



U/S Photo



View U/S Photo



D/S Photo

View D/S Photo - No photo taken.

Site: Drehid

Reference Number: 30

Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Mature Forest;  
 Vegetation:

Feature Type : Pipe

Diameter (m):	0.3
---------------	-----

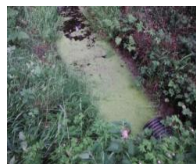
Notes: Road crossing, corrugated pipe culvert, 300mm in diameter. Stream flowing from south to north. Crossing width 4.5m

**Photos**



U/S Photo

View U/S Photo - No photo taken.



D/S Photo

View D/S Photo - No photo taken.

Site: Drehid

Reference Number: 31

Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Mature Forest;

Vegetation:

Feature Type : Pipe

Diameter (m):	0.65
---------------	------

Notes: Road crossing, parallel to access track

**Photos**



**Photo Notes**

U/S Photo

View U/S Photo - No photo taken.



D/S Photo

View D/S Photo - No photo taken.

Site: Drehid

Reference Number: 32

Survey date: 05/06/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Mature Forest;

Vegetation:

Feature Type : North east of substation location

Notes: North east of substation location, mature forest alongside an access track

**Photos**



**Photo Notes**

U/S Photo

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Drehid

Reference Number: 33

Survey date: 31/05/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Grassland (Firm);  
 Vegetation:

Feature Type : Turbine

Turbine No.:	T47
--------------	-----

Notes: Proposed turbine location, firm grassland, free draining

**Photos**



U/S Photo



View U/S Photo

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Drehid

Reference Number: 34

Survey date: 31/05/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Grassland (Firm);  
 Vegetation:

Feature Type : Drainage Ditch

Channel width (m):	2
Channel height (m):	1.5
Channel flow direction:	E - W

Notes: field boundary

**Photos**







U/S Photo


View U/S Photo - No photo taken.












D/S Photo

View D/S Photo - No photo taken.




<p>Site: Drehid</p> <p>Reference Number: 35</p> <p>Survey date: 31/05/2013</p> <p><b><u>Survey Info:</u></b></p> <p>Weather: Dry;</p> <p>Ground Conditions: Grassland (Firm);</p> <p>Vegetation:</p> <p>Feature Type : Road crossing</p> <p>Notes: Pipe culvert, 300mm diameter, 5m wide crossing, upstream drainage ditch 2.5m wide and 2m deep</p>	<p><b><u>Photos</u></b></p>    	<p><b><u>Photo Notes</u></b></p> <p>U/S Photo</p> <p>View U/S Photo</p> <p>D/S Photo</p> <p>View D/S Photo</p>
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<p>Site: Drehid</p> <p>Reference Number: 36</p> <p>Survey date: 31/05/2013</p> <p><b><u>Survey Info:</u></b></p> <p>Weather: Dry;</p> <p>Ground Conditions: Grassland (Firm);</p> <p>Vegetation:</p> <p>Feature Type : Road crossing</p> <p>Notes: Pipe culvert 450mm diameter with a 3.5m wide crossing. Upstream drainage ditch 2.5m wide and 2m deep, parallel to road</p>	<p><b><u>Photos</u></b></p> 	<p><b><u>Photo Notes</u></b></p> <p>U/S Photo - No photo taken.</p> <p>View U/S Photo</p> <p>D/S Photo - No photo taken.</p> <p>View D/S Photo - No photo taken.</p>
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<p>Site: Drehid</p> <p>Reference Number: 37</p> <p>Survey date: 31/05/2013</p> <p><b><u>Survey Info:</u></b></p> <p>Weather: Dry;</p> <p>Ground Conditions: Grassland (Firm);</p> <p>Vegetation:</p> <p>Feature Type : Road crossing</p> <p>Notes: Pipe culvert, 450mm diameter, 4m wide crossing. Upstream drainage ditch 2.5m wide and 2m deep, parallel to the access track</p>	<table border="1"> <thead> <tr> <th style="text-align: left;"><u>Photos</u></th> <th style="text-align: left;"><u>Photo Notes</u></th> </tr> </thead> <tbody> <tr> <td></td> <td>U/S Photo - No photo taken.</td> </tr> <tr> <td></td> <td>View U/S Photo - No photo taken.</td> </tr> <tr> <td></td> <td>D/S Photo - No photo taken.</td> </tr> <tr> <td style="text-align: center;"></td> <td>View D/S Photo</td> </tr> </tbody> </table>	<u>Photos</u>	<u>Photo Notes</u>		U/S Photo - No photo taken.		View U/S Photo - No photo taken.		D/S Photo - No photo taken.		View D/S Photo
<u>Photos</u>	<u>Photo Notes</u>										
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	View U/S Photo - No photo taken.										
	D/S Photo - No photo taken.										
	View D/S Photo										

<p>Site: Drehid</p> <p>Reference Number: 38</p> <p>Survey date: 31/05/2013</p> <p><b><u>Survey Info:</u></b></p> <p>Weather: Dry;</p> <p>Ground Conditions: Grassland (Firm);</p> <p>Vegetation:</p> <p>Feature Type : Road crossing</p> <p>Notes: Pipe culvert, 450mm diameter, 3.5m wide crossing. Upstream drainage ditch 3.5m wide and 3m deep. Pipe blocked.</p>	<table border="1"> <thead> <tr> <th style="text-align: left;"><u>Photos</u></th> <th style="text-align: left;"><u>Photo Notes</u></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"></td> <td>U/S Photo</td> </tr> <tr> <td style="text-align: center;"></td> <td>View U/S Photo</td> </tr> <tr> <td style="text-align: center;"></td> <td>D/S Photo</td> </tr> <tr> <td></td> <td>View D/S Photo - No photo taken.</td> </tr> </tbody> </table>	<u>Photos</u>	<u>Photo Notes</u>		U/S Photo		View U/S Photo		D/S Photo		View D/S Photo - No photo taken.
<u>Photos</u>	<u>Photo Notes</u>										
	U/S Photo										
	View U/S Photo										
	D/S Photo										
	View D/S Photo - No photo taken.										



<p>Site: Drehid</p> <p>Reference Number: 39</p> <p>Survey date: 31/05/2013</p> <p><b><u>Survey Info:</u></b></p> <p>Weather: Dry;</p> <p>Ground Conditions: Grassland (Firm);</p> <p>Vegetation:</p> <p>Feature Type : Road crossing</p> <p>Notes: Pipe culvert, 300mm diameter, 3.5m wide crossing. Upstream drainage ditch 1m wide by 1.5m deep Stream flowing from South to North.</p>	<table border="1"> <thead> <tr> <th style="text-align: left;"><u>Photos</u></th> <th style="text-align: left;"><u>Photo Notes</u></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"></td> <td>U/S Photo</td> </tr> <tr> <td></td> <td>View U/S Photo - No photo taken.</td> </tr> <tr> <td></td> <td>D/S Photo - No photo taken.</td> </tr> <tr> <td></td> <td>View D/S Photo - No photo taken.</td> </tr> </tbody> </table>	<u>Photos</u>	<u>Photo Notes</u>		U/S Photo		View U/S Photo - No photo taken.		D/S Photo - No photo taken.		View D/S Photo - No photo taken.
<u>Photos</u>	<u>Photo Notes</u>										
	U/S Photo										
	View U/S Photo - No photo taken.										
	D/S Photo - No photo taken.										
	View D/S Photo - No photo taken.										

<p>Site: Drehid</p> <p>Reference Number: 40</p> <p>Survey date: 31/05/2013</p> <p><b><u>Survey Info:</u></b></p> <p>Weather: Dry;</p> <p>Ground Conditions: Grassland (Firm);</p> <p>Vegetation:</p> <p>Feature Type : Drainage Ditch</p> <p>Notes: Parallel to access track with road crossing, 4.5m wide crossing. Upstream drainage ditch 1.5m wide by 1.5m deep.</p>	<table border="1"> <thead> <tr> <th style="text-align: left;"><u>Photos</u></th> <th style="text-align: left;"><u>Photo Notes</u></th> </tr> </thead> <tbody> <tr> <td></td> <td>U/S Photo - No photo taken.</td> </tr> <tr> <td></td> <td>View U/S Photo - No photo taken.</td> </tr> <tr> <td style="text-align: center;"></td> <td>D/S Photo</td> </tr> <tr> <td></td> <td>View D/S Photo - No photo taken.</td> </tr> </tbody> </table>	<u>Photos</u>	<u>Photo Notes</u>		U/S Photo - No photo taken.		View U/S Photo - No photo taken.		D/S Photo		View D/S Photo - No photo taken.
<u>Photos</u>	<u>Photo Notes</u>										
	U/S Photo - No photo taken.										
	View U/S Photo - No photo taken.										
	D/S Photo										
	View D/S Photo - No photo taken.										



Site: Drehid

Reference Number: 41

Survey date: 31/05/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Grassland (Firm);  
 Vegetation:

Feature Type : Road crossing

Notes: Pipe culvert 300mm diameter, 4m wide road crossing. Upstream drainage ditch 3m wide, 3m deep. Stream flowing from North to South.

**Photos**



U/S Photo



View U/S Photo



D/S Photo

View D/S Photo - No photo taken.

Site: Drehid

Reference Number: 42

Survey date: 31/05/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Grassland (Firm);  
 Vegetation:

Feature Type : Turbine

Turbine No.:	T23
--------------	-----

Notes: Turbine location, firm grassland, sited in slight depression, no apparent drainage.

**Photos**






U/S Photo.









View U/S Photo

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

<p>Site: Drehid</p> <p>Reference Number: 43</p> <p>Survey date: 31/05/2013</p> <p><b><u>Survey Info:</u></b></p> <p>Weather: Dry;</p> <p>Ground Conditions: Grassland (Firm);</p> <p>Vegetation:</p> <p>Feature Type : Road crossing</p> <p>Notes: Pipe culvert 450mm diameter, 4m wide road crossing. Upstream drainage ditch 2m wide, 1m deep</p>	<table border="1"> <thead> <tr> <th style="text-align: left;"><u>Photos</u></th> <th style="text-align: left;"><u>Photo Notes</u></th> </tr> </thead> <tbody> <tr> <td></td> <td>U/S Photo - No photo taken.</td> </tr> <tr> <td style="text-align: center;"></td> <td>View U/S Photo</td> </tr> <tr> <td></td> <td>D/S Photo - No photo taken.</td> </tr> <tr> <td></td> <td>View D/S Photo - No photo taken.</td> </tr> </tbody> </table>	<u>Photos</u>	<u>Photo Notes</u>		U/S Photo - No photo taken.		View U/S Photo		D/S Photo - No photo taken.		View D/S Photo - No photo taken.
<u>Photos</u>	<u>Photo Notes</u>										
	U/S Photo - No photo taken.										
	View U/S Photo										
	D/S Photo - No photo taken.										
	View D/S Photo - No photo taken.										

<p>Site: Drehid</p> <p>Reference Number: 44</p> <p>Survey date: 31/05/2013</p> <p><b><u>Survey Info:</u></b></p> <p>Weather: Dry;</p> <p>Ground Conditions: Grassland (Firm);</p> <p>Vegetation:</p> <p>Feature Type : Turbine</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Turbine No.: T20</p> </div> <p>Notes: Turbine location, firm grassland, free draining</p>	<table border="1"> <thead> <tr> <th style="text-align: left;"><u>Photos</u></th> <th style="text-align: left;"><u>Photo Notes</u></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"></td> <td>U/S Photo</td> </tr> <tr> <td style="text-align: center;"></td> <td>View U/S Photo</td> </tr> <tr> <td></td> <td>D/S Photo - No photo taken.</td> </tr> <tr> <td></td> <td>View D/S Photo - No photo taken.</td> </tr> </tbody> </table>	<u>Photos</u>	<u>Photo Notes</u>		U/S Photo		View U/S Photo		D/S Photo - No photo taken.		View D/S Photo - No photo taken.
<u>Photos</u>	<u>Photo Notes</u>										
	U/S Photo										
	View U/S Photo										
	D/S Photo - No photo taken.										
	View D/S Photo - No photo taken.										

Site: Drehid

Reference Number: 45

Survey date: 31/05/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm);

Vegetation:

Feature Type : Drainage Ditch

Channel width (m):	5
Channel height (m):	3
Channel flow direction:	S - N

Notes: Draining entire field

**Photos**



**Photo Notes**

U/S Photo

View U/S Photo - No photo taken.



D/S Photo

View D/S Photo - No photo taken.

Site: Drehid

Reference Number: 46

Survey date: 31/05/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm);

Vegetation:

Feature Type : Turbine

Turbine No.:	T22
--------------	-----

Notes: Turbine location, firm well drained grassland

**Photos**



**Photo Notes**

U/S Photo

View U/S Photo



D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Drehid

Reference Number: 47

Survey date: 31/05/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm);

Vegetation:

Feature Type : Drainage Ditch

Channel width (m):	2.5
Channel height (m):	1.5
Crossing width (m):	

Notes: Along field boundary

**Photos**



**Photo Notes**

U/S Photo

View U/S Photo - No photo taken.



D/S Photo

View D/S Photo - No photo taken.

Site: Drehid

Reference Number: 48

Survey date: 31/05/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm);

Vegetation:

Feature Type : Agricultural Crossing

Crossing width (m):	3.5
---------------------	-----

Notes:

**Photos**

**Photo Notes**

U/S Photo - No photo taken.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Drehid

Reference Number: 49

Survey date: 31/05/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm);

Vegetation:

Feature Type : Stream

Channel width (m):	3
Channel height (m):	2.5
Channel flow direction:	W - E

Notes: NW of T22

**Photos**



**Photo Notes**

U/S Photo

View U/S Photo - No photo taken.



D/S Photo

View D/S Photo - No photo taken.

Site: Drehid

Reference Number: 50

Survey date: 31/05/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm);

Vegetation:

Feature Type : Agricultural Crossing

Channel width (m):	2
Channel height (m):	2

Notes: 450mm diameter culvert

**Photos**



**Photo Notes**

U/S Photo

View U/S Photo



D/S Photo

View D/S Photo - No photo taken.

Site: Drehid

Reference Number: 51

Survey date: 31/05/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm);

Vegetation:

Feature Type : Agricultural Crossing

Crossing width (m):	5
---------------------	---

Notes:

**Photos**



**Photo Notes**

U/S Photo

View U/S Photo - No photo taken.



D/S Photo

View D/S Photo - No photo taken.

Site: Drehid

Reference Number: 52

Survey date: 31/05/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm);

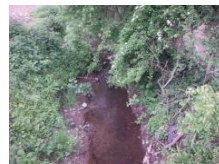
Vegetation:

Feature Type : Agricultural Crossing

Crossing width (m):	3
---------------------	---

Notes: Pipe culvert 1m diameter.  
Upstream drainage ditch 3m wide and 2.5 deep.

**Photos**



**Photo Notes**

U/S Photo

View U/S Photo



D/S Photo



View D/S Photo

Site: Drehid  
 Reference Number: 53  
 Survey date: 31/05/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Grassland (Firm);  
 Vegetation:  
 Feature Type : Road

Road width (m):	3
-----------------	---

Notes: Road leading to T20

**Photos**

**Photo Notes**

U/S Photo - No photo taken.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 54  
 Survey date: 31/05/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Grassland (Firm);  
 Vegetation:

Feature Type : Drainage Ditch

Channel width (m):	3
Channel height (m):	3.5
Channel flow direction:	N - S

Notes: Road crossing. Pipe culvert of 1m diameter

**Photos**

**Photo Notes**



U/S Photo



View U/S Photo



D/S Photo



View D/S Photo



Site: Drehid  
 Reference Number: 55  
 Survey date: 31/05/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Grassland;  
 Vegetation:

Feature Type : Soft Grassland

Turbine No.:	South east of T19
--------------	-------------------

Notes: Sout east of turbine location, soft grassland, draining to boundary, drains on west and east side of field

**Photos**

**Photo Notes**

U/S Photo - No photo taken.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 56  
 Survey date: 31/05/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Grassland (Firm);  
 Vegetation:

Feature Type : Drainage Ditch

Channel width (m):	1
Channel height (m):	1
Channel flow direction:	N - S

Notes:

**Photos**

**Photo Notes**



U/S Photo

View U/S Photo - No photo taken.



D/S Photo

View D/S Photo - No photo taken.



Site: Drehid

Reference Number: 57

Survey date: 31/05/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Grassland (Firm);  
 Vegetation:

Feature Type : Turbine

Turbine No.:	T21
--------------	-----

Notes: Well drained firm grassland

**Photos**



U/S Photo



View U/S Photo

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Drehid

Reference Number: 58

Survey date: 31/05/2013

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Grassland (Firm);  
 Vegetation:

Feature Type : Pipe

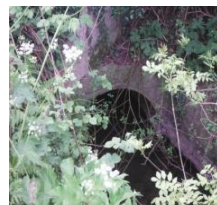
Diameter (m):	1
---------------	---

Notes: Channel 4m wide, 4m deep, 5m wide road crossing, and 7m wide bridge.

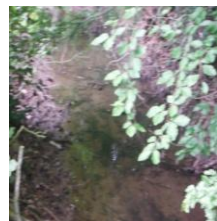
**Photos**



U/S Photo



View U/S Photo



D/S Photo



View D/S Photo

**Photo Notes**

Site: Drehid

Reference Number: 59

Survey date: 12/11/2014

**Survey Info:**

Weather: Dry;

Ground Conditions: Harvested Forest (stumps);  
Young Forest; Mature Forest;

Vegetation: Dry;

Feature Type : Road

Road width (m):	3
-----------------	---

Notes: Edge of existing track/spur. Adjacent ground is poorly drained felled forest. Existing track here is a floating track.

**Photos**

**Photo Notes**



U/S Photo. Looking NW

View U/S Photo - No photo taken.



D/S Photo. Looking West at adjacent harvested forest lands



View D/S Photo. Looking South along spur/track.

Site: Drehid

Reference Number: 60

Survey date: 12/11/2014

**Survey Info:**

Weather: Dry;

Ground Conditions: Harvested Forest (stumps);  
Young Forest; Mature Forest;

Vegetation: Dry; Boggy;

Feature Type : Harvested forest

Notes: Waterlogged partially harvested, partially semi-mature forest.

**Photos**

**Photo Notes**



U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 61  
 Survey date: 12/11/2014

**Survey Info:**

Weather: Dry;  
 Ground Conditions: Harvested Forest (stumps); Young Forest; Mature Forest;  
 Vegetation: Dry; Boggy;

Feature Type : Bridge

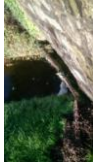
Channel width (m):	3
Channel height (m):	2
Flow depth (m):	1
Road width (m):	3.5
Bridge width (m):	3

Notes:

**Photos**



U/S Photo.



View U/S Photo. Fear English River bridge

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 62  
 Survey date: 12/11/2014

**Survey Info:**

Weather: Wet;  
 Ground Conditions: Harvested Forest (stumps); Young Forest; Mature Forest;  
 Vegetation: Wet; Boggy;

Feature Type : Waterlogged ground

Notes: Ground waterlogged

**Photos**



U/S Photo.



View U/S Photo. Existing track

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 63  
 Survey date: 12/11/2014

**Survey Info:**

Weather: Wet;  
 Ground Conditions: Harvested Forest (stumps);  
 Young Forest; Mature Forest;  
 Vegetation: Wet; Boggy;

Feature Type : Road

Road width (m):	3.5
-----------------	-----

Notes: Road has operating drainage system

**Photos**

**Photo Notes**



U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 64  
 Survey date: 12/11/2014

**Survey Info:**

Weather: Wet;  
 Ground Conditions: Harvested Forest (stumps);  
 Young Forest; Mature Forest;  
 Vegetation: Wet; Boggy;

Feature Type : Pluvial Path

Notes: Large pluvial pool in field next to track.

**Photos**

**Photo Notes**



U/S Photo. Looking west

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 65  
 Survey date: 12/11/2014

**Survey Info:**

Weather: Wet;  
 Ground Conditions: Harvested Forest (stumps);  
 Young Forest; Mature Forest;  
 Vegetation: Wet; Boggy;

Feature Type : Road

Notes: Spur leading off track

**Photos**



**Photo Notes**

U/S Photo. 300 mm plastic pipes used in road drain crossings

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 66  
 Survey date: 12/11/2014

**Survey Info:**

Weather: Wet;  
 Ground Conditions: Harvested Forest (stumps);  
 Young Forest; Mature Forest;  
 Vegetation: Wet; Boggy;

Feature Type : Pluvial Path

Notes: Waterlogged area

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Drehid  
 Reference Number: 67  
 Survey date: 12/11/2014

**Survey Info:**

Weather: Wet;  
 Ground Conditions: Harvested Forest (stumps);  
 Young Forest; Mature Forest;  
 Vegetation: Wet; Boggy;

Feature Type : Road Drain

Notes: Typical forestry road drainage. Swale in  
 subsoils 1 m base width. Clearfell set  
 back approx. 7 m

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Hortland

Reference Number: 1

Survey date: 10/06/13

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm);

Vegetation: Firm

Feature Type : Drainage Ditch

Channel width (m):	4
Channel height (m):	2.5
Channel flow direction:	W - E

Notes: Land drainage

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Hortland

Reference Number: 2

Survey date: 10/06/13

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm);

Vegetation: Firm

Feature Type : Turbine

Turbine No.:	T46
--------------	-----

Notes: firm grassland, adjacent to 01

**Photos**

**Photo Notes**

U/S Photo - No photo taken.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Hortland

Reference Number: 3

Survey date: 10/06/13

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm);

Vegetation: Firm

Feature Type : Agri Crossing

Crossing width (m):	5
---------------------	---

Notes: pipe Culvert 900mm of diameter.Drainage Ditch of 2m wide and 1m high.Streaming from West to East.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Phot – No photo taken.

Site: Hortland

Reference Number: 4

Survey date: 10/06/13

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm);

Vegetation: Firm

Feature Type : Bridge

Notes: Masonry arch bridge, two openings, one on top of the other.Pipe 650mm of diameter on the bottom, 1m wide and 2m high arch on top

**Photos**



**Photo Notes**

U/S Photo - No photo taken.

View U/S Photo.

D/S Photo - No photo taken.

View D/S Photo – No photo taken.



Site: Hortland

Reference Number: 5

Survey date: 10/06/13

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Soft);

Vegetation: Firm

Feature Type : Bridge

Notes: Road crossing, masonry arch bridge of 4m wide, 3m verticals, 1.6m arch height, 5.5 crossing width. Streaming flowing from South to North. Drainage ditch 5m wide and 5m high.

**Photos**



U/S Photo.



View U/S Photo.



D/S Photo.

View D/S Photo - No photo taken.

Site: Hortland

Reference Number: 6

Survey date: 10/06/13

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Soft);

Vegetation: Firm

Feature Type : Road

Notes: Access track, no drainage evident

**Photos**



U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Hortland

Reference Number: 7

Survey date: 10/06/13

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Soft);

Vegetation: Firm

Feature Type : Other

Notes: T45 location, soft grasslands, reeds present, no drainage present.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Hortland

Reference Number: 8

Survey date: 10/06/13

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Soft);

Vegetation: Firm

Feature Type : Road

Road width (m):	3
-----------------	---

Notes: Access track to T44, OTE drainage at southern side of track.

**Photos**

**Photo Notes**

U/S Photo - No photo taken.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Hortland

Reference Number: 9

Survey date: 10/06/13

**Survey Info:**

Weather: Dry;

Ground Conditions: Natural Bog; Mature Forest;

Vegetation: Firm

Feature Type : Turbine

Turbine No.:	T44
--------------	-----

Notes: Mature forest and scrub. Approximately 20m from road way

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Hortland

Reference Number: 10

Survey date: 10/06/13

**Survey Info:**

Weather: Dry;

Ground Conditions: Natural Bog; Mature Forest;

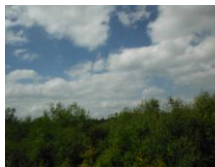
Vegetation: Firm

Feature Type : Turbine

Turbine No.:	T43
--------------	-----

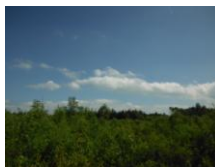
Notes: bog with mature forest and scrub, no apparent drainage system, some small drains

**Photos**



**Photo Notes**

U/S Photo.



View U/S Photo.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Hortland

Reference Number: 11

Survey date: 10/06/13

**Survey Info:**

Weather: Dry;

Ground Conditions: Natural Bog; Mature Forest;

Vegetation: Firm

Feature Type : Road

Notes: Road crossing along permitted access track, culvert 300mm diameter..Drainage Ditch 2.5m wide, 1m high, 4m crossing width.

**Photos**



U/S Photo.



View U/S Photo.



D/S Photo.

View D/S Photo - No photo taken.

Site: Hortland

Reference Number: 12

Survey date: 10/06/13

**Survey Info:**

Weather: Dry;

Ground Conditions: Natural Bog; Mature Forest;

Vegetation: Firm

Feature Type : Two road crossings

Notes: Two road crossings side by side, both culverts of 450mm of diameter.Drainage ditch 1.5m wide by 1m high.

**Photos**



U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Hortland

Reference Number: 13

Survey date: 10/06/13

**Survey Info:**

Weather: Dry;

Ground Conditions: Mature Forest;

Vegetation: Firm

Feature Type : Road

Road width (m):	3
-----------------	---

Notes: Road crossing, culvert 225mm diameter.  
Drainage Ditch 1.5m wide by 1m high.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Hortland

Reference Number: 14

Survey date: 10/06/13

**Survey Info:**

Weather: Dry;

Ground Conditions: Mature Forest;

Vegetation: Firm

Feature Type : Drainage Ditch

Channel width (m):	2
Channel height (m):	1
Channel flow direction:	N - S

Notes:

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Hortland

Reference Number: 15

Survey date: 10/06/13

**Survey Info:**

Weather: Dry;

Ground Conditions: Mature Forest;

Vegetation: Firm

Feature Type : Drainage Ditch

Channel width (m):	2
--------------------	---

Channel height (m):	2
---------------------	---

Notes:

**Photos**

**Photo Notes**

U/S Photo - No photo taken.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Hortland

Reference Number: 16

Survey date: 10/06/13

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm); Mature Forest;

Vegetation: Firm

Feature Type : Turbine

Turbine No.:	T41
--------------	-----

Notes: dry grassland

**Photos**

**Photo Notes**



U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Hortland

Reference Number: 17

Survey date: 10/06/13

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm); Mature Forest;

Vegetation: Firm

Feature Type : Drainage Ditch

Channel width (m):	2.5
Channel height (m):	2
Channel flow direction:	N - S

Notes:

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Hortland

Reference Number: 18

Survey date: 10/06/13

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm); Mature Forest;

Vegetation: Firm

Feature Type : River

Channel width (m):	5
Channel height (m):	4
Channel flow direction:	W - E

Notes: Along southern field between forest and field

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Hortland

Reference Number: 19

Survey date: 10/06/13

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm); Mature Forest;

Vegetation: Firm

Feature Type : Turbine

Turbine No.:	West of T40
--------------	-------------

Notes: Mature forest. No drainage evident

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Hortland

Reference Number: 20

Survey date: 10/06/13

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm);

Vegetation: Firm

Feature Type : Drainage Ditch

Channel width (m):	1.5
--------------------	-----

Channel height (m):	1
---------------------	---

Notes: Crossing, with a width equal to 10m.

**Photos**

**Photo Notes**

U/S Photo - No photo taken.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.





# Hydrology Survey Information

Site: Hortland

Reference Number: 21

Survey date: 10/06/13

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm);

Vegetation: Firm

Feature Type : Drainage Ditch

Channel width (m):	1.5
Channel height (m):	1
Channel flow direction:	E - W

Notes: Road crossing. 3.5m crossing width

**Photos**

**Photo Notes**

U/S Photo - No photo taken.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Hortland

Reference Number: 22

Survey date: 10/06/13

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm);

Vegetation: Firm

Feature Type : Road

Road width (m):	3.5
-----------------	-----

Notes: Road crossing

**Photos**

**Photo Notes**

U/S Photo - No photo taken.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Hortland

Reference Number: 23

Survey date: 10/06/13

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm);

Vegetation: Firm

Feature Type : Bridge

Channel width (m):	5
Channel height (m):	4

Notes: Road crossing, masonry arch. Drainage Ditch, 5m wide, 4m high.

**Photos**



U/S Photo.



View U/S Photo.



D/S Photo.

View D/S Photo - No photo taken.

Site: Hortland

Reference Number: 24

Survey date: 10/06/13

**Survey Info:**

Weather: Dry;

Ground Conditions: Mature Forest;

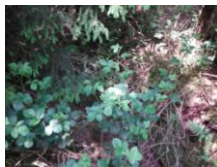
Vegetation: Firm

Feature Type : Drainage Ditch

Channel width (m):	1
Channel height (m):	1.5

Notes: Running North to T42

**Photos**



U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.



# Hydrology Survey Information

Site: Hortland

Reference Number: 25

Survey date: 10/06/13

**Survey Info:**

Weather: Dry;

Ground Conditions: Mature Forest;

Vegetation: Firm

Feature Type : Road

Road width (m):	2.7
-----------------	-----

Notes: End of access track

**Photos**

**Photo Notes**

U/S Photo – No photo taken.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Hortland

Reference Number: 29

Survey date: 10/06/13

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm);

Vegetation: Firm

Feature Type : Turbine

Turbine No.:	T42
--------------	-----

Notes: mature forest

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Hortland

Reference Number: 30

Survey date: 26/02/15

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm)

Vegetation:

Feature Type : Road

Road width (m):
-----------------

Notes: Existing road alongside River Blackwater. River channel 4m wide by 2m deep.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Hortland

Reference Number: 31

Survey date: 26/02/15

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm)

Vegetation:

Feature Type : Bridge

Notes: Existing bridge crossing over River Blackwater. 3m wide Bridge.  
5m span Bridge.  
2m from River Bed to soffit of Bridge

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Hortland

Reference Number: 32

Survey date: 26/02/15

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm)

Vegetation:

Feature Type : Drain

Notes: 2m wide drain

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Hortland

**Photos**

**Photo Notes**

Reference Number: 33

Survey date: 26/02/15

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm)

Vegetation:

Feature Type : Drain

Notes: Drain at boundary with forestry.  
3-4m wide.  
2m deep.



U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Hortland

Reference Number: 34

Survey date: 26/02/15

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm)

Vegetation:

Feature Type : Stream

Notes: Mulgeeth Stream

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Hortland

**Photo Notes**

Reference Number: 35

Survey date: 26/02/15

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm)

Vegetation:

Feature Type : Drain

Notes: Drain Running along tree line to left of photograph.

**Photos**



U/S Photo.

[View U/S Photo](#) - No photo taken.

[D/S Photo](#) - No photo taken.

[View D/S Photo](#) - No photo taken.

Site: Hortland

Reference Number: 36

Survey date: 26/02/15

**Survey Info:**

Weather: Dry;

Ground Conditions: Grassland (Firm)

Vegetation:

Feature Type : Drain

Notes: Drain 2m wide

**Photos**



U/S Photo.

[View U/S Photo](#) - No photo taken.

[D/S Photo](#) - No photo taken.

[View D/S Photo](#) - No photo taken.

**Photo Notes**

Site: Windmill

Reference Number: 1

Survey date: 08/07/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Worked Bog;

Vegetation: Firm

Feature Type : Peat bog, wet channel

Notes: Channel 3m wide by 1.8m deep, flowing NW to SE

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Windmill

Reference Number: 2

Survey date: 08/07/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Worked Bog;

Vegetation: Firm

Feature Type : Harvested bog

Turbine No.:	Feature to the north east of T24
--------------	----------------------------------

Notes: Milled peat harvested Bog (Pic 1224)  
Photograph taken looking West

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.



Site: Windmill

Reference Number: 3

Survey date: 08/07/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Worked Bog;

Vegetation: Firm

Feature Type : Drainage Ditch

Channel width (m):	2
Channel height (m):	2.5
Channel flow direction:	NW - SE

Notes: Peat bog drainage ditch

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Windmill

Reference Number: 4

Survey date: 08/07/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Worked Bog;

Vegetation: Firm

Feature Type : Drainage Ditch

Channel width (m):	1.5
Channel height (m):	1.5

Notes: Stream drainage ditch running along bog boundary with forest drains connecting into this point

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Windmill

Reference Number: 5

Survey date: 08/07/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Worked Bog;

Vegetation: Firm

Feature Type : Harvested bog

Turbine No.:	Feature to the west of T25
--------------	----------------------------

Notes: Milled peat bog area-appears relatively dry (Pic 1229). Photograph taken looking south.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Windmill

Reference Number: 6

Survey date: 08/07/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Worked Bog;

Vegetation: Firm

Feature Type : Bog Drain

Notes: Bog drains at intervals of 15m (Channel profile 1m x 1m) (Pic 1231).

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Windmill

Reference Number: 7

Survey date: 08/07/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Worked Bog;

Vegetation: Firm

Feature Type : Stream

Channel width (m):	1.8
Channel height (m):	2.3

Notes: Stream- Joins back to Feature 4 along forest boundary

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Windmill

Reference Number: 8

Survey date: 08/07/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Worked Bog;

Vegetation: Firm

Feature Type : Harvested bog

Turbine No.:	Feature to the south west of T26
--------------	----------------------------------

Notes: Harvested peat bog, appears dry (Pic 1234). Photograph taken looking SE

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Windmill

Reference Number: 9

Survey date: 08/07/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Worked Bog;

Vegetation: Firm

Feature Type: Peat bog drain between harvested Bog and adjacent lands at red line boundary.

Notes: Drain running E-W. Channel profile 2m x 2m, with a flow of depth 0.2m

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Windmill

Reference Number: 10

Survey date: 08/07/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Worked Bog;

Vegetation: Firm

Feature Type : Bog Drain

Notes: Peat bog drain. Channel profile 2.5m wide by 2m deep. Flowing from North to South.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Windmill

Reference Number: 11

Survey date: 08/07/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Worked Bog;

Vegetation: Firm

Feature Type : Harvested bog

Turbine No.:	Feature to the south west of T24
--------------	----------------------------------

Notes: Milled peat bog area, very dry. Parallel drains at 15m centres, as per feature 6 (Pic 1239). Photograph taken looking East.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.

View D/S Photo - No photo taken.

Site: Windmill

Reference Number: 12

Survey date: 08/07/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Worked Bog;

Vegetation: Firm

Feature Type : Silt Ponds

Notes: Channel 3.5 m wide by 2.5 m deep. Flow depth 0.5m.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Windmill

Reference Number: 13

Survey date: 08/07/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Worked Bog;

Vegetation: Firm

Feature Type : Drainage Ditch

Channel width (m):	2
Channel height (m):	3
Channel flow direction:	NE - SW

Notes: Bog drainage ditch along boundary of the site. Depth of flow 0.05m

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Windmill

Reference Number: 14

Survey date: 08/07/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Worked Bog;

Vegetation: Firm

Feature Type : Bridge

Channel width (m):	1.5
Channel height (m):	1.5

Notes: Single stone arch bridge at stream crossing. Arch 1.5m wide by 1.5m deep.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.



View D/S Photo.

Site: Windmill

Reference Number: 15

Survey date: 08/07/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Worked Bog;

Vegetation: Firm

Feature Type : Stream

Channel width (m):	1.8
Channel height (m):	1.5

Notes: Stream crossing. No access available to determine if the stream crossing structure is a pipe or a culvert.

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.



D/S Photo.

View D/S Photo - No photo taken.

Site: Windmill

Reference Number: 16

Survey date: 08/07/2013

**Survey Info:**

Weather: Dry;

Ground Conditions: Worked Bog;

Vegetation: Firm

Feature Type : Bridge

Channel width (m):	2.5
Channel height (m):	2.5
Road width (m):	4.5
Bridge width (m):	6

Notes: Bridge crossing.- Culvert 0.8m wide by 2m deep

**Photos**



**Photo Notes**

U/S Photo.

View U/S Photo - No photo taken.

D/S Photo - No photo taken.



View D/S Photo.

Site: Windmill

Reference Number: 17

Survey date: 11/11/2014

**Survey Info:**

Weather: Wet;

Ground Conditions: Agricultural Land;

Vegetation: Wet;

Feature Type : Bridge

Notes: Concrete culvert. Access not possible during survey. Ponded water at low point in road at bridge location.

**Photos**

**Photo Notes**

U/S Photo - No photo taken.

View U/S Photo - No photo taken.



D/S Photo.



View D/S Photo.

Site: Windmill

Reference Number: 18

Survey date: 11/11/2014

**Survey Info:**

Weather: Wet;

Ground Conditions: Harvested Bog/milled peat

Vegetation: Wet;

Feature Type : Drainage Ditch

Channel width (m):	3
Channel height (m):	2
Channel flow direction:	SW - NE

Notes: Perimeter drain, drains edges of bog and working area behind the yard (piped outfalls into ditch). There is a slight mounding then and the inner lands are drained northwards in bog drains. The perimeter drain to the east drains out towards the road, crosses the entrance road and joins a stream at the main road.

**Photos**

**Photo Notes**



U/S Photo.

View U/S Photo - No photo taken.



D/S Photo. Piped outfalls to ditch from operating area.

View D/S Photo - No photo taken.



Site: Windmill

Reference Number: 19

Survey date: 11/11/2014

**Survey Info:**

Weather: Wet;

Ground Conditions: Harvested Bog/milled peat

Vegetation: Wet;

Feature Type : Road

Road width (m):	5
-----------------	---

Notes: Existing track

**Photos**



**Photo Notes**

U/S Photo. Roadside drainage evident

View U/S Photo - No photo taken.

D/S Photo - No photo taken.



View D/S Photo.

Appendix H2

Calculations

Turbine Cluster	Culvert	AREA km <sup>2</sup>	SAAR mm	SOIL	Design Flow 3 term EQN IOH Method			Design Flow 3 term EQN FSSR Method			Max. Design 100 yr Flood m <sup>3</sup> /s	Design Culvert Size		Adjusted Design Culvert Size				
					QBAR m <sup>3</sup> /s	Q100(x 1.96SOIL Type >2, x 2.61SOIL Type 1) x 1.65 m <sup>3</sup> /s	Increase by 20% for Climate Change	QBAR m <sup>3</sup> /s	Q100(x 1.96) x 1.5 m <sup>3</sup> /s	Increase by 20% for Climate Change		Width mm	Height/Diameter mm	Freeboard 300mm (IF) mm	Embedment 500mm (IF) mm	Width mm	Height/Diameter mm	Culvert Type
Drehid Hortland	SC1	10.9220	812	0.45	4.066	13.149	15.779	4.274	12.566	15.080	15.779	4500	1800	300		4500	2100	Clear Span Structure
Drehid Hortland	SC2	2.9760	801	0.45	1.258	4.068	4.882	1.271	3.737	4.484	4.882	2700	1200	300		2700	1500	Clear Span Structure
Drehid Hortland	SC3	0.4340	801	0.45	0.227	0.733	0.880	0.216	0.636	0.763	0.880		1050	300	500		1850	Circular Pipe Clear Span Structure
Drehid Hortland	SC4	3.2940	793	0.45	1.361	4.401	5.281	1.378	4.053	4.863	5.281	3000	1200	300		3000	1500	Clear Span Structure
Drehid Hortland	SC6	19.3360	779	0.3	2.671	8.639	10.367	3.054	8.980	10.776	10.776	3300	1800	300		3300	2100	Clear Span Structure

Notes:

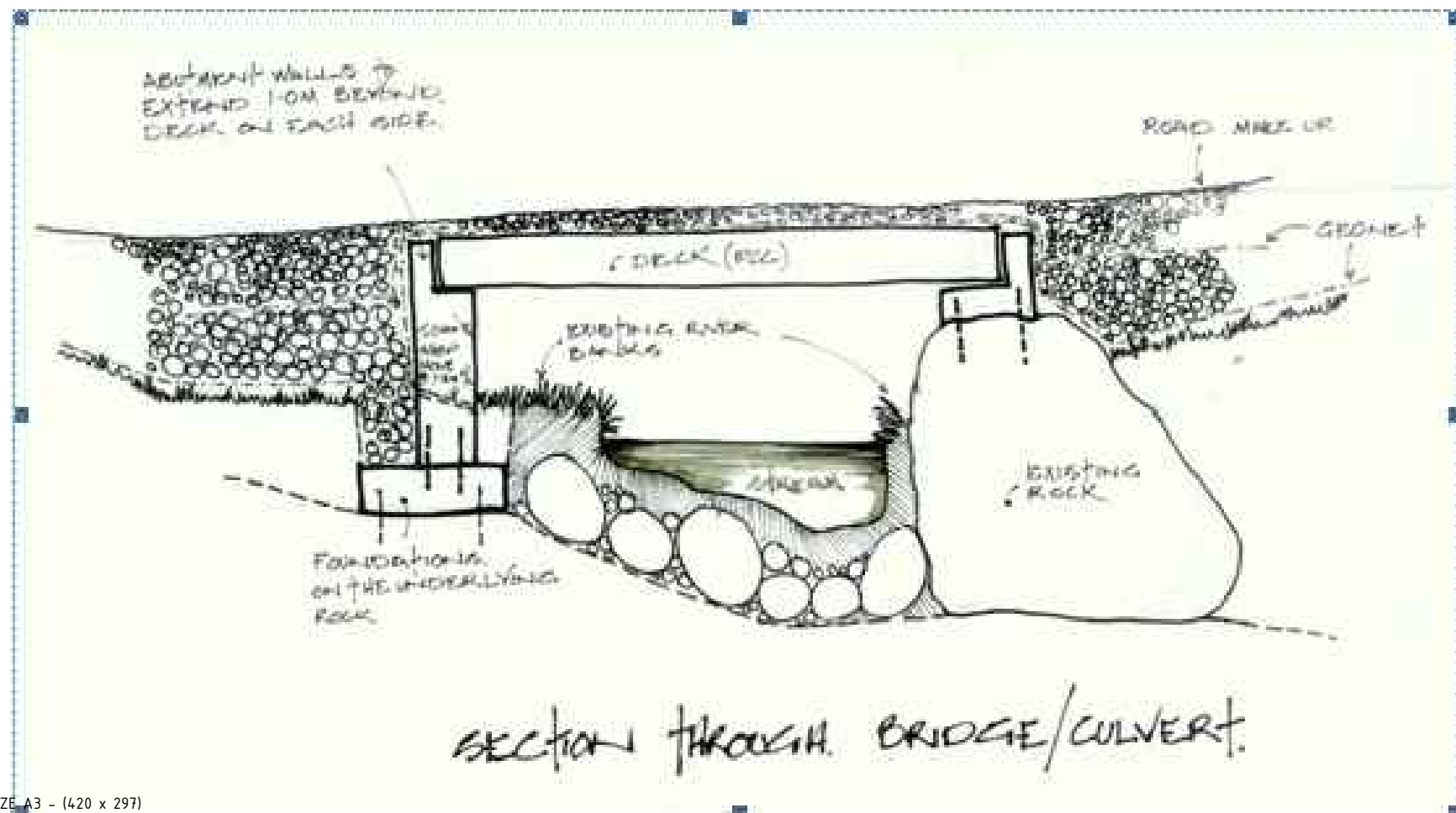
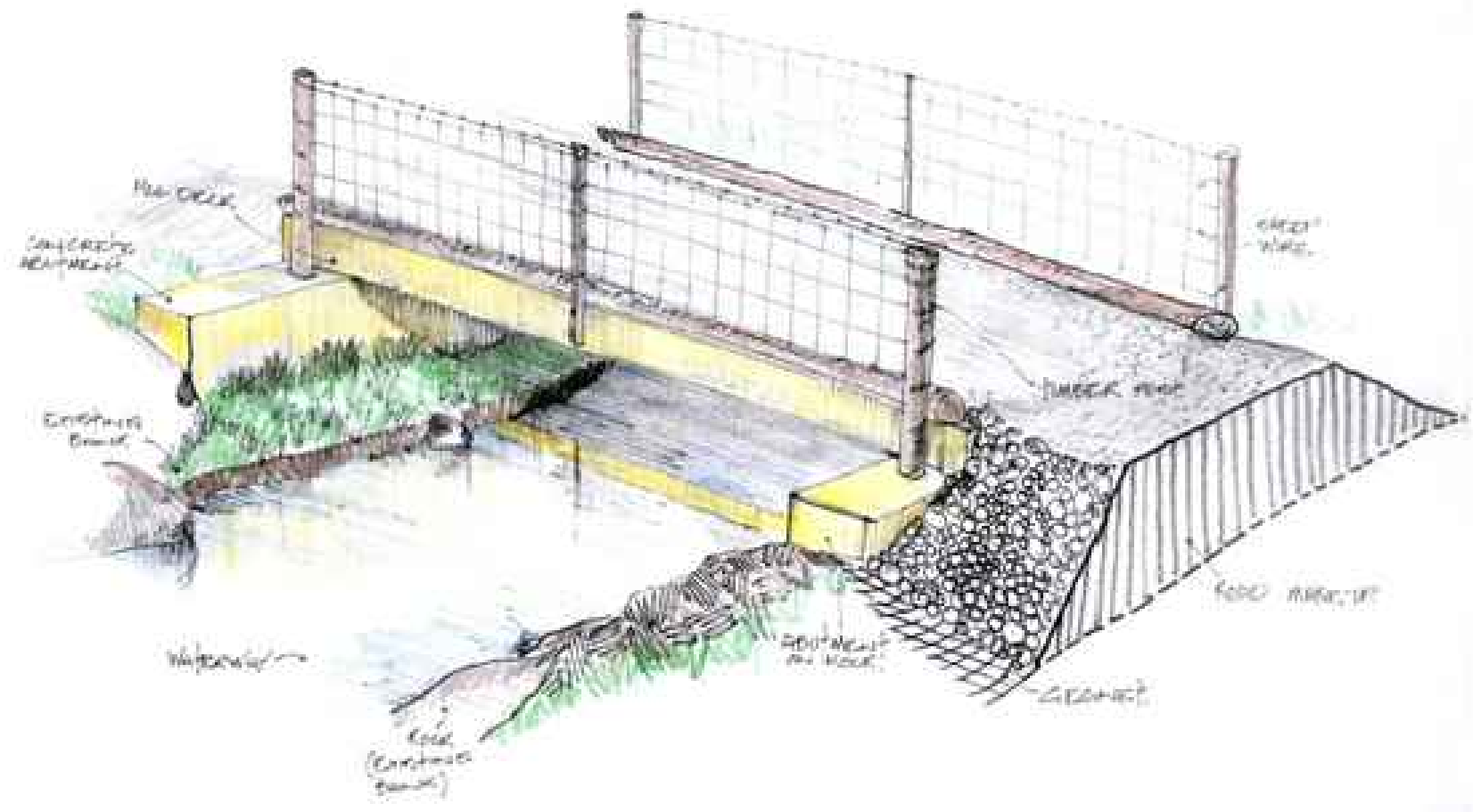
- 1) 3-Term EQN is  $QBAR = 0.00066 (Area^{0.92})(SAAR^{1.22})(Soil^{2.0})$  Ref.: Flood Studies Report No. 6 and  $QBAR = 0.00108 (Area^{0.89})(SAAR^{1.17})(Soil^{2.17})$  for catchments less than 25km<sup>2</sup>. Hyd. Report No. 124
- 2) SAAR (Average Annual Rainfall) from at site FSU Web Portal, www.opw.hydronet.com
- 3) SOIL from FSR Maps.
- 4) Q100 from Region curves ordinates from Flood Studies Report, Table 2.39
- 5) Factors of Safety multiples of 1.5 and 1.65 included for the relevant formulae.
- 6) Culvert catchment area determined from FSU Web Portal
- 7) Climate change - increase of 20% in flows - ref: OPW - Appendix C Standard Specifications for Feasibility and Pre-feasibility Studies for flood relief works - March 2004 (the note is based on the Desk Study carried out by Dr. Michael Bruen)

Location	FSU Web Portal			Pooled Group	Pooled Group Analysis	Adjustment for Climate Change	Design Culvert Size		Adjusted Design Culvert Size		Culvert Type		
	AREA km2	SAAR mm	QMED m3/s	Growth Factor	Design 100 yr Flow m3/s	x1.2 m3/s	Width mm	Height/Di ameter mm	Freeboar d 300mm (IFI) mm	Embedm ent 500mm mm		Width mm	Height/Di ameter mm
Drehid Hortland SC5_Mulgeeth Tributary of the River Blackwater_Ungauged site code 07_1720_6	26.7470	796	2.80	2.38	6.67	8.01	3300	1500	300		3300	1800	Clear Span Structure, to span a minimum of 2.5 m beyond the existing bank of the stream and to incorporate any mammal requirements.
Cloncumber SC7_Cloncumber Stream, tributary of the Slate River_Ungauged site code 14_1870_17	63.6760	810	2.46	2.10	5.18	6.21	2700	1500	300		2700	1800	Clear Span Structure, to span a minimum of 2.5 m beyond the existing bank of the stream and to incorporate any mammal requirements.
Cloncumber SC8_Slate River_Ungauged site code 14_235_4	53.5450	791	4.63	2.39	11.07	13.28	3300	2100	300		5000	4000	Clear Span Structure. The structure will not be smaller than the adjacent existing structure at this location, as required by OPW. The existing structure is a 5000mm wide x 4000mm high stone arch bridge. The structure will be designed to incorporate any mammal requirements.

## Appendix H3

A typical design of a bottomless culvert  
(Matiere type arch structure)

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NATURAL SCALE

100mm

50

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ORIGINAL DRAWING SIZE A3 - (420 x 297)

<b>FEHILY TIMONEY &amp; COMPANY</b> CONSULTANTS IN ENGINEERING AND ENVIRONMENTAL SCIENCES		
Title of Drawing  TYPICAL MATIERE ARCH TYPE STRUCTURE		
Date 25-Aug-14	Sheet 1 of 1	Scale 1:49
Dwg. No. Ftc-sd-Wind Farm-014	Rev. A	

Appendix H4  
Flow Calculations

## Culvert Design Report N/A

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	67.07 m	Storm Event	Design
Computed Headwater Elev.	63.71 m	Discharge	39.5300 m <sup>3</sup> /s
Headwater Depth/Height	0.51	Tailwater Elevation	61.99 m
Inlet Control HW Elev.	63.44 m	Control Type	Outlet Control
Outlet Control HW Elev.	63.71 m		

Grades			
Upstream Invert	61.05 m	Downstream Invert	61.01 m
Length	6.50 m	Constructed Slope	0.005077 m/m

Hydraulic Profile			
Profile	M2	Depth, Downstream	1.70 m
Slope Type	Mild	Normal Depth	2.16 m
Flow Regime	Subcritical	Critical Depth	1.70 m
Velocity Downstream	3.63 m/s	Critical Slope	0.011923 m/m

Section			
Section Shape	Arch	Mannings Coefficient	0.033
Section Material	Steel structural plate 47 In CR	Span	8.10 m
Section Size	8100 x 5260 mm	Rise	5.26 m
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	63.71 m	Upstream Velocity Head	0.53 m
Ke	0.50	Entrance Loss	0.26 m

Inlet Control Properties			
Inlet Control HW Elev.	63.44 m	Flow Control	Unsubmerged
Inlet Type	90° headwall	Area Full	32.9 m <sup>2</sup>
K	0.00830	HDS 5 Chart	34
M	2.00000	HDS 5 Scale	1
C	0.03790	Equation Form	1
Y	0.69000		



## Culvert Design Report N/A

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	67.07 m	Storm Event	Design
Computed Headwater Elev.	63.71 m	Discharge	39.6800 m <sup>3</sup> /s
Headwater Depth/Height	0.51	Tailwater Elevation	62.00 m
Inlet Control HW Elev.	63.45 m	Control Type	Outlet Control
Outlet Control HW Elev.	63.71 m		

Grades			
Upstream Invert	61.05 m	Downstream Invert	61.01 m
Length	6.50 m	Constructed Slope	0.005077 m/m

Hydraulic Profile			
Profile	M2	Depth, Downstream	1.70 m
Slope Type	Mild	Normal Depth	2.16 m
Flow Regime	Subcritical	Critical Depth	1.70 m
Velocity Downstream	3.64 m/s	Critical Slope	0.011924 m/m

Section			
Section Shape	Arch	Mannings Coefficient	0.033
Section Material	Steel structural plate 47 In CR	Span	8.10 m
Section Size	8100 x 5260 mm	Rise	5.26 m
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	63.71 m	Upstream Velocity Head	0.53 m
Ke	0.50	Entrance Loss	0.26 m

Inlet Control Properties			
Inlet Control HW Elev.	63.45 m	Flow Control	Unsubmerged
Inlet Type	90° headwall	Area Full	32.9 m <sup>2</sup>
K	0.00830	HDS 5 Chart	34
M	2.00000	HDS 5 Scale	1
C	0.03790	Equation Form	1
Y	0.69000		

Location	AREA km <sup>2</sup>	SAAR mm	SOIL	Design Flow 3 term EQN IOH Method			Design Flow 3 term EQN FSSR Method			Max. Design 100 yr Flood m <sup>3</sup> /s	Increase in design 100 yr flow due to development m <sup>3</sup> /s	Post Development Design 100 yr Flow m <sup>3</sup> /s
				QBAR m <sup>3</sup> /s	Q100(x 1.96SOIL Type >2, x 2.61SOIL Type 1) x 1.65 m <sup>3</sup> /s	Increase by 20% for Climate Change	QBAR m <sup>3</sup> /s	Q100(x 1.96) x 1.5 m <sup>3</sup> /s	Increase by 20% for Climate Change			
Boolykeagh Tributary of the River Boyne crossing at Roe's Bridge	4.6270	843	0.3	0.821	2.654	3.184	0.902	2.653	3.183	3.184	0.084	3.268

Notes:

- 1) 3-Term EQN is  $QBAR = 0.00066 (Area^{0.92})(SAAR^{1.22})(Soil^{2.0})$  Ref.: Flood Studies Report No. 6 and  $QBAR = 0.00108 (Area^{0.89})(SAAR^{1.17})(Soil^{2.17})$  for catchments less than 25km<sup>2</sup> (Inst. Hyd. Report No. 124)
- 2) SAAR (Average Annual Rainfall) from Met Eireann.
- 3) SOIL from FSR Maps.
- 4) Q100 from Region curves ordinates from Flood Studies Report, Table 2.39
- 5) Factors of Safety multiples of 1.5 and 1.65 included for the relevant formulae.
- 6) Culvert catchment area determined from FSU Web Portal
- 7) Climate change - increase of 20% in flows - ref: OPW - Appendix C Standard Specifications for Feasibility and Pre-feasibility Studies for flood relief works - March 2004 (the note is based on the Desk Study carried out by Dr. Michael Bruen)

	FSU Web Portal			Pooled Group	Pooled Group Analysis	Adjustment for Climate Change		
Location	AREA	SAAR	QMED	Growth Factor	Design 100 yr Flow	x1.2	Increase in design 100 yr flow due to development	Post Development Design 100 yr Flow
	km2	mm	m3/s		m3/s	m3/s	m3/s	m3/s
Slate River at Agar Bridge_Ungauged site code 14_1803_4	142.79	804	6.71	2.19	14.70	17.64	0.073	17.72

Location	AREA km <sup>2</sup>	SAAR mm	SOIL	Design Flow 3 term EQN IOH Method			Design Flow 3 term EQN FSSR Method			Max. Design 100 yr Flood m <sup>3</sup> /s	Increase in design 100 yr flow due to development m <sup>3</sup> /s	Post Development Design 100 yr Flow m <sup>3</sup> /s	Existing Surcharge at Structure in Q100 Flow m	Additional Surcharge at Structure in Q100 Flow due to Development m
				QBAR m <sup>3</sup> /s	Q100(x 1.96SOIL Type >2, x 2.61SOIL Type 1) x 1.65 m <sup>3</sup> /s	Increase by 20% for Climate Change	QBAR m <sup>3</sup> /s	Q100(x 1.96) x 1.5 m <sup>3</sup> /s	Increase by 20% for Climate Change					
Boolykeagh Tributary of the River Boyne crossing at Roe's Bridge	4.6270	843	0.3	0.821	2.654	3.184	0.902	2.653	3.183	3.184	0.084	3.268	0.110	0.030

Notes:

1) 3-Term EQN is  $QBAR = 0.00066 (Area^{0.92})(SAAR^{1.22})(Soil^{2.0})$  Ref.: Flood Studies Report No. 6 and  $QBAR = 0.00108 (Area^{0.89})(SAAR^{1.17})(Soil^{2.17})$  for catchments less than 25km<sup>2</sup> (Inst. Hyd. Report No. 124)

2) SAAR (Average Annual Rainfall) from Met Eireann.

3) SOIL from FSR Maps.

4) Q100 from Region curves ordinates from Flood Studies Report, Table 2.39

5) Factors of Safety multiples of 1.5 and 1.65 included for the relevant formulae.

6) Culvert catchment area determined from FSU Web Portal

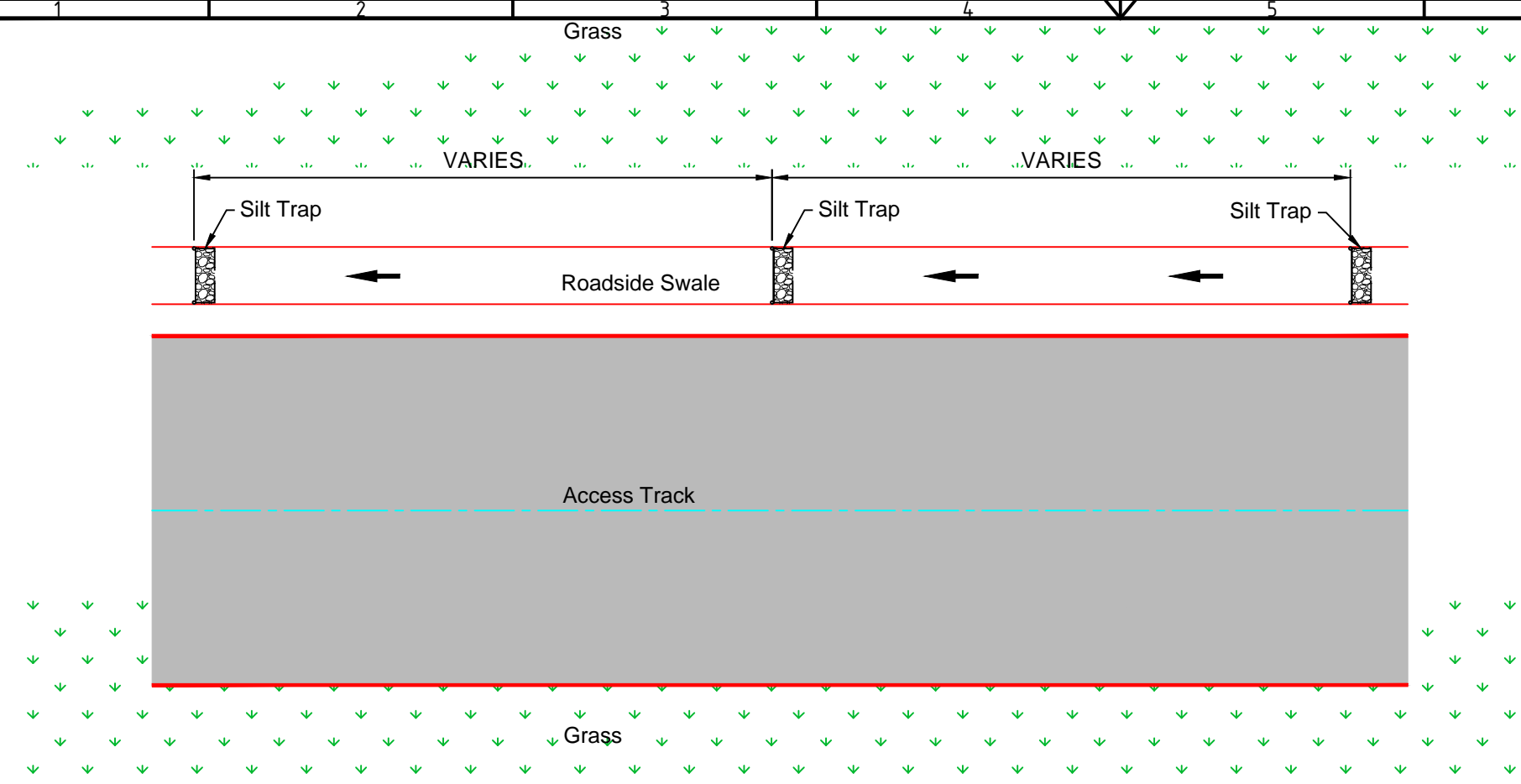
7) Climate change - increase of 20% in flows - ref: OPW - Appendix C Standard Specifications for Feasibility and Pre-feasibility Studies for flood relief works - March 2004 (the note is based on the Desk Study carried out by Dr. Michael Bruen)

Location	FSU Web Portal			Pooled Group	Pooled Group Analysis	Adjustment for Climate Change				
	AREA	SAAR	QMED	Growth Factor	Design 100 yr Flow	x1.2	Increase in design 100 yr flow due to development	Post Development Design 100 yr Flow	Existing Surcharge at Structure in Q100 Flow	Additional Surcharge at Structure in Q100 Flow due to Development
	km2	mm	m3/s		m3/s	m3/s	m3/s	m3/s	m	m
River Blackwater crossing at Clonguiffin_Ungauged site code 07_231_6	161.29	806	17.16	1.92	32.94	39.53	0.152	39.68	None	None
Slate River at Agar Bridge_Ungauged site code 14_1803_4	142.79	804	6.71	2.19	14.70	17.64	0.073	17.72	None	None

## Appendix H5

### Details of a typical silt trap

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### PLAN OF SILT TRAP IN SWALE

Scale 1:100

NATURAL SCALE

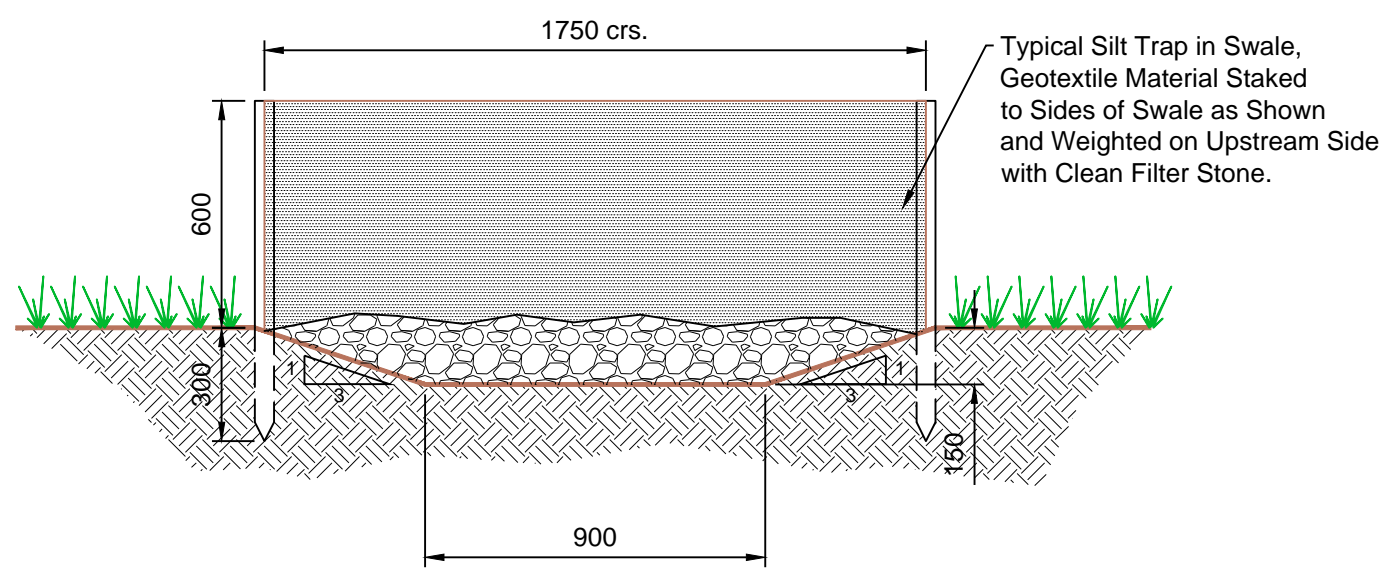
100mm

50

20

10

0



### SILT TRAP IN SWALE

Scale 1:20

<b>FEHILY TIMONEY &amp; COMPANY</b> CONSULTANTS IN ENGINEERING AND ENVIRONMENTAL SCIENCES			
Title of Drawing  TYPICAL SILT TRAP IN SWALE			
Date 25-Aug-14	Sheet 1 of 1	Scale AS SHOWN	
Dwg. No. Ftc-sd-Wind Farm-010			Rev. A

## Appendix H6

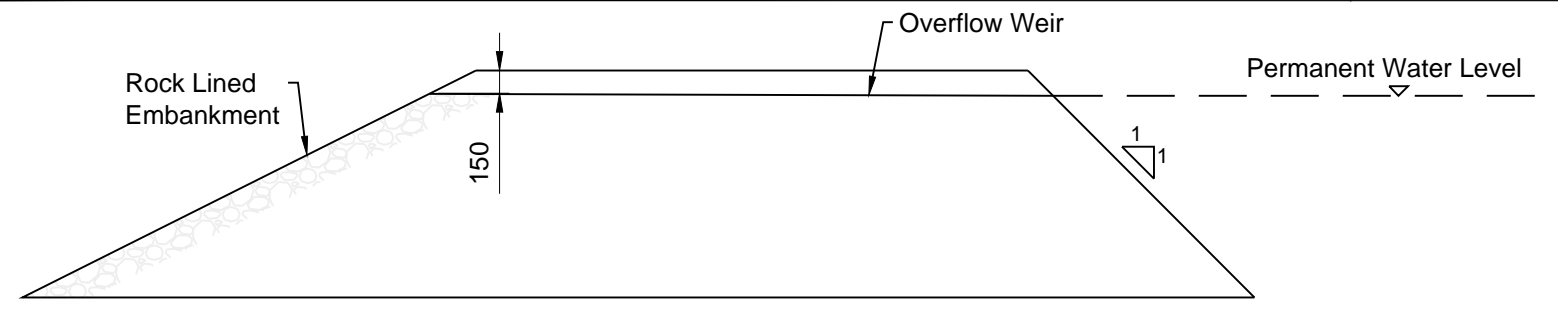
### Typical stilling pond



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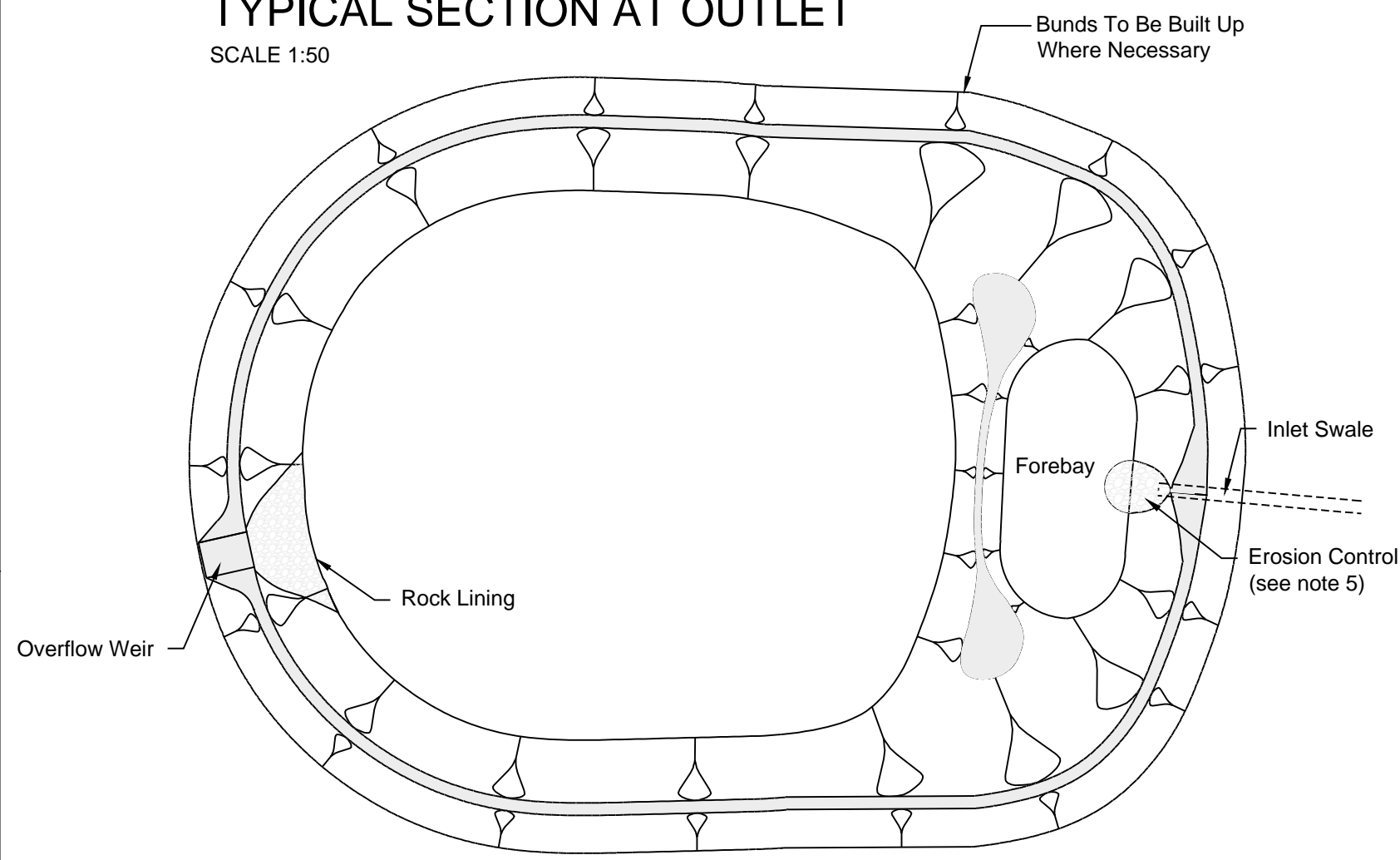
**NOTES**

1. This drawing should only be read in relation to subject of the title. Other information shown on drawing is to be considered indicative only.
2. All dimensions are in millimetres unless otherwise stated.
3. The pond base and sides below the permanent water level should be made impermeable by:  
Cohesive material using native clay or a synthetic liner 1 mm LLDPE.
4. Bunds in ponds to be constructed from native clay.
5. Erosion control to be rock lining. Extent to be agreed on site.
6. Rock lining to be a 125mm thickness of Class 1B material.
7. Refer to stilling pond schedules for pond sizes.
8. Swale inlet at 0.15 m below top of pond.
9. All ponds to be fenced off.



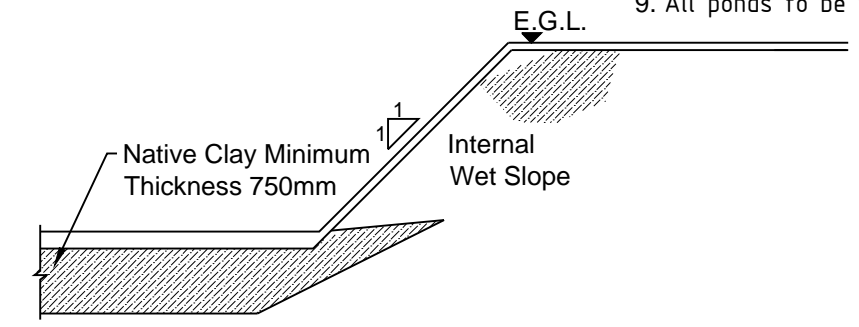
**TYPICAL SECTION AT OUTLET**

SCALE 1:50



**TYPICAL STILLING POND LAYOUT**

Scale 1:500

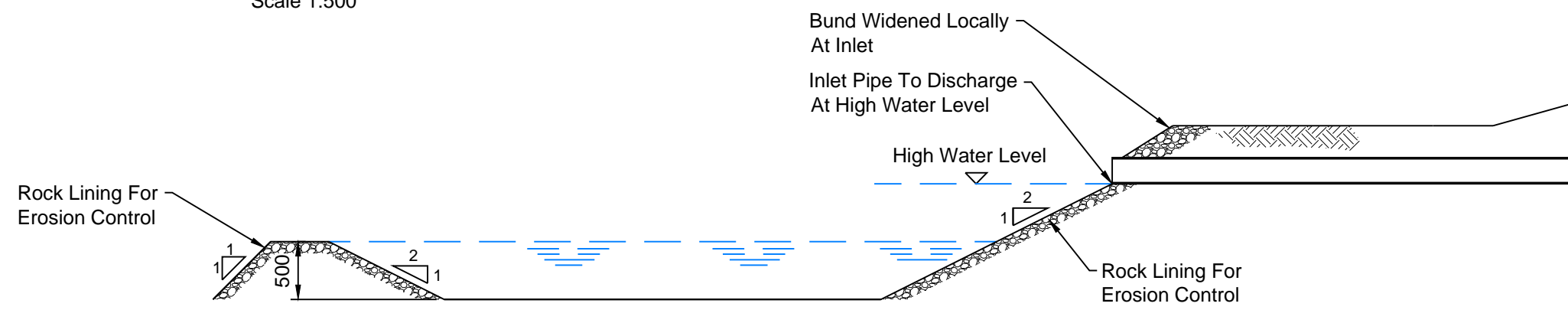


**TYPICAL BUND CONSTRUCTION**

(Where Pond is Below Ground Level)

Scale 1:50

NATURAL SCALE  
100mm  
50  
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10  
0

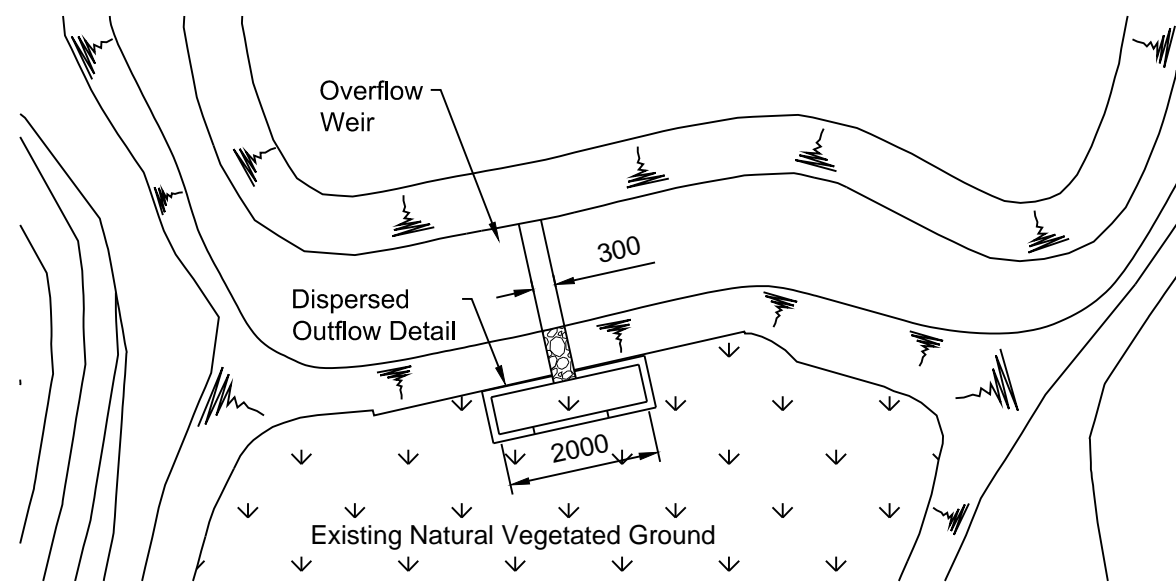


**TYPICAL SECTION THROUGH FOREBAY**

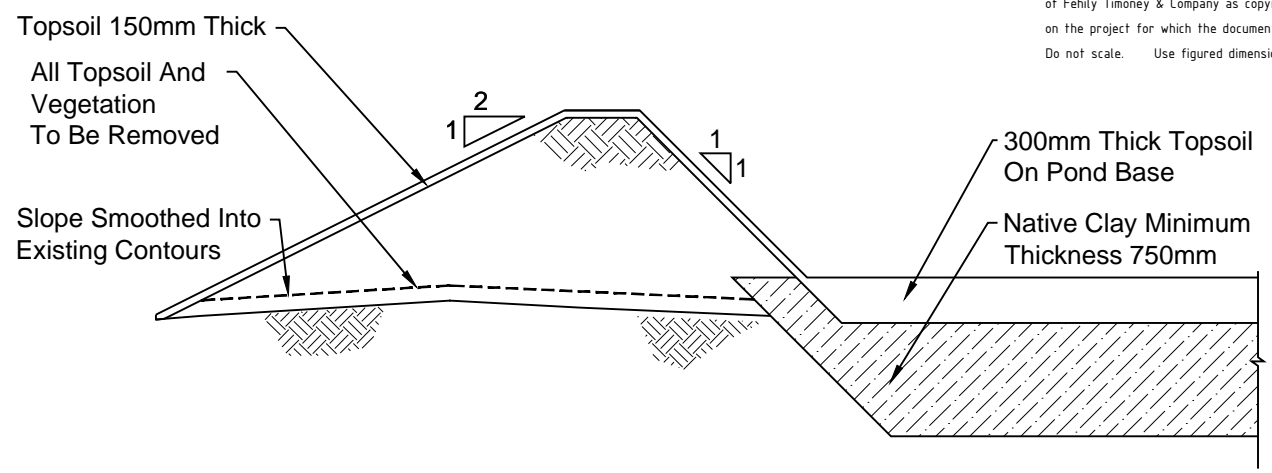
Scale 1:50

<b>FEHILY TIMONEY &amp; COMPANY</b> CONSULTANTS IN ENGINEERING AND ENVIRONMENTAL SCIENCES		
Title of Drawing  STILLING POND DETAILS SHEET 1 OF 2		
Date 25-Aug-14	Sheet 1 of 1	Scale AS SHOWN
Dwg. No. Ftc-sd-Wind Farm-006		Rev. A

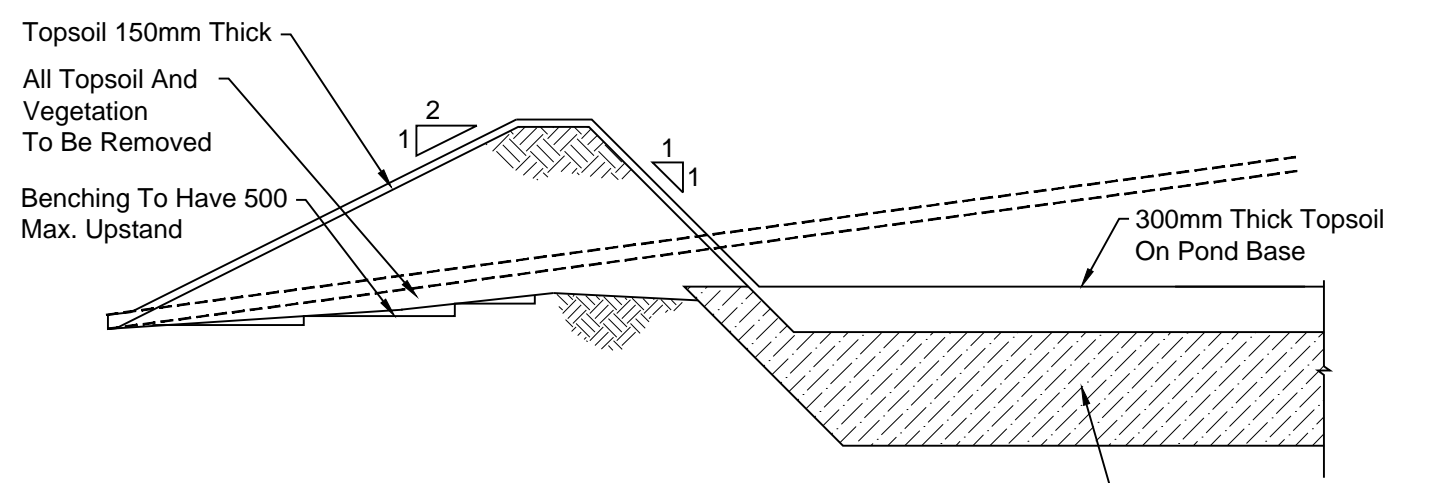
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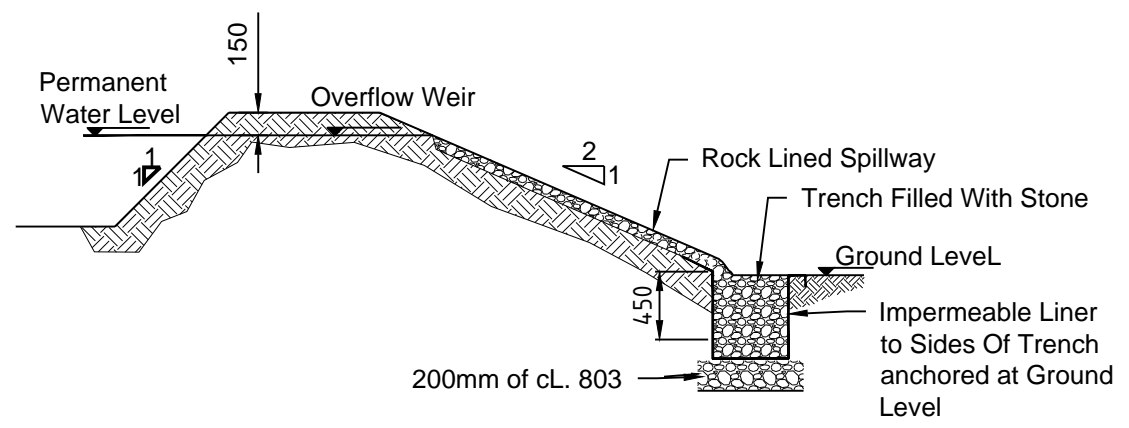
**PLAN OF POND OUTFALL DETAIL**  
Scale 1:100



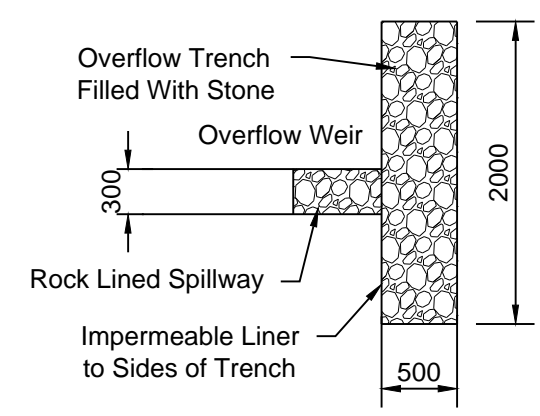
**TYPICAL BUND CONSTRUCTION**  
(Where Existing Ground Slope Less Than 1:5)  
Scale 1:50



**TYPICAL BUND CONSTRUCTION**  
(Where Existing Ground Slope Greater Than 1:5)  
Scale 1:50



**DETAILS AT OUTFALL & DISPERSED OUTFALL DETAIL**  
SCALE 1:50



**PLAN**  
Scale 1:50

<b>FEHILY TIMONEY &amp; COMPANY</b> CONSULTANTS IN ENGINEERING AND ENVIRONMENTAL SCIENCES		
Title of Drawing  STILLING POND DETAILS SHEET 2 OF 2		
Date 25-Aug-14	Sheet 1 of 1	Scale AS SHOWN
Dwg. No. Ftc-sd-Wind Farm-007		Rev. A

NATURAL SCALE  
100mm  
50  
20  
10  
0



CONSULTANTS IN ENGINEERING & ENVIRONMENTAL SCIENCES  
Cork : Tel 021-4964133 Fax 021-4964464

DESIGNED: MC CHECKED:  
DATE: 26/03/2015 REVISION: -  
JOB NUMBER: LE14-731-04  
CALC NUMBER: C-1  
FILE: Q:\2014\LE14\731\04\06 EIS\09  
Hydrology\Reports\Draft Appendices\Appendix  
H6\LE1473104\_Typical Stilling Pond\_26.03.15.xls  
SHEET: Calc cover

PROJECT: Maigne Wind Farm  
DESCRIPTION: Typical Stilling Pond Design and Layout

Rev	Date	Purpose and Description	Prepared	Checked	
-	26/03/2015	Design of Stilling Pond	MC		

Met Eireann  
Return Period Rainfall Depths for sliding Durations  
Irish Grid: Easting: 272867, Northing: 229669,

DURATION	Interval		Years															
	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,		
5 mins	2.5,	3.4,	3.9,	4.7,	5.2,	5.6,	6.9,	8.4,	9.3,	10.7,	11.9,	12.8,	14.2,	15.3,	16.2,	N/A		
10 mins	3.4,	4.8,	5.5,	6.5,	7.3,	7.8,	9.6,	11.7,	13.0,	14.9,	16.5,	17.8,	19.8,	21.3,	22.6,	N/A		
15 mins	4.0,	5.6,	6.4,	7.7,	8.5,	9.2,	11.3,	13.7,	15.3,	17.5,	19.5,	21.0,	23.3,	25.1,	26.6,	N/A		
30 mins	5.3,	7.3,	8.4,	9.9,	11.0,	11.8,	14.4,	17.3,	19.2,	21.8,	24.1,	25.9,	28.7,	30.8,	32.6,	N/A		
1 hours	7.0,	9.5,	10.8,	12.8,	14.1,	15.0,	18.2,	21.7,	24.0,	27.2,	29.9,	32.1,	35.3,	37.8,	39.9,	N/A		
2 hours	9.3,	12.4,	14.1,	16.4,	18.0,	19.2,	23.1,	27.3,	30.1,	33.8,	37.1,	39.6,	43.5,	46.4,	48.8,	N/A		
3 hours	11.0,	14.5,	16.4,	19.1,	20.8,	22.2,	26.5,	31.2,	34.3,	38.5,	42.1,	44.9,	49.1,	52.3,	55.0,	N/A		
4 hours	12.3,	16.2,	18.2,	21.2,	23.1,	24.6,	29.3,	34.4,	37.6,	42.1,	46.0,	49.0,	53.5,	57.0,	59.8,	N/A		
6 hours	14.5,	18.9,	21.2,	24.5,	26.7,	28.4,	33.6,	39.3,	42.9,	47.9,	52.2,	55.5,	60.4,	64.2,	67.3,	N/A		
9 hours	17.0,	22.1,	24.7,	28.5,	30.9,	32.8,	38.6,	44.9,	49.0,	54.5,	59.2,	62.8,	68.3,	72.4,	75.8,	N/A		
12 hours	19.1,	24.7,	27.5,	31.6,	34.3,	36.3,	42.6,	49.4,	53.8,	59.7,	64.8,	68.6,	74.4,	78.8,	82.4,	N/A		
18 hours	22.5,	28.9,	32.1,	36.6,	39.6,	41.9,	48.9,	56.5,	61.3,	67.8,	73.4,	77.7,	84.0,	88.9,	92.8,	N/A		
24 hours	25.3,	32.2,	35.7,	40.7,	43.9,	46.4,	54.0,	62.2,	67.3,	74.3,	80.3,	84.8,	91.6,	96.7,	100.9,	115.0		
2 days	30.3,	38.0,	41.7,	47.1,	50.6,	53.2,	61.3,	69.8,	75.2,	82.4,	88.6,	93.2,	100.1,	105.3,	109.5,	123.7		
3 days	34.7,	43.1,	47.2,	53.0,	56.7,	59.5,	68.1,	77.1,	82.8,	90.3,	96.8,	101.6,	108.8,	114.2,	118.5,	133.1		
4 days	38.8,	47.8,	52.2,	58.3,	62.3,	65.2,	74.4,	83.9,	89.8,	97.7,	104.5,	109.5,	117.0,	122.5,	127.1,	142.1		
6 days	46.2,	56.4,	61.3,	68.2,	72.5,	75.8,	85.9,	96.3,	102.8,	111.4,	118.6,	124.1,	132.1,	138.1,	142.9,	159.0		
8 days	53.1,	64.3,	69.7,	77.2,	81.9,	85.5,	96.4,	107.7,	114.6,	123.9,	131.7,	137.5,	146.0,	152.4,	157.6,	174.6		
10 days	59.6,	71.7,	77.5,	85.7,	90.8,	94.6,	106.3,	118.4,	125.8,	135.6,	143.9,	150.0,	159.1,	165.8,	171.3,	189.2		
12 days	65.8,	78.8,	85.1,	93.8,	99.2,	103.3,	115.7,	128.5,	136.4,	146.8,	155.5,	161.9,	171.5,	178.6,	184.3,	203.1		
16 days	77.7,	92.4,	99.4,	109.1,	115.3,	119.8,	133.6,	147.7,	156.4,	167.8,	177.4,	184.5,	194.9,	202.6,	208.8,	229.3		
20 days	89.1,	105.3,	113.1,	123.8,	130.5,	135.4,	150.5,	165.9,	175.3,	187.7,	198.0,	205.7,	216.9,	225.2,	231.9,	253.9		
25 days	102.8,	120.9,	129.5,	141.3,	148.7,	154.2,	170.8,	187.6,	197.8,	211.3,	222.6,	230.9,	243.1,	252.1,	259.3,	283.0		

NOTES:

N/A Data not available

These values are derived from a Depth Duration Frequency (DDF) Model

For details refer to:

'Fitzgerald D. L. (2007), Estimates of Point Rainfall Frequencies, Technical Note No. 61, Met Eireann, Dublin',  
Available for download at [www.met.ie/climate/dataproducts/Estimation-of-Point-Rainfall-Frequencies\\_TN61.pdf](http://www.met.ie/climate/dataproducts/Estimation-of-Point-Rainfall-Frequencies_TN61.pdf)

## Maighne Wind Farm

### Stilling Pond downslope of Turbine Locations

Location	Turbine Hardstanding & Foundations	Imp. Factor X 0.75	Existing access roads	Proposed site access roads	Area road x 4.5 m wide	Imp. Factor X 0.75	Area	Area	Greenfield Area
	m <sup>2</sup>		m	m	m <sup>2</sup>		m <sup>2</sup>	ha	ha
At turbines	2125	1593.75	0	260	1170	877.5	2471.25	0.25	0.33
				<b>Greenfield</b>					<b>0.33</b>
				<b>Developed Site</b>				<b>0.25</b>	

#### Assumptions;

New access roads are 4.5m wide

2650 m<sup>2</sup> allowed for hardstanding for turbines, with an impermeability factor of 0.75

The new site access roads will have a maximum cross-fall of 2% and drain over the edge into a swale.

The new roads have an impermeability factor of 0.75

Existing roads have an impermeability factor of 0.75

Overland flow from the hill side of the tracks will be accommodated in interceptor drains. These interceptor drains will discharge diffusely over existing vegetated areas.

The roads are drained 'over the edge' into swales.

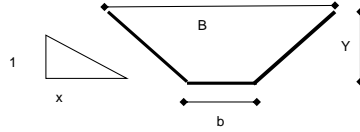
The hardstanding areas associated with the turbine locations will be drained into swales. Where swales have a slope of less than 1/50 they require check dams at intervals in the swale.

The outflow weir from stilling ponds will accommodate a 1 in 100 year, 30 minute duration flow. Where stilling ponds are to be backfilled following construction and after satisfactory re-establishment of vegetation, the weir will become the diffuse outfall for a drainage swale, which will be left in place to drain the surface water from the new development.

Suspended solids removal is estimated in accordance with the plain sedimentation method in CIRIA B14.

Q:\2014\LE1473104\06 EIS\09 Hydrology\Reports\Draft Appendices\Appendix H\LE1473104\_Typical Stilling Pond\_26.03.15.xls  
 Open channel design  
 Microsoft Office Excel 2003

References: Open Channel Design - Douglas/Gasiorek/Swaffield, Fluid Mechanics and Swale Design - The Suds Manual, CIRIA C697



b = varies Allow width for mowing in swales  
 Y = varies Depth (May depend on upstream pipe diameter or culvert entering channel)  
 x = varies Side slope (Varies)  
 n = Check Table Manning's 'n' (Rough stream bed, poor condition n = 0.06, concrete lined n = 0.017)  
 i = 0.001 (min.bed slope, longitudinal gradient - varies but must be less than 0.02 for swales)

Area A (b+(x\*Y))\*Y  
 Wetted Perimeter P b+((2\*Y)\*((1+x^2)^0.5))  
 Top Width B b+2\*x\*Y  
 Hydraulic Mean Depth m A/P

Q = (1/n)\*(A^(5/3)/P^(2/3))^0.5 m<sup>3</sup>/s Manning Formula  
 V = Q/A m/s (Maximum V not to exceed 2 m/s or 0.3 m/s in swales)  
 QReq= Q 5, I = 25.96 mm/hr (30 min. duration incl. CC)  
 Qmax= Q 100, I = 56.98 mm/hr (30 min. duration incl. CC)

Job Nr.:	LE14-731-04
Designed by:	Mary Creedon
Date:	18/12/2014

Swale from T27, contributing impervious area = 0.25 ha

Location/Chainage	Description	b m	Y m	x	n	i	A m <sup>2</sup>	P m	A <sup>5/3</sup>	P <sup>2/3</sup>	i <sup>1/2</sup>	Qcap m <sup>3</sup> /s	Q Req m <sup>3</sup> /s	Qmax m <sup>3</sup> /s	V (for Qreq) m/s	Critical depth V <sup>2</sup> /g m	Depth Y>V <sup>2</sup> /g	Status
Swale	Trap_Channel	0.9	0.150	3	0.06	0.005	0.203	1.849	0.070	1.506	0.071	0.05	0.02	0.04	0.09	0.0008	depth greater than critical	Capacity Adequate

Notes:  
 1) When designing open channels the depth of flow must be greater than the critical depth to avoid the formation of a hydraulic jump.  
 2) Erosion protection such as check dams to be considered for very steep gradients.

## Maighne Wind Farm

**Location: Downslope of turbine T27**

### Sizing of the Stilling Pond

<b>Volume =</b>	<b>30</b> m <sup>3</sup>	Volume required for settlement only
Length of the pond, L =	<b>8.5</b> m	input
Width of the Pond, W=	<b>5.5</b> m	input
Side slope = 1V:ZH	Z = <b>1</b>	input
Free board =	<b>0.15</b> m	input
Live depth =	<b>0</b> m	input from invert of orifice outfall
Permanent depth =	<b>1</b> m	input
Total depth =	1.15 m	
Live and dead storage (total water) depth =	1 m	3m is Max. allowable
Surface Area of the pond =	46.75 m <sup>2</sup>	
Top water level length =	8.2 m	
Top water level width =	5.2 m	
Area at top water level, A =	43 m <sup>2</sup>	<--- Use to assess SS Removal
Permanent water level length =	8.2 m	
Permanent water level width =	5.2 m	
Area at permanent water level, a =	42.64 m <sup>2</sup>	
Bottom width, b =	3.2 m	
Bottom Length, l =	6.2 m	
Bottom area =	19.84 m <sup>2</sup>	
Calculated live volume = $H/3*(A+a+\sqrt{Aa}) =$	<b>0</b> m <sup>3</sup>	
Permanent volume* =	<b>31</b> m <sup>3</sup>	
Freeboard volume =	<b>7</b> m <sup>3</sup>	
Total volume excavation =	<b>37</b> m <sup>3</sup>	

#### Check for efficient nutrient removal & Suspended Solids Removal:

\*CIRIA B14 Design of flood storage reservoirs 6.6.2 states that the permanent pool should be at least the size of 12mm times the contributing catchment area.

Permanent Volume	2500 m <sup>2</sup>	X	0.012 m	30.00 m <sup>3</sup>	ok
------------------	---------------------	---	---------	----------------------	----

## Maigne Wind Farm

**Location: Downslope of turbine T27**

### Assessment of Adequacy of Size of Stilling Pond for Reduction in Concentration of Suspended Solids:

Guidelines:

Ref.: Freshwater Fish Directive

Measured at the discharge point from the surface water settling ponds to the boundary stream.  
 Level (Suspended Solids mg/l) = 25 mg/l

Ref.: Ernest W. Steel - Water Supply & Sewerage, Plain Sedimentation

Top Surface Area of Live Storage of Swale sized as per CIRIA guidelines:

Area = 43 m<sup>2</sup>

Trial 1

Maximum Outflow :

0.03960 m<sup>3</sup>/s

$$\begin{aligned} \text{Flow velocity in Pond : } Q/A &= 0.0396 \div 43 \\ &= 0.00092093 \text{ m/s (v)} \end{aligned}$$

Ref. Table 6.6 CIRIA B14

Material	% content	settling velocity, m/s	content	
1. Gravel	5	0.8	129.1	mg/l
2. Sand	5	0.022	129.1	mg/l
3. Silt	20	0.00018	516.4	mg/l
4. Clay	70	0.000011	1807.4	mg/l
<b>Total</b>	<b>100</b>		<b>2582</b>	
Avg. particle settling velocity =		0.0411437	m/s (v <sub>s</sub> )	

$$\begin{aligned} \text{Ratio of Removal} = r = V_s / V &= 0.0411437 \div 0.00092093 \\ &= 45 \end{aligned}$$

$$\text{Percentage Removal} = 100\%$$

Typical Incoming Concentration = 2582 mg/l

(Ref.: CIRIA B14, Section 6.1.3. Table 6.1 Event mean concentrations of Suspended Solids)

Required Maximum Outgoing Concentration = 25 mg/l

SS Concentration from Stormwater Pond = 25 mg/l



### Sizing of overflow spillway

Checking the depth of water over top water level (i.e. head for the weir)

Job No. **LE14-731-04**

Pond: **Location: Downslope of turbine T27**

#### Overflow Weir Design

The overflow weir Invert should be at the Top Water Level

The 100-year discharge	<b>0.04</b> m <sup>3</sup> /s	
100 year water depth over TWL =	<b>0.100</b> m	target value
Discharge through broad crested weir, $Q^* = 1.705 \cdot B \cdot H^{1.5}$		
Take the overflow weir width B =	<b>0.800</b> m	
Discharge capacity of the weir, Qcap =	0.0431 m <sup>3</sup> /s	

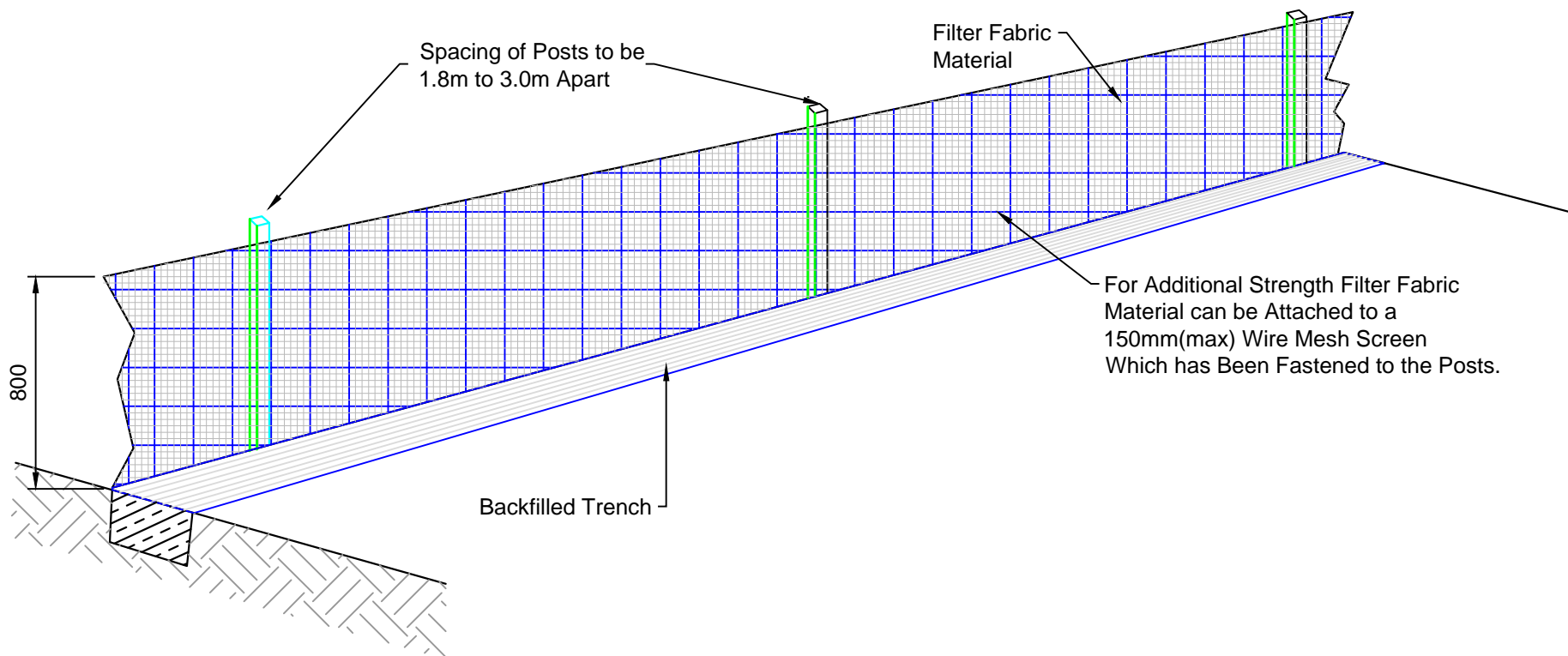
**Weir Width = 0.8 m**

\*Ref: *Fluid Mechanics by Douglas, Gasiorek and Swaffield, 1979, pp 456*

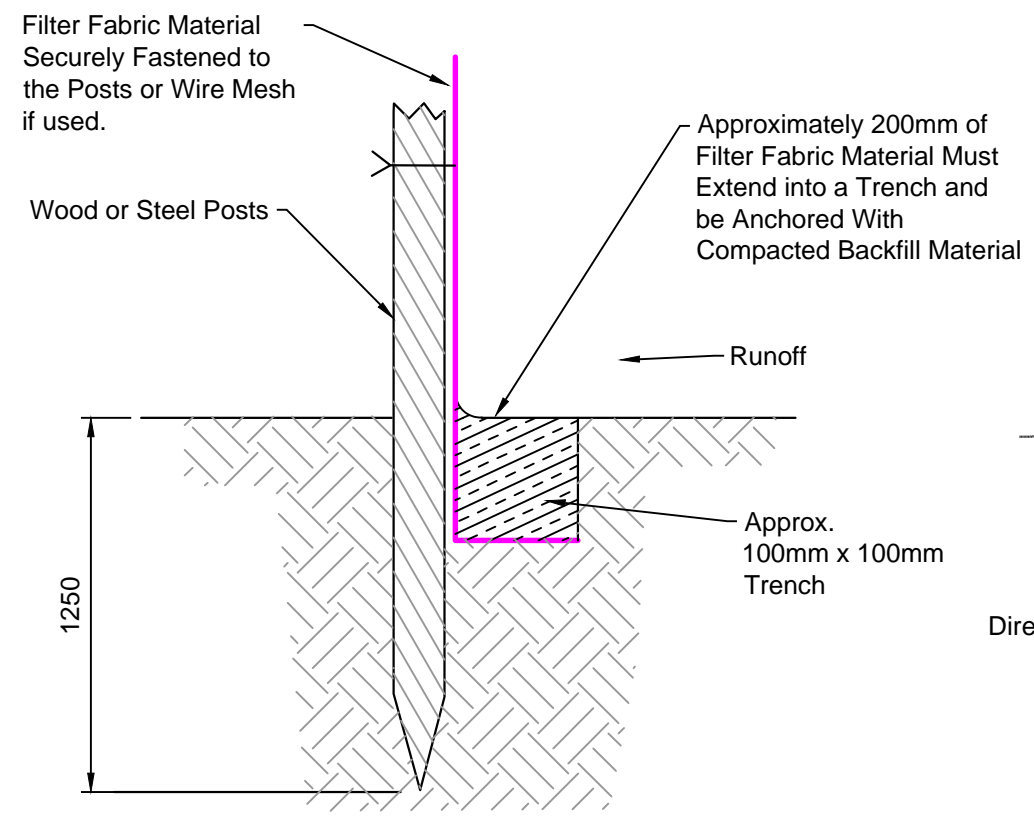
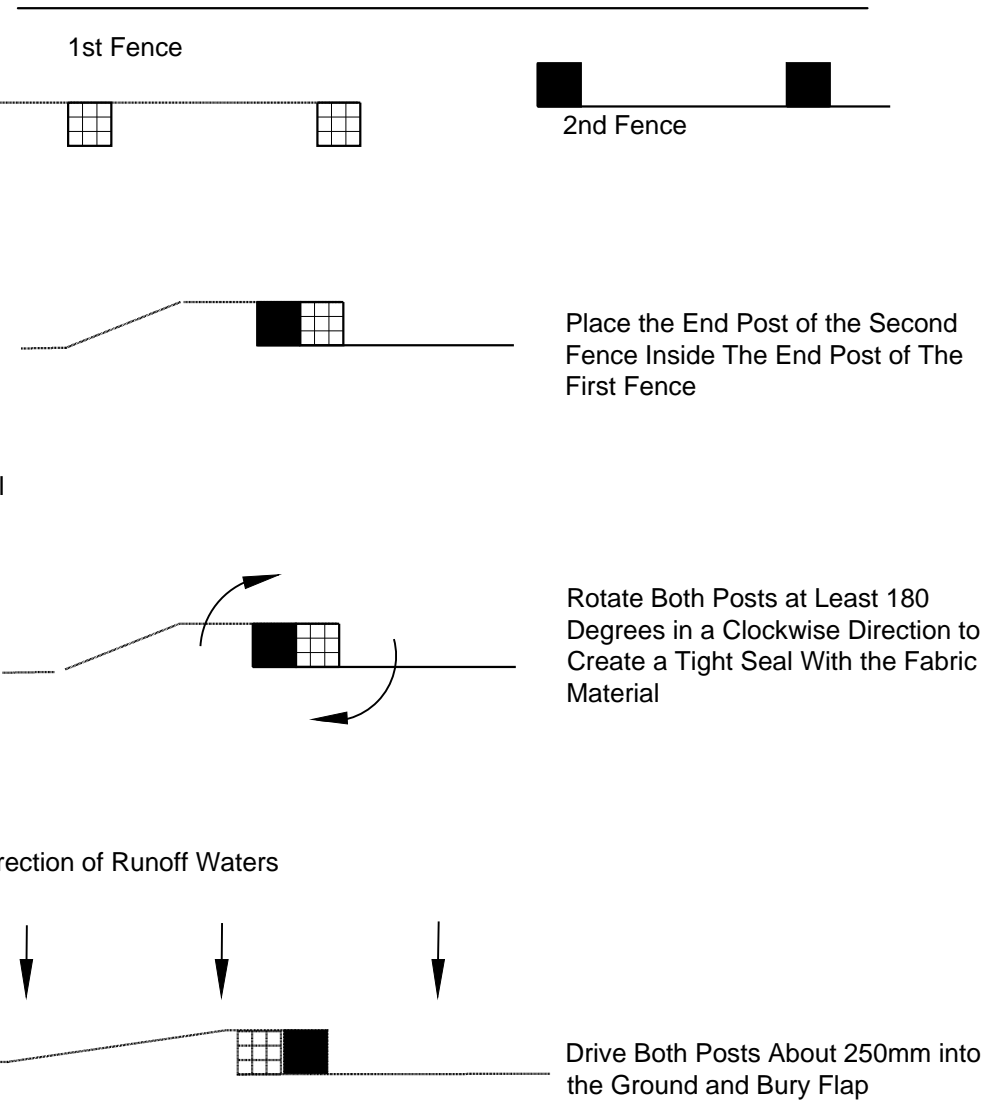
## Appendix H7

### Detail of the silt fencing

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Attaching Two Silt Fences



NATURAL SCALE

100mm

50


20

10

0

10mm

ORIGINAL DRAWING SIZE A3 - (420 x 297)

<p><b>FEHILY TIMONEY &amp; COMPANY</b> CONSULTANTS IN ENGINEERING AND ENVIRONMENTAL SCIENCES</p> 		
<p>Title of Drawing</p> <p>SILT FENCE DETAILS</p>		
Date 25-Aug-14	Sheet 1 of 1	Scale 1:25
Dwg. No. Ftc-sd-Wind Farm-015		Rev. A