moray offshore renewables ltd

Environmental Statement

Technical Appendix 3.7 A - Hydrology, Geology and Hydrogeology Technical Report

Telford, Stevenson, MacColl Wind Farms and associated Transmission Infrastructure Environmental Statement

edp renewables
powered by nature

REPSOL

This page has been intentionally left blank.

This document was produced by RPS Planning and Development Ltd on behalf of Moray Offshore Renewables Ltd

RPS

Document Owner		**Nicola Brookfield - RPS Planning and Development**			
Document Status		**For Approval**			
File Name		**8460001-PPW0200-RPS-Hydrology Technical Appendix Final (2nd Draft)**			
Revision	**Date**	**Description**	**Originated By**	**Checked By**	**Approved By**
-	31.10.11	1st Draft	Ben Amaira Alex Smith Florenz Hollebrandse	Dougal Nicol Nicola Brookfield	
A1	11.01.12	2nd Draft	Ben Amaira	Nicola Brookfield	
A2	19.01.12	3rd Draft	Ben Amaira	Nicola Brookfield	
A3	24.04.12	Final (1st Draft)	Ben Amaira	Nicola Brookfield	
A4	09.05.12	Final (2nd Draft)	Ben Amaira	Nicola Brookfield	

moray offshore renewables limited
4th Floor
40 Princes Street
Edinburgh
EH2 2BY

Tel: +44 (0)131 556 7602`

This page has been intentionally left blank.

Contents

List of Figures:

This page has been intentionally left blank.

1. Introduction

This Technical Appendix presents the detailed Phase 1 Desk Study in support of Chapters 8.1, 15.1.4 and 18.1 for Telford, Stevenson and MacColl Wind Farms and Associated Transmission Infrastructure Environmental Statement (ES) including:

- Desk based research of geological plans, SEPA Aquifer and Vulnerability Maps, BGS online borehole records and hydrological plans;
- Data requests from SEPA and Aberdeenshire Council covering landfills, potentially contaminated land records and private water supplies;
- Site walkover details for areas of interest in the onshore cable route;
- Preliminary peat probing information;
- Review of historical map records for the onshore cable route held by National Map Library of Scotland; and
- Development of a conceptual site model to represent historic sites and completion of preliminary risk assessment of potentially contaminated land.

At the conception of this project, the Desk Study was completed for two possible route options with onshore cable landfalls at Fraserburgh or Rattray after which the cable would traverse onshore below ground to link up to a grid connection at Peterhead Power Station.

After a detailed assessment of the two route options, MORL identified the Fraserburgh to Peterhead cable route as the preferred option and it is this route which is assessed in this report. The study area for this route is approximately 29 km long and varies in width from 1 km to 3 km as shown on Figure 1.

The hard copy issue of this report includes the text and figures from Appendix 1. All other supporting appendix information referred to is available from MORL on request.

1.1 Objectives

The objectives of this desk study for the cable route were to:

1. Establish the current environmental setting of the study area, namely geology, hydrogeology and hydrology;
2. Identify areas of land with historically potentially contaminative activities; and
3. Assess areas of potentially contaminated land relative to potential receptors, namely the water environment and human health, in the context of the future use of land within the cable route.

These objectives would be completed with the aim of informing the requirement to identify those sites within the cable route that may require more detailed contaminated land assessment (e.g. site investigation) upon formalisation of the final cable route within the extents of the study area.

These works were performed in the context of Planning Advice Note 33 and Part IIA of the Environmental Protection Act 1990, governing development and the management of potentially contaminated land.

1.2 Limitations

This desk study is presented as a Technical Appendix in support of MORL's ES for the onshore transmission infrastructure for the Project. It should not be read or interpreted in isolation of the ES in order to understand the background of the proposed development. The desk study is also accompanied by a supporting GIS package (Appendix 9) to manage and present the volume of data recovered by the desk study of the cable route. This GIS package should be used where specific detail is sought in relation to individual sites or references identified within the cable route.

The following limitations apply to this document:

- This report provides available factual data for the site obtained only from the sources highlighted herein and related to the site on the basis of the location information provided by the Client;
- The study information is not necessarily exhaustive and further information relevant to the site may be available from other sources;
- The accuracy of maps cannot be guaranteed and it should be recognised that different conditions on site may have existed between and subsequent to the various map surveys;
- Any borehole data from British Geological Survey sources is included on the basis that: "The British Geological Survey accept no responsibility for omissions or misinterpretation of the data from their Data Bank as this may be old or obtained from non-BGS sources and may not represent current interpretation";
- Where any data supplied by the client or from other sources, including that from previous site investigations, have been used it has been assumed that the information is true and correct. While reasonable care and skill has been applied in review of this data no responsibility can be accepted by RPS for inaccuracies in the data supplied by any other party;
- This report is prepared and written in the context of legislation and guidance at the time of writing. New information, improved practices and changes in legislation may necessitate a re-interpretation of the report in whole or in part

after its original submission;

- The report is provided for sole use by the Client and is confidential to them, their professional advisors, no responsibility whatsoever for the contents of the report will be accepted to any person other than the client. [Unless otherwise agreed];
- This report has been produced as part of an RPS company's service to the client under a contract of appointment, the terms of which govern the extent of liability in relation to this report. No liability shall arise other than in respect of any breach of such contract or any deed or collateral warranty given in relation to that; and
- This report is prepared and written in the context of the objectives and scope of work stated in the introduction to this report and its contents should not be used out of context.

2. Site Information and Environmental Setting

2.1 Study Area

Located in the Banff and Buchan area of north east Scotland, the study area, encompassing the onshore cable route from Fraserburgh to Peterhead, is approximately 44 km^2. The study area comprises a number of environments including urban, rural, agricultural, industrial and coastal land.

The topography of the region is gently undulating to a maximum elevation of 93 m AoD at Corse Farm, by New Leeds (NK 010 536).

For the purposes of collating and interpreting data recorded during the desk study, the study area has been divided into route sections, these are:

- Boddam Urban Area;
- Southern Area
- Northern Area; and
- Fraserburgh Urban Area.

The boundaries of these route sections are presented in Figure 1.

2.2 Current Use

The Banff and Buchan Area of northern Aberdeenshire comprises predominantly agricultural land, with both arable and livestock farming practices undertaken in the area.

The coastal areas of the region are also noted for their seafood and marine engineering industries, with large ship yards and ports at both Fraserburgh and Peterhead servicing both the oil and fishing industries. Peterhead Port also offers sheltered deep water for berthing.

Fraserburgh and Peterhead are both large towns and offer a variety of consumer service industries. The region is also interspersed with a number of smaller residential towns and villages.

Current and historical Land uses are described in greater detail in Section 4.

2.3 Geology

Information regarding the geology of the cable route was provided by reviewing the following information sources:

- BGS Digital Geological Map of Great Britain 1:625000 scale (DiGMapGB-625), bedrock data CD-rom. Verison 1.1. 2003;
- BGS Digital Geological Map of Great Britain 1:625000 scale (DiGMapGB-625), superficial deposits data CD-rom. Verison 1.1. 2003;
- BGS GeoIndex (http://www.bgs.ac.uk/geoindex).

2.3.1 Superficial Geology

Based on BGS mapping the superficial geology underlying the cable route is expected to comprise:

- alluvium;
- till;
- blown sand;
- glacial sand and gravel; and
- localised areas of peat.

A superficial geology map is present as Figure 2.

The superficial geology underlying the Northern Area of the cable route is shown to be dominated by glacial till which is crossed in places by alluvium, glacial sand and gravel and peat. In the south of the Northern Area there are three areas of glacial sand and gravel close to Longside. In the north of the Northern Area, glacial sand and gravel is shown to extend from Rathen (adjacent to the west of the route) northward to Fraserburgh. Alluvium deposits of clay, silt and sand are also identified along the course of the River Ugie and South Ugie Water.

In addition to the glacial superficial geology, peat is identified on the cable route close to New Leeds. The area of peat is shown to trend northwest southeast through the cable route. Two smaller areas of peat are also shown to the east associated with the St Fergus Moss, and southeast associated with Rora Moss.

In the south, the Southern Area of the route is expected to be underlying by superficial deposits comprising exclusively glacial till of Quaternary age. This is generally a mix of poorly sorted glacial materials comprising clay, sand, gravel, cobbles and boulders.

Peat Probing

In order to determine the potential for any underground engineering to impact on peat identified by the superficial geology map, an initial peat probing exercise was undertaken on the 10 October 2011 at selected locations.

An area of peat is shown to cross the Northern Area of the cable route from New Leeds to Corse. This was chosen as the most crucial area of peat to characterise as it occurs across the width of the cable route. The two other smaller areas of peat shown in the superficial geology map are considered to be of lower significance given that they cross into the cable route from assumed larger extents of peat land off site and have a relatively small area within the cable route.

Peat probing using a carbon fibre peat probe was undertaken in areas where the potential for peat to be present was evident (i.e. peat habitat observed on site). Probing of the peat was undertaken at regular intervals along a walked route across the peat feature. For terrestrial environmental characteristics see Technical Appendix 4.7 A Terrestrial Ecology Technical Report.

In the area targeted between New Leeds to Corse, areas of peat were observed to the north east of New Leeds at NK 003 547. Peat probing in this area comprised 17 probe locations that recorded peat depths of between 0.1 m and 1.88 m.

A second smaller area of peat was identified to the east of Corse at NK 015 536 where peat probing at six locations revealed peat depths between 0.2 m and 0.7 m.

Figure 3 presents the findings of peat probing within the proposed cable route.

2.3.2 Solid Geology

Based on BGS mapping the solid geology underlying the onshore cable route is expected to comprise:

- Felsic igneous intrusive rocks;
- Psammite, semipelite and pelite of the Argyll group; and
- Quartzite of the Argyll Group.

A bedrock geology map is present as Figure 4.

In the south, the cable route is shown to be underlain almost exclusively by felsic rocks of Ordovician to Devonian age. This is likely to comprise rock types such as

granite and other coarse grained igneous intrusions.

The remainder of the cable route is dominated by bedrock comprising the Argyll Group of metamorphic rocks including psammite, semipelite, pelite and quartzite. These are metamorphic rock types likely to include crystalline rock types such schist and gneiss.

In addition to the overall bedrock geology two dykes are shown to cross the cable route. These are shown to be comprised of dolerite and basalt of Carboniferous to Permian age that are located close to the Forehill Treatment Works and Hythie.

There are no geological faults shown within the cable route.

2.3.3 Borehole Records

Information on the location of borehole records within the study area was provided by the British Geological Society (BGS). A GIS shapefile detailing all the borehole records within the study area was provided and this is included in the GIS package accompanying this desk study (Appendix 9).

The GIS file identifies 53 boreholes records located throughout the study area.

The table below summarises the information provided in the BGS borehole logs that are also available to view online. These borehole records are also presented in Appendix 2.

Table 1 – Summary Of BGS Borehole Records

Borehole Registration Number	Grid Reference	Depth (m)	Geological Classification	Observations
NK14SW16925/16	NK 12277 42739	2.50	-	0-0.65 Topsoil. 0.65-2.50 Stiff red brown CLAY.
NK14SW16925/14	NK 12112 43126	6.00	- -	0-0.25 Topsoil. 0.25-2.00 Firm red brown sandy CLAY. 2.00-6.00 Stiff red brown sandy CLAY.
NK14SW16925/12	NK 12020 43540	2.00	-	0-0.25 Topsoil. 0.25-2.00 Firm brown sandy CLAY.
NK14SW4	NK 11108 43835	10.40	- Till Till Till	0-0.40 Topsoil. 0.40-9.90 Stiff red brown laminated CLAY. 9.90-10.40 Brown sandy CLAY. 10.40 Rock obstruction.
NK04NE10	NK 0987 4635	10.80	- Till Glacial sand & gravel Till Caledonian bedrock	0-1.00 Made Ground. 1.00-9.50 Stiff red brown CLAY. 9.50-10.4 0Sandy GRAVEL. 10.40-10.80 Very clayey pebbly SAND. 10.80 Weathered GRANITE.

Table 1 – Summary Of BGS Borehole Records				
NK04NE7	NK 07107 45850	5.80	- Fluvioglacial sand & gravel Fluvioglacial sand & gravel Caledonian bedrock	0-0.40 Peaty topsoil. 0.40-5.00 Pebbly SAND. 5.00-5.60 Stiff red CLAY. 5.60-5.80 Pink GRANITE.
NK04NE3	NK 05959 47389	13.70	- Fluvioglacial sand and gravel Glaciolacustrine deposits Till Till	0-0.70 Peaty topsoil 0.70-2.60 Yellow silty SAND. 2.60-6.70 Yellow very clayey SAND. 6.70-9.80 Grey sandy SILT. 9.80-13.70 Greenish grey sandy CLAY.
NK04NW9	NK 04799 48209	20.00	- Fluvioglacial sand & gravel Glaciolacustrine deposits	0-0.50 Peaty topsoil. 0.50-3.50 Brownish grey GRAVEL. 3.50-20.00 Red brown laminated SILT.
NK04NE2	NK 05748 48429	20.20	Alluvium Glaciolacustrine deposits Glaciolacustrine deposits Glaciolacustrine deposits	0-0.30 Peaty topsoil. 0.30-3.00 Sandy GRAVEL. 3.00-17.40 Red brown silty CLAY. 17.40-18.80 Stiff greenish grey CLAY. 18.80-20.20 Stiff reddish brown CLAY.
NK04NW8	NK 05748 48429	13.70	Alluvium Fluvioglacial sand & gravel Till Caledonian bedrock	0-0.50 Clayey topsoil. 0.50-3.50 GRAVEL. 3.50-7.50 Grey sandy GRAVEL. 7.50-13.50 Stiff brown grey CLAY. 13.50-13.70 Pink GRANITE.
NK04NW7	NK 04809 49017	4.40	- Till Dalradian bedrock	0-0.40 Topsoil. 0.40-4.10 Orange brown sandy CLAY. 4.10-4.40 Weathered Psammite.
NK05SW4	NK01531 51198	7.70	Till Caledonian bedrock	0-0.50 Made Ground. 0.50-7.40 Stiff dark grey sandy CLAY. 7.40-7.70 Pink GRANITE.
NK05NW1	NK 01000 58000	4.80	None given.	0-0.20 Topsoil. 0.20-2.00 Brown SAND & SILT. 2.00-4.00 Soft grey SILT. 4.00-4.60 Grey silty SAND. 4.60-4.80 Sand and pebble GRAVEL.

The borehole logs confirm the geological maps by identifying alluvium, till and glacial sand & gravel within the cable route.

The logs indicate that the glacial till underlying the site is generally a firm to stiff red brown to grey sandy clay with occasional gravels. The glacial sand & gravel is identified in the logs as fluvial glacial sand & gravel that is shown to overlie the glacial till and also form horizons between the till deposits.

The alluvium deposits identified are generally described as sandy gravel. In a number of the logs peaty shallow topsoil is noted.

The BGS logs also provide an indication of the depth to bedrock and the rock types underlying the cable route. In a number of the logs granite was encountered at between 5.60 m bgl and 13.50 m bgl. In addition, metamorphic rock types were identified, including psammite that were at a depth of 4.10 m bgl.

2.4 Hydrogeology

Information regarding the hydrogeological environment underlying the onshore cable route was taken from the following sources:

- SEPA's Bedrock Aquifer Map of Scotland, 1:625 000, 2004;
- SEPA's Superficial Aquifer Map of Scotland, 1:625 000, 2004;
- Hydrogeological Map of Scotland, 1:625 000, 1988;
- SEPA's River Basin Management Plan (RBMP) Interactive Map (http://213.120.228.231/rbmp/);
- Groundwater Vulnerability Map of Scotland, NERC, 1:625 000, 1995; and
- SEPA's Groundwater Vulnerability of the Uppermost Aquifer Map of Scotland, 1:625 000, 2004.

Extracts of the above sources are provided in Figures 5 to 7 where available digitally.

2.4.1 Hydrogeological Classification

The Hydrogeological Map of Scotland indicates that the onshore cable route is underlain by four main hydrogeological units. In the south, between Boddam and the South Ugie Water, the underlying hydrogeology is shown to be dominated by impermeable rocks, generally without groundwater except at shallow depth. However, some groundwater may be present within shallow cracks and joints.

The hydrogeological map also indicates that a concealed aquifer with limited or local potential comprising of Quaternary coastal deposits and river alluvium is situated along the course of the River Ugie and South Ugie Water. These are generally fine deposits of silt and clay with occasional sand, gravel and cobble that are generally of limited depth and produce low borehole yields. However, in coarser materials voids drawing river water can produce large yields.

In the north of the cable route between the River Ugie and the coastal areas the underlying hydrogeology is classified as a region underlain by Precambrian impermeable rocks generally without water, except at shallow depth. These are generally crystalline rocks with little potential for groundwater storage and transport except in cracks and joints associated with tectonic features or near surface weathering.

At the coast, the landfall area is underlain by locally important blown sand aquifers (i.e. dune sands) that are aerially restricted but that can potentially provide limited local supplies of groundwater. Further inland, the cable route are underlain by sand and gravel of glaciofluvial origin grading from clay and silt through to cobbles. The groundwater potential of these areas varies according to the thickness of the

material, with borehole yields not unknown to be up to 15 l/s. The exposed and shallow nature of the groundwater places it at risk from diffuse and point source pollutants.

The SEPA Bedrock Aquifer Map of Scotland indicates that the cable route is underlain by aquifers of very low productivity or low productivity where flow is dominated by fracture flow. In the Southern Area and lower sections of the Northern Area, the bedrock aquifers are shown to be of very low productivity where groundwater flow is by fracture flow. This generally accords with the felsic bedrock geology shown in the geological map. The remainder of the cable route is shown to be underlain by a bedrock aquifer of low productivity where groundwater flow is also driven by fracture flow.

The SEPA Superficial Aquifer Map of Scotland indicates that the cable route is underlain by aquifers of low, medium and high productivity where flow is driven by intergranular fracture flow. The Southern Area and parts of the Northern Area of the cable route have not been classified according to the map.

At the landfall point, the superficial aquifer is classified as moderately productive. Further inland of the landfall points the superficial aquifer is classified as highly productive. This generally matches the area of glacial sand and gravel shown in the superficial geology map. In the south of the cable route an area of highly productive superficial aquifer is also shown to trend along the course of the River Ugie and South Ugie Water which matches the areas of alluvium. The remainder of the cable route is shown to be underlain by a moderately productive superficial aquifer.

The SEPA River Basin Management Plan (RBMP) Interactive Map was reviewed to provide additional information on the groundwater bodies underlying the onshore cable route. The table below provides details on the groundwater bodies identified. This information is available at http://gis.sepa.org.uk/rbmp/.

Table 2 – Summary Of Groundwater Body Classifications

Name of Waterbody	SEPA Classification
Peterhead bedrock and localised sand & gravel aquifer	Good
Ugie bedrock and localised sand & gravel aquifer	Good
North Ugie Valley sand and gravel	Good
Fraserburgh bedrock and extensive sand & gravel aquifers	Good

Datasheets for the above groundwater bodies are presented in Appendix 3.

2.4.2 Groundwater Vulnerability

The Groundwater Vulnerability Map of Scotland indicates that the majority of the cable route is underlain by weak permeability strata. These are formations of generally low permeability that do not widely contain groundwater in exploitable quantities. However, some formations can produce sufficient borehole yields for private and domestic use.

At the landfall point at the coast and along the course of the River Ugie and South Ugie Water the groundwater vulnerability is classed as moderately permeable. These are fractured or potentially fractured formations without a high primary permeability or other formations of variable permeability. These formations will rarely produce large quantities of abstractable groundwater but they are important for local supplies and in providing base flow to rivers.

SEPA's Groundwater Vulnerability Map of the Uppermost Aquifer indicates that the site is underlain by vulnerability classes 4a, 4b, 4c, 4d, 3 and 2. The table below summarises the vulnerability class definitions.

Table 3 – Summary Of SEPA's Groundwater Vulnerability Class Definitions

Classification			Definition
High ↓ Low	5		Vulnerable to most water pollutants with rapid impact in many scenarios.
	4	4a	Vulnerable to those pollutants not readily adsorbed or transformed.
		4b	
		4c	
		4d	
	3		Vulnerable to some pollutants with many significantly attenuated.
	2		Vulnerable to some pollutants, but only when continuously discharged/leached.
	1		Only vulnerable to conservative pollutants in the long-term when continuously and widely discarded and leached.

Source:

Development of a groundwater vulnerability screening methodology for the Water Framework Directive, SNIFFER, 2004.

Class 4 is divided into 4 subclasses (a, b ,c and d) according to the depth and permeability rate of the superficial deposits.

The Southern Area is shown to be underlain largely by vulnerability classes 2, 3 and 4b. The Northern Area is shown to be underlain almost exclusively by vulnerability class 4b with smaller areas of 4c and 4d shown crossing the centre of the route close to New Leeds and Longmay.

2.4.3 Drinking Water Protection Area

The SEPA RBMP Interactive Map was used to provide information on groundwater and surface water protection areas.

The Interactive Map indicates that the entire area of the cable route is underlain by a Drinking Water Protection area for groundwater.

The Interactive Map also indicates that the River Ugie is a Drinking Water Protected River between the tidal limit at Inverurie and the confluence with the South Ugie Water.

2.4.4 Private Water Supplies

Information on the location and source of private water supplies within the cable route was supplied within the consultation response from Aberdeenshire Council. A GIS shapefile detailing all the abstraction records within the cable route was provided and this is included in the GIS package accompanying this desk study (Appendix 9). Figure 8 (Sheets 1 to 4) also presents the locations of the private water supply features known to exist within the route.

The information provided by Aberdeenshire Council indicates that there are 110 supply points in the cable route area. There are a further seven private water supply records which have not been positioned on the GIS due to the lack of a grid reference and address details for the supply point.

The private water supply records have been classified according to The Private Water Supplies (Scotland) Regulations 2006. The majority of the private water supply records provided by Aberdeenshire Council are noted to be 'Type B.' These are private water supplies used solely for domestic and private use which take less than ten cubic metres of water per day or serve less than 50 persons. There are only five records that are noted to be 'Type A' located close to the east of Longside at NK 046 471, NK 055 470 and NK 056 474. Type A supplies on average provide 10 or more cubic metres of water per day or serve 50 people or more, or regardless of the former, is supplied or used as part of a commercial or public activity.

The information provided by Aberdeenshire Council also provides an indication of water supply source. This has identified that two supplies originate from a spring and twelve supplies originate from a well. The remaining supplies (this being the majority) originate from unknown/undocumented sources.

It should be noted that the private water supply information provided by Aberdeenshire Council is dependent on the accuracy and completeness of data returned by the land owners and tenants, and that completed by Aberdeenshire Council workers. Therefore, no claim is made as to the accuracy or completeness of the information.

In addition, the locations of wells, pumps and springs have also been included in the identification of historic features (Section 3).

2.4.5 CAR Licensed Abstractions

Information on Controlled Activity Regulations (CAR) licensed water abstractions has been provided by SEPA.

SEPA identify a total of three licensed abstractions within the cable route, two for agricultural purposes and one for mining/quarrying. Information regarding these is presented in the consultations responses in Appendix 4. The CAR abstraction sites are also presented in Figure 8.

2.5 Hydrology

The main surface water features within or flowing through the study area are shown in Figure 9.

The largest river is the River Ugie with two major tributaries the North Ugie Water and the South Ugie Water. The North Ugie Water flows through the cable route study area over a length of 4.5 km, approximately. Other rivers generally cross the route perpendicularly over the shortest possible distance.

All rivers near the onshore cable route are classified as lowland rivers and have a relatively low longitudinal gradient. The larger rivers, including the River Ugie, meander through relatively wide floodplains. River beds predominantly consist of gravel and sand or clay.

Beside the main rivers shown in Figure 9, there are a large number of minor watercourses within the cable route. This includes both natural streams and man-made drainage ditches and channels. This is thought to be related to the relatively flat topography and the need for improved drainage for agricultural purposes.

2.5.1 Water quality

Water quality along all main rivers flowing through the onshore cable route is monitored by SEPA under the Water Framework Directive (European Parliament, Council 2000). This data has been analysed and has been summarised in the table below.

Table 4 – Surface Water Quality Classifications

River	Overall status (in 2008)
Kessock Burn	Moderate
Water of Philorth	Moderate

Table 4 – Surface Water Quality Classifications	
Burn of Savoch	Moderate
River Ugie and tributaries	Moderate

SEPA have advised that the River Ugie and the Ugie Catchment is part of a Priority Catchment Initiative which aims to eradicate agricultural practices which prevent the River Ugie meeting 'Good' status for the Water Framework Directive.

2.5.2 Lochs and Other Water Bodies

There are no significant open water bodies within the onshore cable route. However, there are a number of smaller ponds, flooded quarries and a small reservoir present.

There is one water body downstream of the cable route, the Loch of Strathbeg. This loch is designated as a SSSI, SPA and a RAMSAR site.

The Green Burn and the Burn of Logie flow through the cable route and discharge into the Loch of Strathbeg via the Burn of Savoch.

2.6 Designated Sites

Information on designated sites within the cable route was taken from the Scottish Natural Heritage GIS database of designated sites which identified the following :

- Three Sites of Special Scientific Interest;
- One Local Nature Reserve; and
- One Special Protection Area.

Figure 10 provides a location map of the designated sites. Additional information on the designated sites provided by the SNH online Interactive Map is presented in Appendix 3.

The Kirkhill geological SSSI is identified at NK012526 close to Leys. This site is designated due to it representing the most complete record of Middle to Late Quaternary deposits in Scotland that are considered to be of high importance for Quaternary studies.

The Philorth Valley geological SSSI is also identified within the Northern Area of the cable route at NK010634. This site is designated due to its importance for the study of relative sea-level changes in Scotland during the Holocene.

Downstream of the cable route is The Loch Strathbeg SSSI. This is designated due to its importance for migratory birds and wildfowl in addition to the flora and fauna of

the dune slacks. The site also provides interest by a variety of raised shoreline features and is considered outstanding for coastal geomorphology studies.

In the north of the cable route, the Waters of Philorth is a designated Local Nature Reserve containing saltmarshes, dunes and grasslands.

Aberdeenshire Council has also provided information on Sites of Environmentally Sensitive Areas (SESA) and Sites of Interest to Natural Science (SINS) in their response to consultations.

The information provided by Aberdeenshire Council indicates that the Sinclair Hills geomorphology site extends onto the north of the cable route close to the Water of Philorth. This site is noted to be designated due to its importance for ice movement studies.

3. Site History

3.1 Methodology

In order to determine the potential for the onshore cable route to be impacted by historical potentially contaminated land, historical mapping research was undertaken by reviewing the relevant historical paper maps held at the National Library of Scotland's Map Library in Edinburgh.

Details of the historical maps reviewed are included in Appendix 5. Appendix 8 also contains a complete list of the identified sites (Historic Sites Record). A number of key historical maps are presented in Appendix 5.

This process was supplemented by undertaking consultations with Aberdeenshire Council regarding their record of potential contaminated sites and contaminative activities.

3.1.1 Consultation Response

To provide information on potentially contaminated land and petroleum records located within the cable route consultations were held with Aberdeenshire Council Infrastructure Services Department on the 15 September 2011. The information requested included the following:

- Designated or suspected Part IIA or contaminated land sites:
- Details of sites where remediation has been undertaken;
- Information on historical and contemporary landfill sites; and
- Information on petroleum sites and tanks.

In addition, information on the location of private water supplies, local geodiversity sites and Local Nature Conservation Sites for Geology, was also requested.

The consultation response with regard to contaminated land was received by provision of GIS data on the 22 September 2011. Petroleum records information was also received separately on the 13 October 2011.

Limited information received is presented in Appendix 4, however, the majority of the data provided by the Council has been incorporated into the GIS package.

Information provided indicates that remedial works have been undertaken at Kirkhill Landfill (council ref BN0011) which included the installation of a gas flare.

Aberdeenshire Council have also noted that they hold site investigation reports at various stages for nine sites within the route. In addition, historical petroleum records are held for two filling stations within the cable route which contain a total of six petroleum or diesel tanks. No land owner site investigation reports were made available for review as part of this desk study.

In response to the request for details regarding petroleum records within the cable route Aberdeenshire Council provided details of four active filling stations within the Fraserburgh Area. These are the Barbours Garage on Cross Street, Kessock Service Station on South Road and Watermill Service Station on Banff Road. The petroleum records indicate that the sites have between two and six petrol and diesel tanks with capacities up to 40,000 litres.

It should be recognised that the Council's data is derived from an on-going search process. This data is based on several data sources including council records and available historical mapping. In this regard, no claim is made by the Council as to the accuracy or completeness of the information.

3.2 GIS Package

For the purpose of managing and presenting the data accumulated through the consultation process and in reviewing the historic maps, identified sites were recorded in a GIS database. In the instance of reviewed historic maps, key features of interest were digitised directly onto the GIS. The data provided by Aberdeenshire Council (already in a GIS format) was then merged into this.

The current 1:10000 scale Ordnance Survey map was used as the base map in the GIS on to which features of interest were digitised using present day boundaries where possible. The extent of digitised historical sites that did not have an equivalent present day boundary were approximated in the GIS. Where this was not possible or could not be accurately positioned, a single point location was allocated for that feature in the GIS.

To present the historical map dates in the GIS, the survey or revision dates of the maps have been grouped into Epochs as follows:

- Epoch_1: First Edition, 1:10560 scale, surveyed in 1868-1870;
- Epoch_2: Second Edition, 1:10560 scale, surveyed in 1899-1901;
- Epoch_3: Second Edition (1st revision), 1:10560 scale, revised in 1924-1925;
- Epoch_4: Third Edition, 1:10560 scale, surveyed in 1955;
- Epoch_5:
  - Third Edition (1st revision), 1:10560 scale, revised in 1963;
  - Second Edition 25 inch scale (1:2500), 1st revision, revised in 1963;

- Epoch_6:
  - Third Edition (2nd revision), 1:10560 scale, revised between 1970-1974;
  - Second Edition 25 inch scale (1:2500), 2nd revision, revised between 1970-1977
- Epoch_7:
  - Third Edition (3rd revision), 1:10560 scale, revised between 1983-1985;
  - Second Edition of the 25 inch scale (1:2500), 2nd Revision, revised in 1982-1991;
  - 1:1250 scale, surveyed in 1988;
- Epoch_8: LandLine digital map revised yearly between 1998 and 2005;
- Epoch_9: MasterMap digital map revised yearly between 2006 and 2010.

The complete GIS containing both the Council's records and those generated through the review of historic maps, was then used to generate a series of maps covering the cable route, presenting the identified historic sites (Figure 11, Sheets 1 to 13). This GIS package contains a range of data supporting each site entry, such as grid references, size and feature types. This data can be accessed via the GIS package accompanying this desk study report (Appendix 9).

Each historic site entry is identified as either a polygon, point of line feature. Some of these overlap, however, where possible duplicate entries evident in the merging of the Council records with the review of historic maps, have been removed.

Each GIS entry represents a historic site that may have the potential to have resulted in contaminated. The implications of the potential risks associated with this have been explored further in Section 5. However, it should be recognised that the identification of a site and its boundary is limited to the accuracy of the historic maps and should not be inferred to indicate all land within that boundary may be contaminated. The nature of any possible contaminative legacy is subject to further site investigation and assessment, and may vary greatly depending upon the historic features or activities that were once undertaken within any given site.

3.3 Historic Sites Overview

The information provided by Aberdeenshire Council and that obtained through the review of historic maps has identified a range of historic activities and land uses, including:

- Infilled quarries and sand & gravel workings;
- Sheep dips;
- Garages and filling stations;
- Depots;
- Works and Factories Unspecified;
- Railway yards and sidings;
- Railway lines/tracks;
- Docks and harbours;

- Smithies;
- Rifle Ranges;
- Ship Building & Breaking;
- Tanks;
- Gasholders;
- Dams, Lades and Ponds;
- Builder Yards;
- Corn Mills;
- Poultry Farms;
- Military Land (including airfields and camps)
- Sewage Works;
- Electrical Substations; and
- Landfills.

Aberdeenshire Council additionally provided a brief account of the information they hold for a number of the landfill sites identified in the cable route. The table below summarises the details provided.

Table 5 – Summary Of Landfill Activities.

Name	Operational Dates		Waste/Notes
	Start	End	
Lakeview Nurseries Landfill	Oct 1990	1992	Inert soil and clay from demolition and extraction.
Meikle Rathen Quarry Landfill	Unknown	Unknown	Mineral extraction ceased in Jan 1978.
Ardglassies Farm Quarry Landfill	Unknown	Unknown	Sand & gravel extraction in the 1970's.
Oldtown of Newmill Quarry Landfill	1980	1982	Sand & gravel extraction in the 1970's.
Middle Essie 3 Landfill	Before 1994	2009	Boulder clay and builders rubble. SEPA ref WML/N/20119.
Kirkhill Landfill	1979	Apr 1993	Domestic, commercial, industrial and offshore wastes. A gas flare is in operation at the site.
Leys Quarry Landfill	Unknown	1997	Sand & gravel extraction ceased in 1981. SEPA ref WML/N/20206.
Bridge of Rora Landfill	Unknown	Dec 1994	Sand extraction ceased in May 1981, described as 'site full' when closed.

Additional information regarding registered landfills was requested of SEPA. A response from Caroline Simmers, Senior Environmental Protection Officer at SEPA, provides information one registered site in the study area:

- WML/N/20206 Leys Quarry, Kininmonth: Site accepted waste for a number of years prior to closure. License not yet surrendered.

A summary of selected historic sites identified within the route is provided below. These are just a number of the historic sites identified, the complete record can be accessed and reviewed via the accompanying GIS package.

3.4 Boddam Urban Area

Features in the Boddam Urban Area appear in historic maps dating back to 1868, including railway land and industrial uses such as a former granite polishing works. More recent potential contaminative land uses within Boddam Urban Area include filling stations, sewage works and a large electrical substation associated with Peterhead Power Station.

3.5 Southern Area

Some of the earliest historic sites identified in the Southern Area of the cable route include smithies (blacksmiths) dating back to 1868. The railway line crossing the cable route in the south-east, adjacent to the boundary with the Boddam Urban Area, also dates back to before 1900.

Prominent features in this section of the route include a large area of land located to the immediate south of the Peterhead ring road, located on the northern edge of the Southern Area that crosses almost the complete route width. This land appears to have had multiple historic uses, such as works and depots, including the presence of tanks, and these form parts of present day industrial estates. Areas of this land also appear identified by the Council as Vacant and Derelict Land.

Another prominent feature includes a large quarry, circa 1924, located adjacent to the Peterhead ring road, on the north periphery of the route. This feature does not appear in present day mapping.

Beyond these features, sites in the Southern Area are generally of a smaller scale, being recorded as point features in the GIS. The only exception being a small industrial estate present in the north-westernmost corner of the Southern Area. This section of the route appears more densely occupied by historic sites at its south western end, the remainder being relatively free of larger areas of potentially contaminated land.

3.6 Northern Area

Historical mapping of the Northern Area has identified a number of historical extraction sites, such as sand & gravel pits, and quarries. The majority of these features are concentrated within the southern half of the cable route with few sites shown in the north of the route. In the south of this area of the cable route, the earliest recorded quarry is the Cairngall Granite Quarry, located on the southern periphery of the route, circa 1868-71 and recorded as discussed since 1955. The south of the route is also dominated by Longside Airfield. The airfield occupies some 40 hectares inside the cable route, but maps indicate that the majority of the major airfield features and infrastructure occur off site to the east.

In addition to the airfield an area of unknown works is also present within its boundaries, inside the route from 2005 to the present day.

Northwards, in the vicinity of the South and North Ugie Waters, sections of the former Great North of Scotland Railway Line and former Inverquinzie Canal are present. There are a number of former sand and gravel pits in this vicinity, where the South and North Ugie Waters converge to form the Ugie River.

Central sections of the Northern Area to the north of the North Ugie Water, exhibit predominantly a number of smaller historic sites, annotated as points in the GIS. These include features such as wells, small pits, smithies, mills, tanks and pumps. The exception to this comprises two former quarries located near Denhead, which have been the subject of known landfilling. Further larger infilled areas may also be present in the route to the east of New Leeds at a further former quarry and a historic loch.

Further north, the former Great North of Scotland Railway Line is evident within the cable route. The railway line enters the route west boundary near Cortes Village and runs northwards within the route, along its eastern flank to Fraserburgh. A number of historic railway features, such as the stations and yards near Cortes Village and Rathen (circa 1869 to 1955), are also present along this alignment. The line now forms the Formartine and Buchan Way.

To the east of Rathen, more notable historic sites include four former quarries or pits that include areas that are known to have been subject to more recent landfilling.

Nearing the end of the Northern Area, Pilroth House includes a former gasometer (circa 1900-01 to 1974). This feature is likely associated with a small private gasworks for the production of coal gas which is likely to have been used in the nearby Pilroth House and other estate buildings. The historical maps indicate the presence of a circular feature at the location of the gasometer and a small rectangular structure adjacent to it. The small structure is likely to be the gas processing plant.

3.7 Fraserburgh Urban Area

A wide range of historical sites are apparent occupying the land within the onshore cable route that now forms the eastern extremities of Fraserburgh. This includes the Great North of Scotland Railway Line (circa 1869 to late 1970s) with associated railway station, marshalling yards, sheds and other infrastructure. In addition to the North, South and Balaclava Harbours are identified at the northernmost end of the cable route.

Other sites in the urban area of Fraserburgh (since the earliest mapping) include, slaughter houses, works, repair yards, industrial estates, tanks, electrical substations, depots, pumping stations, unspecified works, saw mills, sand pits and garages.

Beyond the current extents of Fraserburgh, the route shows limited large historic sites, the only exception being a rifle range (circa 1869 to 1901), now Fraserburgh golf course, Fraserburgh cemetery and an old sand pit located in The Bents (the beach to the east of Fraserburgh).

4. Site Visits

Further to the review of historic sites, key areas of interest were picked out to be included in a number of site walkovers. These were chosen based specifically upon their former uses. A record of which sites were visited is included in the Historic Sites Record presented in Appendix 8 and walkover notes for all of these sites are presented in Appendix 6, with photographs in Appendix 7. The locations of all of these sites are also included in Figure 11.

Permission for access was requested of all landowners by CKD Galbraith. Only sites with access granted were visited as part of the walkovers.

Sites were also observed for the presence of Japanese Knotweed. This species has previously been identified by RPS ecological walkovers at and close to Rattray Wood, and at the River Ugie near Ednie Cottage. No evidence of this species was identified during these walkovers at any location.

Key areas of interest are described in detail in the following sections.

4.1 Fraserburgh Urban Area

The proposed landfall for the cable route is situated in the Fraserburgh Urban Area. Walkovers in this area were completed by RPS on 5 October 2011.

Based on the walkovers, it is observed that historic and current industrial activity is predominantly located in the west of the area and comprises Fraserburgh Harbour and the Fraserburgh Harbour and Kessock Industrial Estates.

The majority of activities within the Fraserburgh Harbour Industrial Estate are related to the fishing and marine engineering industries, and include fabrication sheds, dry docks, ship painting and fishing processing and wholesale factories. A business centre and government offices were also identified. Given the nature of some of the heavy industrial processes associated with marine fabrication and ship painting, it is likely that a number of potentially contaminative activities are undertaken, however, no evidence of spills or contamination were identified.

Various above ground storage tanks, drums and material storage containers were identified across the industrial estate, with two large liquid nitrogen tanks located at one of the fish processing units.

The Kessock Industrial Estate comprises urban service industries including a petrol station, car servicing, repair and sales units, neighbourhood stores, a brewery and a refrigerated lorry depot. A number of disused warehouses were also identified which

had potentially asbestos containing roofing. It is noted that above ground storage tanks were present at the brewery, and it is considered likely that underground storage tanks are present at the petrol station.

It is noted that the Mintlaw to Fraserburgh branch of the Formartine and Buchan Way (from herein to be referred to as the Buchan Way) terminates in this area. The Buchan Way is a former railway line (1861 – 1979) which links Dyce (Aberdeen) to Fraserburgh and Peterhead. Following the closure of the railway, the Buchan Countryside Group began work to turn the network into a combined cycle path and walkway which crosses the onshore cable route at various locations. It is noted that the foundations of the railway, and any associated potentially contaminative materials, may remain present underlying the cycle path.

A former rifle range and a pit, located within and adjacent to the south of The Bents sand dune system are considered no longer present. The walkover revealed that the layout of a pit remains at the location and there is potential that it has been restored to an unknown degree with fill material. Evidence of fly-tipping at this location is present.

The former rifle range is now utilised as Fraserburgh Golf Course and sheds at the very west of the former site are occupied by the green keeper's workshops.

4.2 Northern Area

Moving south from the town of Fraserburgh, the Northern Area forms the longest section of the onshore cable route and terminates approximately 3 km to the west of Peterhead.

The desk study identified the presence of a former gasometer to the north of Philorth House. Access was not granted to this land and as such no visit to assess the presence of the gasometer could be completed as part of these walkovers.

Given the rural/agricultural setting of this section of cable route, historic land uses are limited. It is noted that a number of former quarries, now disused, exist across the section. It is generally observed that these remain in a condition that suggests no restoration has taken place, as evidenced in the site photographs. The former quarry at Denhead now forms an area of open rough ground, with quarry ponds occupying the majority of the site area. This quarry pond (FRC1109) is identified by Aberdeenshire Council as a landfill. It is noted that no evidence of the landfill was observed during the walkovers.

A quarry at Kininmonth Grange (FRC1050) is identified by Aberdeenshire Council as Kirkhill Landfill, utilised for the disposal of commercial, domestic, industrial and

offshore waste. The landfill was closed in 1993. Given the location of the site, access could not be achieved as part of the walkovers, however, anecdotal evidence indicates that the site includes a landfill flare to control landfill gas (see Appendix 7).

A number of further quarries are identified by Aberdeenshire Council (FRC1046 - Meikle Rathen Quarry Landfill, FRC1108 – Ardglassie Farm Landfill, BB0072 – Oldtown of Newmill Quarry Landfill). These sites could not be accessed as part of this investigation and as such have not been discussed further.

To the southeast, a former quarry located at Bridge of Rora is now occupied by an area of juvenile deciduous tree plantation. Given the topography at this location, there is potential that any former quarry has been infilled or regarded although this is unconfirmed.

A section of canal was highlighted by desk-based research as present adjacent to the River Ugie, south of Wester Rora Farm. The site visit could not identify the presence of this feature; as such it is considered that this canal has been infilled, though the nature of material used for this purpose is unconfirmed. The potential exists that any canal liners used in the creation of this waterway remain in-situ.

A number of sand and gravel pits were also identified by the desk-based research. Those surrounding Lintmill Croft, by Bridge of Hythie (FRC1053 – FRC1055), appear to have been re-established as topographical features of the landscape. It is considered unlikely that these have been infilled (see Appendix 7). The former gravel pit at Willies Fauld (FRC1049) now appears to be utilised as an agricultural storage area. Based on field observations, the boundary of the former gravel pit could not be determined. The potential exists that this site has been either infilled or regraded.

Desk based research identified areas of infilled ground at two sites by Corsend and Littlehill. Although direct access could not be achieved to these sites, observations identified that site BN1050 has been recently levelled and appears to be in the process of being developed. Site BN1298 appears to form part of existing peat moorland, with marsh grasses and heather. No evidence of infilling could be determined during the walkovers. Additionally, a small number of Council Landfills were determined to be located within the cable route. Two of these, BB0531 and BB0533 are now overlain by an unclassified road. Site BB0028 is currently occupied by the Lakeview Garden and Aquatic Centre. Information provided by Aberdeenshire Council confirms that inert soil wastes from demolition and soil/clay from excavations has been used to fill this site.

Continuing south within the cable route a series of sand and gravel pits are located surrounding the poultry farm (FRC1057) at Bridge of Rora. The largest of the pits

(FRC1060) appears to be disused, however no restoration appears to have taken place. The pits at the south of this location appear to remain in use, given the presence of graders on site and machinery movement was also noted. The pit at FRC1110 now consists of open land and rough vegetation and no infilling appears to have taken place. BN0051 is identified by Aberdeenshire Council as a landfill, however, as this is a point reference, no boundary could be identified and the area appears to be re-established as an agricultural field. At the time of the walkover, the field at this location comprised rough stubble.

The poultry farm appears to comprise 5 large barns. A number of large silos were observed within the boundary. It is noted that views of the poultry farm were obscured by graded slopes surrounding its boundary, and access could not be facilitated.

A further gravel pit is identified approximately 1.5 km further south east downstream on the North Ugie Water at Wester Rora. Similarly, this site could not be accessed and visibility was limited, however, it appears that the site remains active due to the presence of machinery and graders. Additionally, a former canal section has been identified by the desk study. No visual evidence of this feature remains on site.

A section of the Longside Airfield (FRC1061) is present within the south east corner of the Northern Area. It appears that the area of the airfield within the cable route is no longer utilised though the runway remains in-situ and at the time of the walkover appeared to be occupied by construction vehicles and equipment. The remainder of the site is overgrown and areas are fenced of for sheep grazing. A number of small brick structures were also identified as disused.

An additional works site (FRC1181) is located within the boundary of the above airfield. Field observations indicate the presence of a large hanger at the site, however no clear access or views could be obtained at the time of the walkover and as such the site use is unconfirmed.

4.3 Southern Area

To the west of the Forehill Treatment Works is the William Coutts Transport Depot. This was identified by the desk study as an industrial estate; however, it appears to be occupied by a single operator. Although access could not be achieved, the site was observed to comprise a number of sheds, workshops and office structures. It is noted that the larger sheds/workshops appeared to include potentially asbestos containing roof tiles.

A former quarry (JRC2033), at George Watson Crescent (Peterhead), is now occupied by an office development (Peterhead & District Group Training Ltd and

Peterhead Engineers Development Ltd). No evidence of the former quarry remains at this location. As such, the potential remains that it may have been infilled.

The Upperton Industrial Estate is located at the southern extent of this section of the cable route. Although access could not be permitted to individual units within the estate, field observations indicate the presence of a number of mixed use units. The majority of the estate appears to be occupied by Enviroco, a waste management company, and their Damhead Waste Management and Treatment Centre. The nature of materials contained on this site remain unconfirmed. Maps indicate the presence of two ponds within the site boundary, though these were not visualised as part of the walkover.

4.4 Boddam Urban Area

An electrical substation (BU1074) is located adjacent to the west of Peterhead Power Station. Although direct access could not be achieved, the site appears to be occupied by a single larger hanger type unit. At the rear (west) of the unit, three large pylons enter/leave the unit, laying north west/south east.

A section of former railway line (BU3007) is no longer present in the area. Its former route appears to be occupied by agricultural fields.

To the south east of the substation, a former petrol station (BU1001) is now occupied by a car and caravan sales unit. Although the features (pumps) of the petrol station remain, they appear to be no longer in use. It is considered very likely that underground fuel storage tanks remain in-situ. A barn structure at the back of the site appears to have potentially asbestos containing roof tiles. A residential property is located to the northwest of the site.

5. Conceptual Site Model & Risk Assessment

5.1 Introduction

The UK framework underpinning the management of land contamination is a risk-based approach as implemented by Part IIA of the Environmental Protection Act (1990) and other associated statutory guidelines, e.g. PAN 33.

The three component source-pathway-receptor, 'pollutant linkage' concept is central to the framework which is used to determine the existence of 'contaminated land' according to the definition set out under Part IIA. In a similar manner the pollutant linkage concept is also central to identifying the potential risks to receptors in the context of defining a site's suitability for use under the planning regime, this being the case for the proposed cable route reviewed herein.

For possible risks to receptors to exist, all three of the components, a source, pathway and receptor, must be present to create a potential 'pollutant linkage':

- Source - contamination (by soil, groundwater and/or gas phases);
- Pathway - means by which the contamination may pose a risk on a receptor by linking this physically to the source; and
- Receptor - subject that could be affected by contamination via the pathway.

Critical receptors include human beings and the water environment (groundwater and/or surface water bodies), but receptors may also include wider subjects such as buildings materials, e.g. cabling.

In the framework of contaminated land assessment, the source-pathway-receptor pollution linkage concept is represented by a conceptual site model (CSM) for any given site. This model takes account of the site specific circumstances that will influence the potential for risks to arise, i.e. for each stage of the pollution linkage (sources, pathways and receptors) to be present.

5.2 Onshore Cable Route CSM

In the context of the cable route, potential contaminated sites identified in the desk study research can be represented by a CSM. This model will represent the range of potentially contaminated sites identified and also their situations, namely the presence or absence of receptors and so the likely pathways present generating possible pollutant linkages.

Given the large area of the study site a detailed CSM for each individual potentially contaminated site identified is not plausible. As such, a higher level CSM for all sites has been developed as detailed in the following sections.

5.2.1 Sources

Sources associate with contaminated sites may take different forms. Contamination may be restricted to a range of particular chemicals, e.g. metals, it may be dispersed in different media, such as soil or groundwater, or it may be present in a raw state, such as free product. It may also have different properties, such as the potential to generate soil gases such as methane. Specific knowledge such as this, regarding specific source characteristics, is gained through a comprehensive understanding of site specific circumstances.

Broadly, contaminant types associated with specific historic land uses are documented in literature and guidance. An example of this is the EA publication CLR 8[1]. This highlights the following possible contamination that could be associated with well known historic industrial activity, the kinds of which may be present in the cable route:

Table 6 – Possible Contaminant Associated With Historic Land Use

Land Use	Metals	Asbestos	Pesticides	Oils & Hydrocarbons	PAHs	PCBs	Others
Animal Processing Works	Yes	Yes	Yes	Yes	Yes	-	Yes
Chemical Works	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Docks	Yes	Yes	-	Yes	Yes	Yes	Yes
Engineering Works	Yes	Yes	-	Yes	Yes	Yes	Yes
Gasworks	Yes	Yes	-	Yes	Yes	-	Yes
Metal Manufacturing	Yes	Yes	-	Yes	Yes	-	Yes
Power Stations	Yes	Yes	-	Yes	Yes	Yes	-
Railway Land	Yes	Yes	Yes	Yes	Yes	Yes	-
Road Vehicle Facilities	Yes	Yes	-	Yes	Yes	-	-
Textile Works	Yes	Yes	-	Yes	Yes	-	Yes
Timber Works	Yes	Yes	Yes	Yes	Yes	-	Yes
Waste Facilities	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes:
Others - Inorganics (such as cyanide and sulphate) and phenols.

Potential contamination associated with the sites identified in the desk study may comprise some or all of the above chemicals, depending upon the site specific circumstances. However, regardless if the type of contamination and it potential

[1] It is recognised that this document has been formally withdrawn by the EA, however, the guidance within this document regarding the association of chemical contaminants with industrial land uses is still considered valid.

form, for the purposes of this investigation it has been assumed that a potential contamination source fundamentally represents a mass of chemical contamination capable of posing risk. This assumption has been adopted for each of the sites identified in the cable route.

5.2.2 Receptors

Potential receptors susceptible to risks posed by potential contamination sources are defined by the situation of the sites and their future use. It is assumed that once the cable is complete the land overlying the cable will be reinstated and its current use retained. A number of the receptors will be the same for all the sites and some will vary depending upon the sites' locations.

Those receptors considered to be susceptible at all sites include:

- Human Health - construction workers;
- Human Health - future site users;
- Water Environment - underlying groundwater bodies present in either superficial deposits or bedrock; and
- Property - cabling material.

Those receptors considered to be susceptible depending on the sites' locations include:

- Human Health - future users of existing properties; and
- Water Environment - surface water (freshwater or coastal discharge zones).

5.2.3 Pathways

Pathways are the means by which a receptor is likely to be physically affected by a source. Where present, these connect receptors to the source forming potential pollutant linkages.

Based upon the potential for a contaminant mass to act as a source at any of the sites within the cable route, and that a number of receptors are considered susceptible at all sites, a number of potential pathways are also considered to be present at each site. These include:

- dermal contact with soils and dust;
- ingestion of soils and dust;
- inhalation of soils and dust;
- migration of soil leachate/liquids through the unsaturated zone;

- vertical or lateral migration through the saturated zone to deeper groundwater or in shallow groundwater off site;
- direct contact with cable materials; and
- inhalation of soil gases and vapours in confined spaces (e.g. excavations).

Similarly to receptors, where these are considered to be susceptible depending on the sites' locations, the pathways present will also be governed by the sites' location. These include:

- migration of soil vapours to indoor air and subsequent inhalation ;
- migration of soil gases to indoor air and subsequent asphyxiation or explosion;
- migration through the saturated zone to surface water; and
- direct run off to surface water.

5.2.4 Potential Pollutant Linkages

On the basis of the identified potential sources, pathways and receptors above, the following linkages are considered to be potentially present at all possible contaminated land sites:

- Linkage 1 - Direct exposure (dermal contact, ingestion or inhalation) of contaminated soils to future site users;
- Linkage 2 - Direct exposure (dermal contact, ingestion or inhalation) of contaminated soils to construction workers;
- Linkage 3 - Migration of soil leachate/liquids through the unsaturated zone to underlying groundwater;
- Linkage 4 - Migration of mobile contamination/solutes through the saturated zone to groundwater off site;
- Linkage 5 - direct contact with cable materials; and
- Linkage 6 - Build up of soil gases/vapours in confined spaces (e.g. excavations) and inhalation/asphyxiation of construction workers.

On the basis of the sources, pathways and receptors identified above the following linkages are considered to be potentially present at selected contaminated land sites depending upon their location:

- Linkage 7 - inhalation of indoor vapours by future users of existing properties on or adjacent to the sites;
- Linkage 8 - migration of soil gases to indoor air and subsequent asphyxiation or explosion, on or in the vicinity of the sites ;
- Linkage 9 - Migration of mobile contamination/solutes through the saturated zone to surface water; and

- Linkage 10 – direct run off of contaminated materials to surface water receptors on or adjacent to the sites.

These linkages have been graphically represented in the indicative CSM presented in Figure 12 Appendix 1.

5.3 Risk Assessment

The desk study identified a number of potentially contaminated sites within the onshore cable route. The level of risk posed by these sites is unlikely to be the same for each and every site. In order to try and determine which sites may represent a risk to the proposed development or wider environment (in the context of PAN 33), all identified sites have been assessed and categorised.

The outcome of the risk assessment and categorisation will inform which sites are considered likely to require further investigation/assessment should the final route of cable be proposed in intersect them or in the case of known landfills if the cable is proposed to be within 250 m from their location.

5.3.1 Data Management

The wide range of potentially contaminated sites identified in the desk study was reviewed and categorised in order to facilitate the risk assessment process.

Site Categorisation

All sites of historical land use identified were allocated into one of the following categories:

0 – Wells, Pumps and Springs
1 – Possible Infilled Ground
2 – Tanks
3 – Known Landfills
4 – Vehicle Facilities
5 – Railway Facilities
6 – Industrial
7 – Light Industrial
8 – Electrical Sub Stations
9 – Ministry of Defence (MOD) Sites
10 – Unknown Works
11 – Linear Features

Examples of some of the above categories include:

- Possible Infilled Ground – quarries, sand pits, gravel pits, lades, ponds and reservoirs;
- Vehicle Facilities – filling stations, garages and depots;
- Railway Facilities – stations, yards, sidings and sheds;
- Industrial – power stations, harbours, slaughterhouses, brick works, engineering works, gas terminal, sawmills, gas holders, textile production, scrap yards, industrial estates and waste transfer stations;
- Light Industrial – sewerage works, pumping stations, cemeteries, mills, smithies, sheep washes, corn mills, poultry farms and food processing;
- Unknown Works – any works specified as 'Unknown Works' in historic mapping; and
- Linear Features- disused railway lines and canals.

GIS Database Editing

Potential contaminated sites were identified from two sources, by a review of historic maps held in the National Library of Scotland and from consultations with Aberdeenshire Council. Many of the sites were identified by both these resources and to avoid duplicated data, entries appearing in both resources were reviewed and the more accurate entry retained and the duplicated removed from the dataset. Where no discrepancy in the accuracy could be observed, the Council entry was retained, being considered the more authoritative. Where duplicates concerned polygon entries in the GIS, the boundaries of the polygons were merged to create a new polygon, comprising the boundary of both the Council and RPS polygons.

Once the duplicate entries had been deleted from the resources the remaining GIS entries from the Council and RPS map review were combined to create a single GIS database representing all potential contaminated sites identified in the onshore cable route. A copy of the GIS shapefile for potential contaminated land sites is included in Appendix 9.

5.3.2 Risk Evaluation

In order to complete a risk assessment of the potentially contaminated sites their potential contaminative severity was appraised. This provided a comparison of the sites relative to one another and also inferred the likelihood for further works to be required.

Source Potential

The nature of the historic site activity was gauged as low, low/medium, medium/high or high, depending upon the perceived likely potential for more severe contamination issues to exist at the site. This generated the following relative to the categories defined above:

Table 7 – Source Potential Categorisation	
Land Use Category	**Source Potential Ranking**
Wells, Pumps and Springs	Low
Possible Infilled Ground	Low/Medium or Medium/High
Tanks	Low/Medium or Medium/High
Known Landfills	High
Vehicle Facilities	Medium/High or High
Railway Facilities	Medium/High or High
Industrial	Medium/High or High
Light Industrial	Low/Medium or Medium/High
Electrical Substations	Low/Medium
MOD Sites	Low/medium to High
Unknown Works	High
Linear Features	Medium/High or High

The potential of the source was also considered relative to its potential to generate soils gases. The potential for soil gases is typically present at almost all potential contaminated sites due to made ground, however, where known bulk infilling has occurred (e.g. known landfills), this potential is likely to be higher. The categories of Possible Infilled Ground and Known Landfills are therefore considered to have a high soil gas potential.

Where appropriate, the source potential was informed by the results of the walkovers completed.

CSM Receptors

The potential receptors indentified in the CSM were considered to identify which sites may be located in more sensitive environments and so those that may represent greater risks.

However, as this process would provide an assessment of the sites relative to one and other, only those receptors considered to be variable between sites were considered. This dictated that (as per Section 5.2.2 above) only the presence of existing properties or surface water within the proximity of the site would have a bearing on the relative assessment of the sites.

In the context of the linkages associated with these receptors, this dictates that where a site is located in close proximity to buildings, so indoor vapour inhalation or accumulation of soil gases will pose a greater risk, and so the site's risk should be considered greater. Similarly, where a site is in close proximity to surface water, so the potential for this to be impacted by contaminated migration via groundwater is apparent, and again the site may pose a greater risk than would otherwise be the case.

The definitions of proximity were defined as 50 m for buildings and 200 m for surface water. Therefore where sites fell within these distances, they were considered sufficiently close to consider buildings and surface water as plausible receptors.

Scoring

To enable the impact of the source potential and presence of CSM receptors to be gauged for the sites, and so to put their contamination potential into context, a numerical system was developed. Values were applied to each variable parameter as presented in the table 8 below.

Table 8 – Risk Assessment Valuation

Source Contamination Potential		Soil Gas Potential		Building proximity		Surface Water Proximity	
Low	0	Normal	1	>50m	1	>50m	1
Low/Medium	5						
Medium/High	25	High	2	<50m	2	<50m	2
High	50						

A score was then generated for each site by multiplying the Source Contamination Potential by the Soil Gas Potential, Building Proximity and Surface Water proximity. In so doing each potential contaminated site was allocated a score to categorise the sites relative to one and other. The scores can also be considered to represent thresholds for each site as shown in the table 9 below.

Table 9 – Risk Threshold Score

Risk Score	Risk Level	Action Requirements
0	Low	No further investigation or assessment works considered necessary.
5 to 40	Low to Moderate	Possible Phase II works required but subject to findings of further detailed Phase I work.
50	Moderate	Phase II works more than likely but of possible lower complexity/scale.
100 to 400	High	Phase II works more than likely and of potential greater complexity/scale.

A summary of the risk evaluation for each historic site is included in the Historic Sites Record in Appendix 8.

Findings

The application of the conceptual site modelling and risk assessment process revealed the following findings (table 10):

TABLE 10 – Cable Route Risk Categorisation

Route Section	Number of Sites				
	Total	Low	Low to Moderate	Moderate	High
Boddam Urban Area	9	1	5	1	2
Southern Area	53	20	15	8	10
Northern Area	309	193	74	11	31
Fraserburgh Urban Area	122	3	34	57	28

These findings are graphically presented in Figure 13.

All findings of the risk assessment process and site categorisation, available for each individual site, are available in the GIS database associated with this report (Appendix 9).

6. Conclusions and Recommendations

The desk study has provided a baseline view of the environmental setting of the land within the proposed onshore cable route study area. This includes geology, hydrogeology, hydrology and historic sites.

This baseline has been interpreted using standard contaminated land appraisal principles, namely the conceptual modelling of possible pollutant linkages and their qualitative risk assessment. In so doing, potentially contaminated land within the cable route has been identified considering the proposed development and land's future use. This reflects the guiding principles of appropriate guidance such as PAN 33 and Part IIA.

Potentially contaminated land has been categorised to provide an indication of the requirement for further works. Once the cable route is finalised this categorisation, complimented by knowledge of the locations of potentially contaminated land, will inform further assessment requirements to ensure the land's suitability for future use upon development.

Potentially contaminated sites are summarised for the cable route as follows:

- Sites requiring further Phase I Assessment and potential Phase II works – 128
- Sites requiring possible lower complexity Phase II works – 77
- Sites requiring possible higher complexity Phase II works – 71

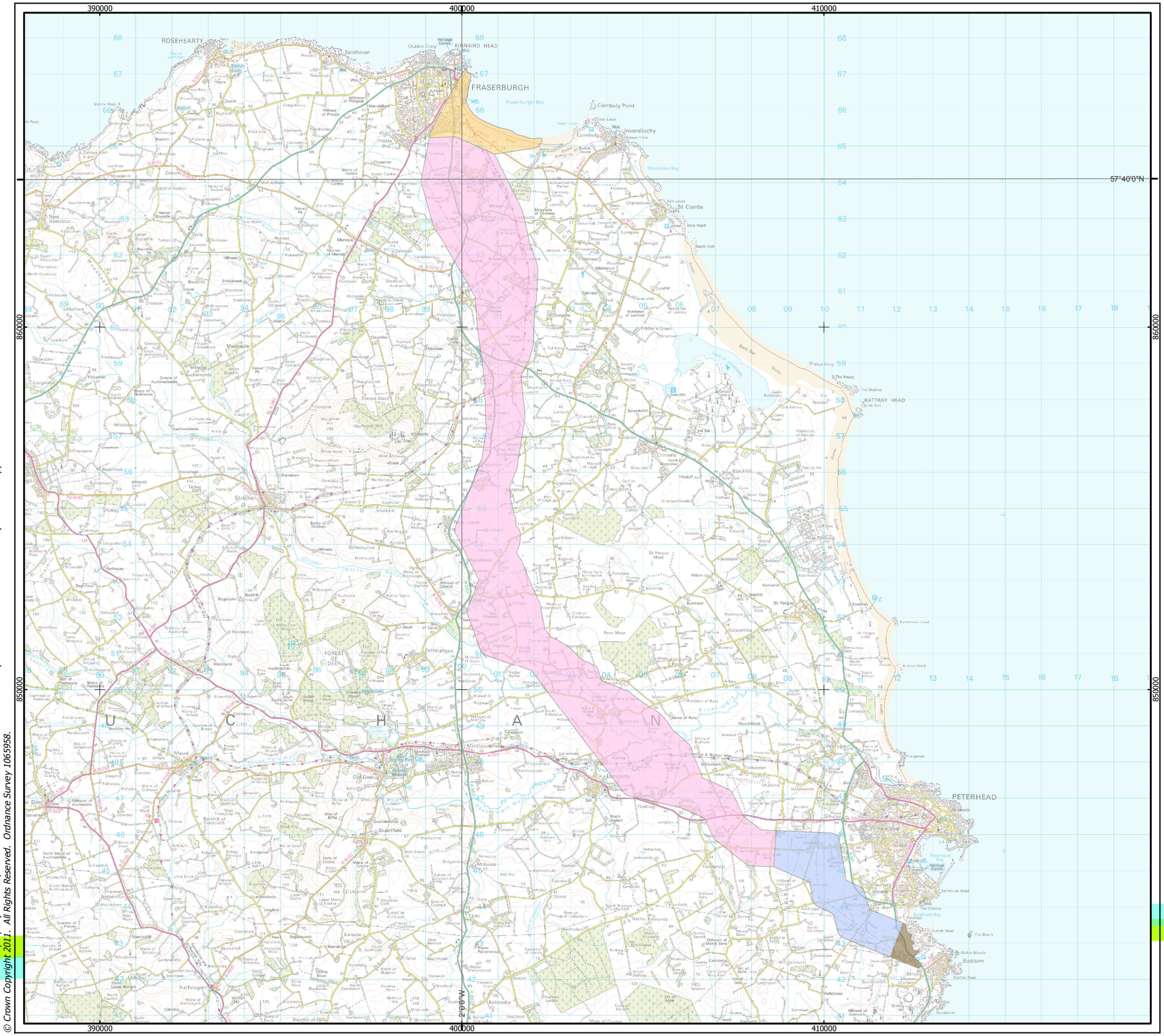
Further Phase I Assessment may potentially include detailed consultations with landowners and site visits to further refine the understanding of the potential contamination source identified. Phase II works comprises the undertaking of intrusive site investigations to characterise ground/groundwater conditions and the scope of this work would be dependent on the CSM developed for the individual sites.

It should however be recognised that the requirement to complete any of these further works depends upon the specific finalised route of the proposed cable within the current study area. Furthermore, these total site numbers do not provide a reflection that some sites may be greater in area than others or that total site numbers may be inflated by a number of small sites.

With the potential for future assessment works in mind, it is noted that Aberdeenshire Council has requested that further research of potential contaminated land is extended to include any site of a know landfill were this to lie within the 250 m of the proposed cable route.

Appendix 1 – Figures (Included in Environmental Statement)

This page has been intentionally left blank.



edp renewables

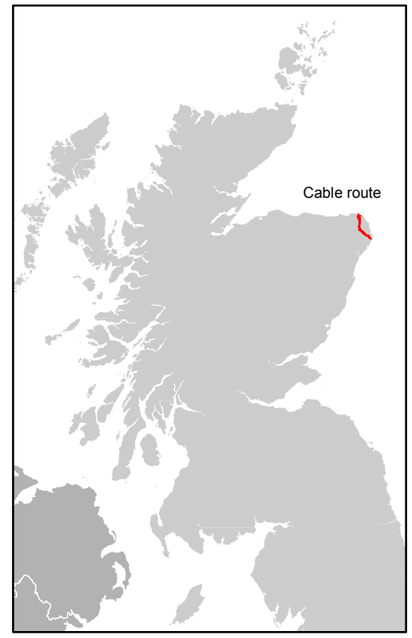
REPSOL

Moray Offshore Renewables Ltd

Key

Cable Route Sections

- Boddam Urban Area
- Northern Area
- Fraserburgh Urban Area
- Southern Area



Context Plan

Horizontal Scale: 1:100,000 A3 Chart

0 2,500 5,000 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

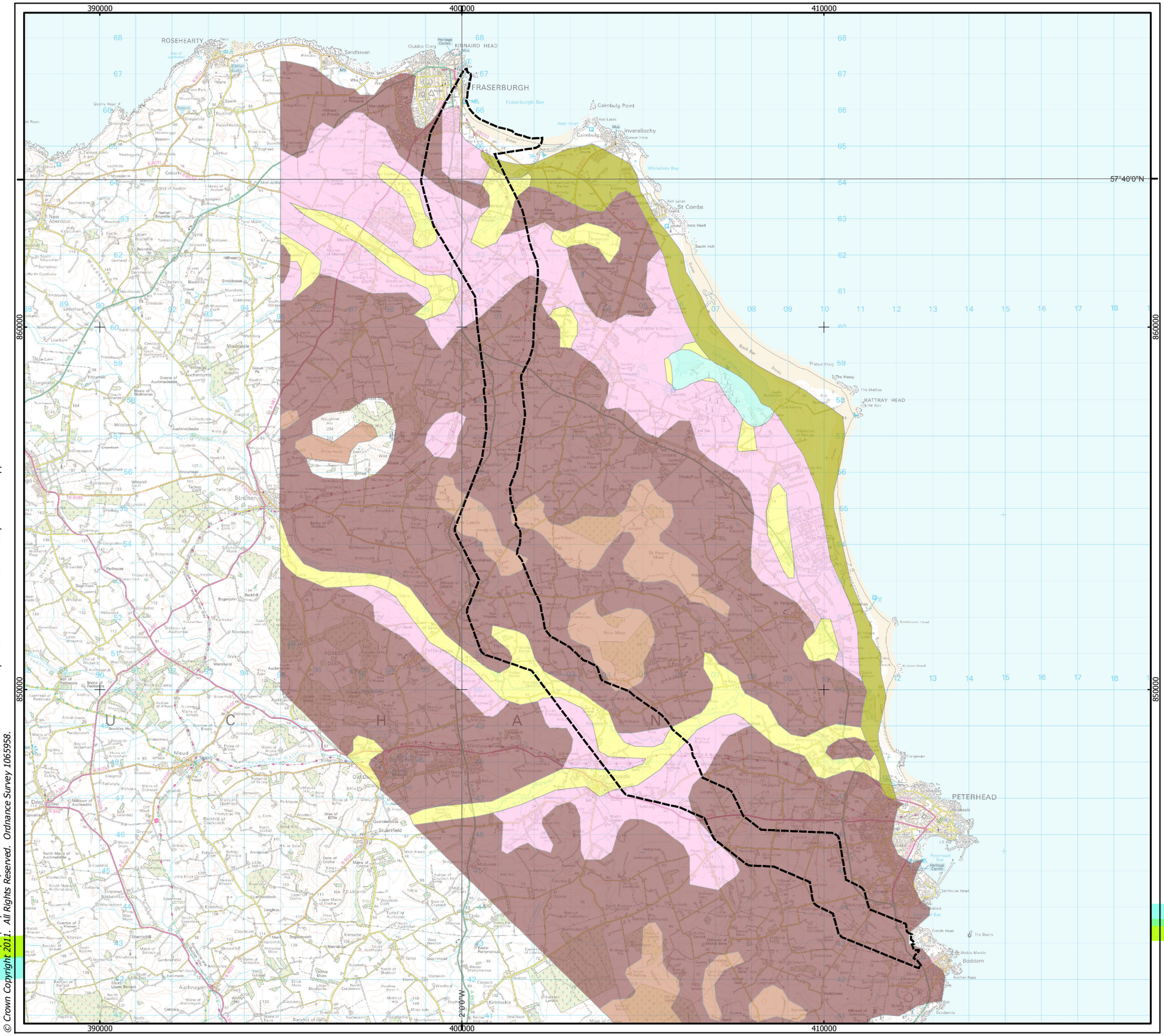
Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-101

Figure 1 Cable Route Layout & Location Plan

Moray Offshore Renewables Ltd



edp renewables

REPSOL

Moray Offshore Renewables Ltd

Key

Cable Route

Superficial Geology

- ALLUVIUM
- BLOWN SAND
- DRIFT GEOLOGY (NOT MAPPED)
- GLACIAL SAND AND GRAVEL
- PEAT
- TILL

Horizontal Scale: 1:100,000 A3 Chart

0 2,500 5,000 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-102

Figure 2
Superficial Geology Map

Moray Offshore Renewables Ltd

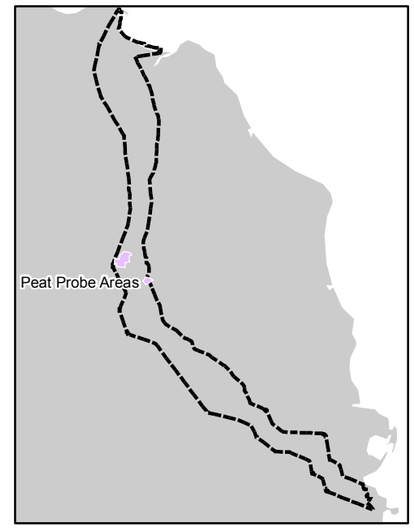
Moray Offshore Renewables Ltd

Key

- Cable Route
- Peat Probe Area

Peat Depth (m)

- 0 - 0.1
- 0.11 - 0.3
- 0.31 - 0.6
- 0.61 - 0.94
- 0.95 - 1.88



Horizontal Scale: 1:6,500 A3 Chart

0 150 300 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

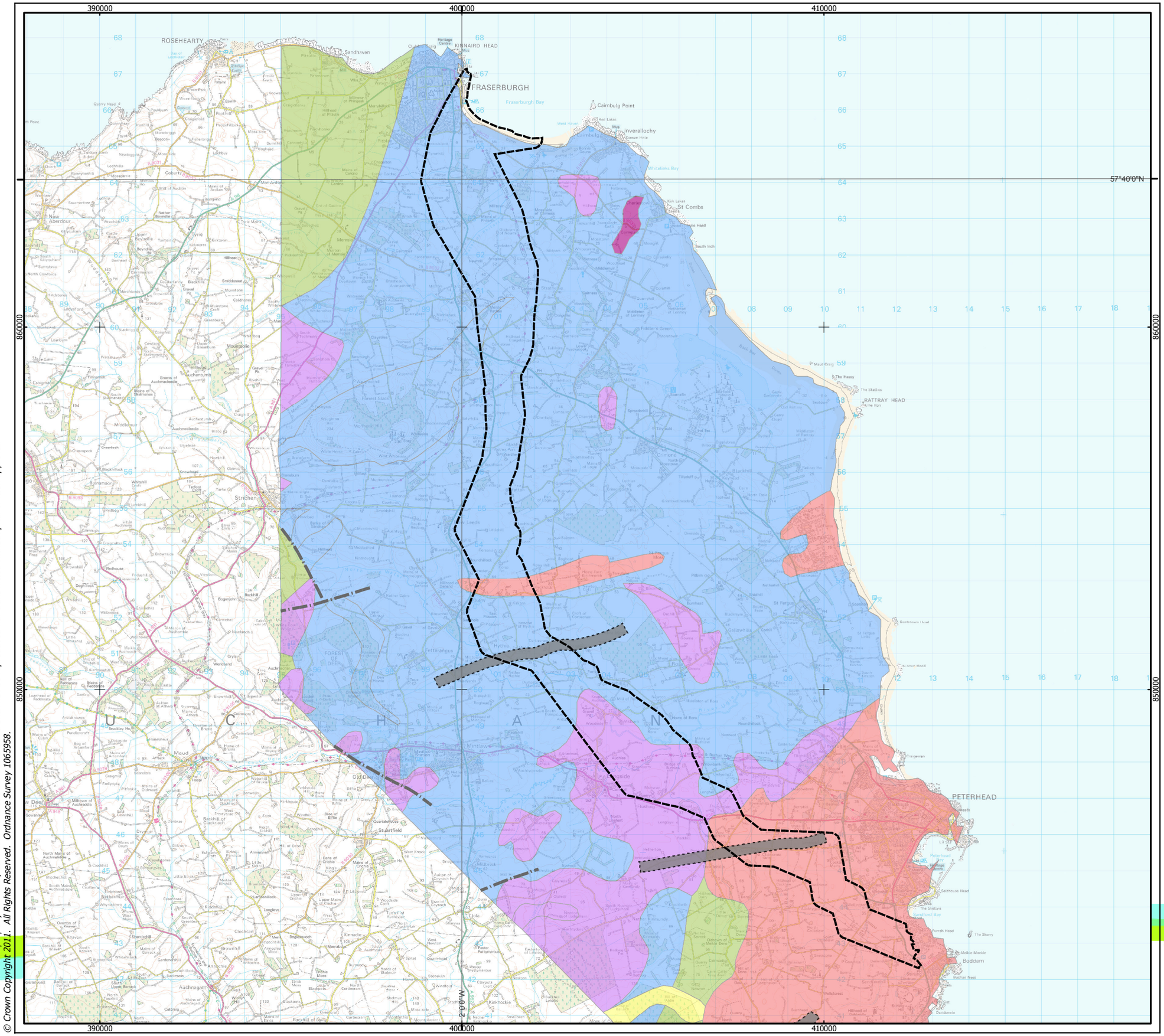
Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-103

Figure 3
Peat Depth Map

Moray Offshore Renewables Ltd



edp renewables

REPSOL

Moray Offshore Renewables Ltd

Key

- Cable Route

Bedrock Geology

- ARGYLL GROUP
- NEOGENE ROCKS (UNDIFFERENTIATED)
- SOUTHERN HIGHLAND GROUP
- UNNAMED IGNEOUS INTRUSION, LATE SILURIAN TO EARLY DEVONIAN
- UNNAMED IGNEOUS INTRUSION, NEOPROTEROZOIC
- UNNAMED IGNEOUS INTRUSION, ORDOVICIAN TO SILURIAN
- FAULT AT ROCKHEAD
- UNNAMED IGNEOUS INTRUSION, CARBONIFEROUS TO PERMIAN

Horizontal Scale: 1:100,000 A3 Chart

0 2,500 5,000 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

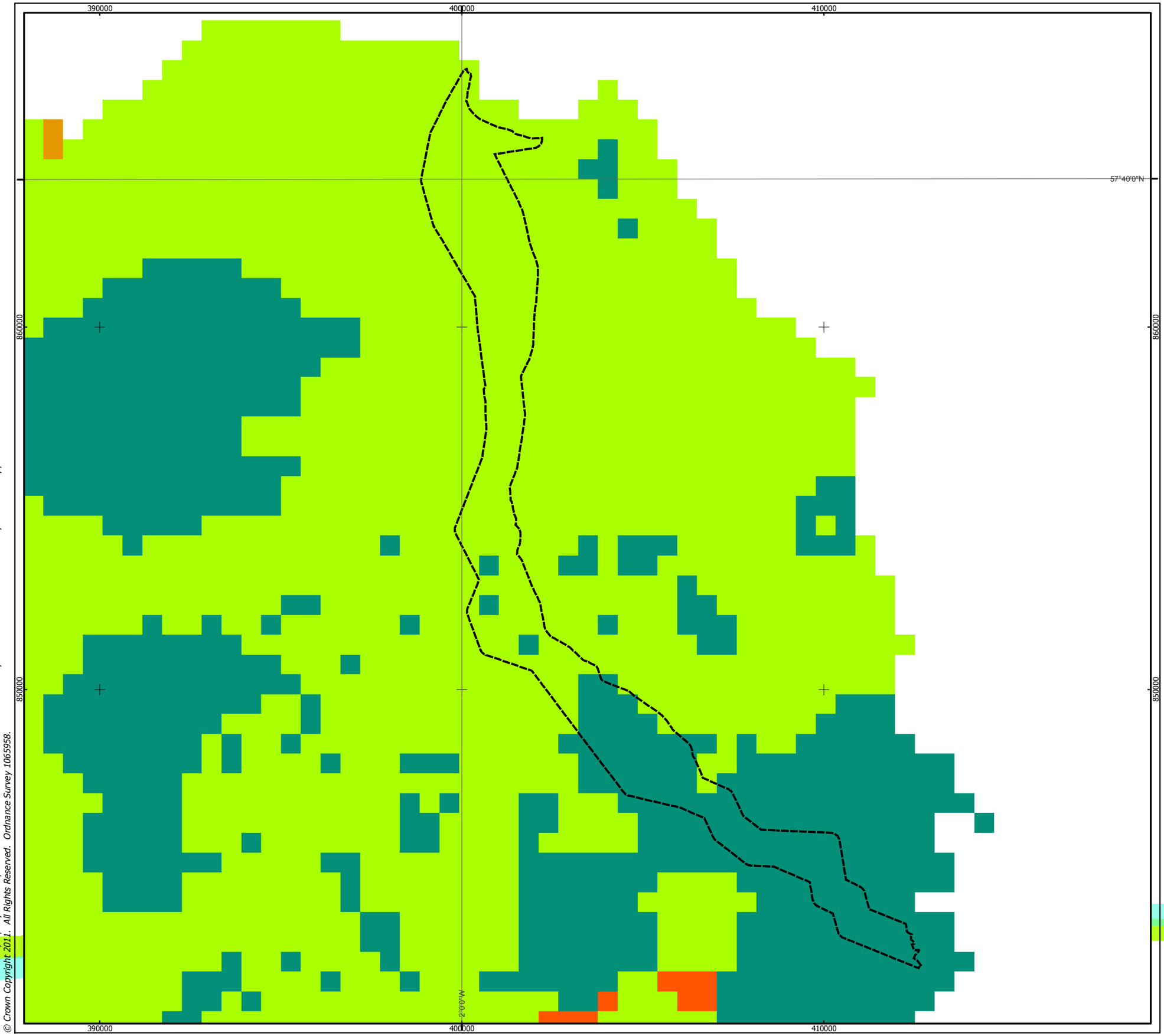
Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-104

Figure 4
Bedrock Geology Map

Moray Offshore Renewables Ltd



edp renewables

REPSOL

Moray Offshore Renewables Ltd

Key

Cable Route

Bedrock Aquifers

- IF H
- IF M
- F L
- F VL

IF = Intergranular fracture flow
F = Fracture flow

H = High productivity
M = Moderate productivity
L = Low productivity
VL = Very low productivity

Horizontal Scale: 1:100,000 A3 Chart

0 2,500 5,000 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

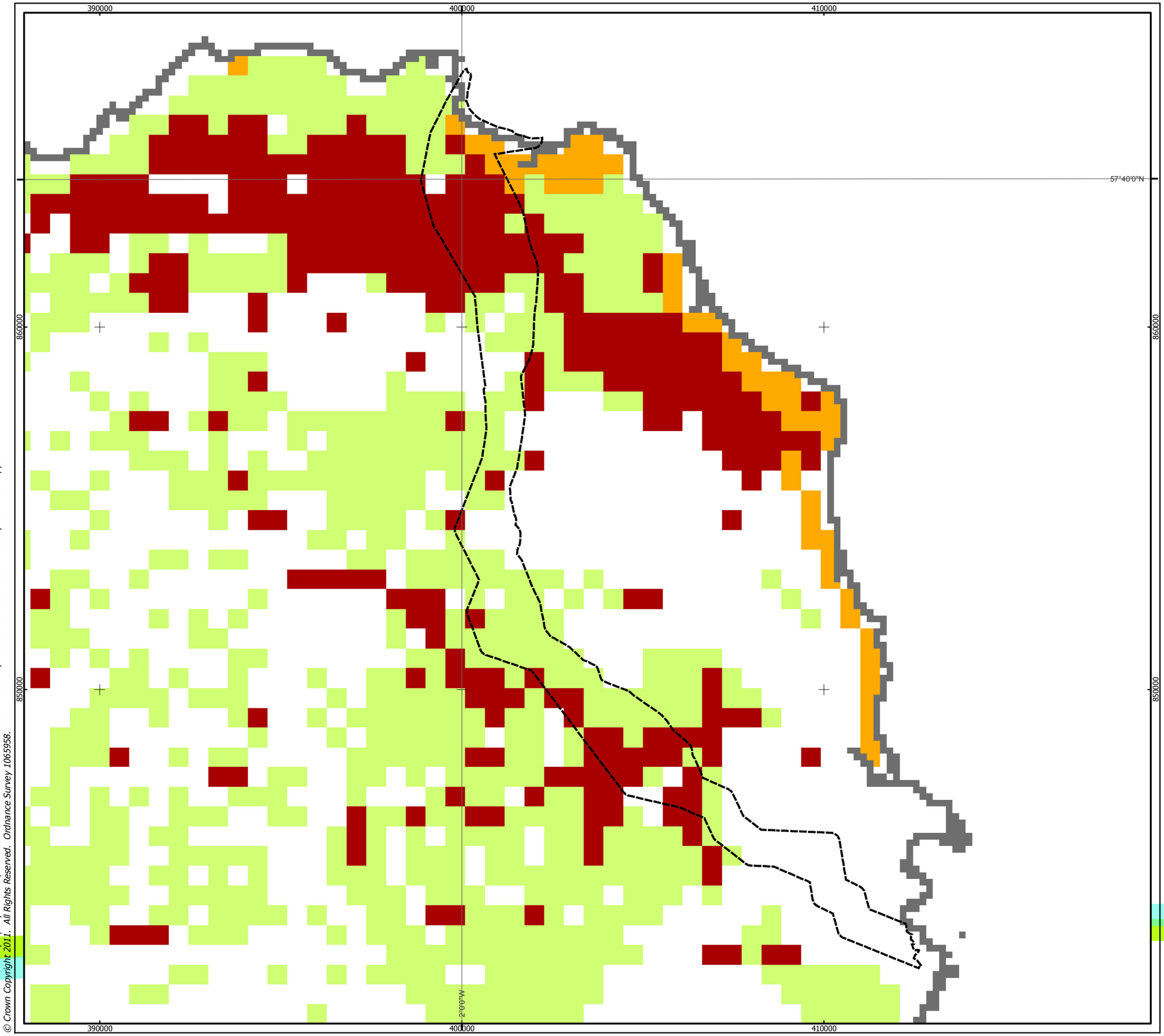
Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-105

Figure 5
SEPA Bedrock Aquifer Map

Moray Offshore Renewables Ltd



edp renewables

REPSOL

Moray Offshore Renewables Ltd

Key

Cable Route

Bedrock Aquifers

- I H
- I M
- I L

I = Intergranular flow

H = High productivity
M = Moderate productivity
L = Low productivity

Horizontal Scale: 1:100,000 A3 Chart

0 2,500 5,000 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

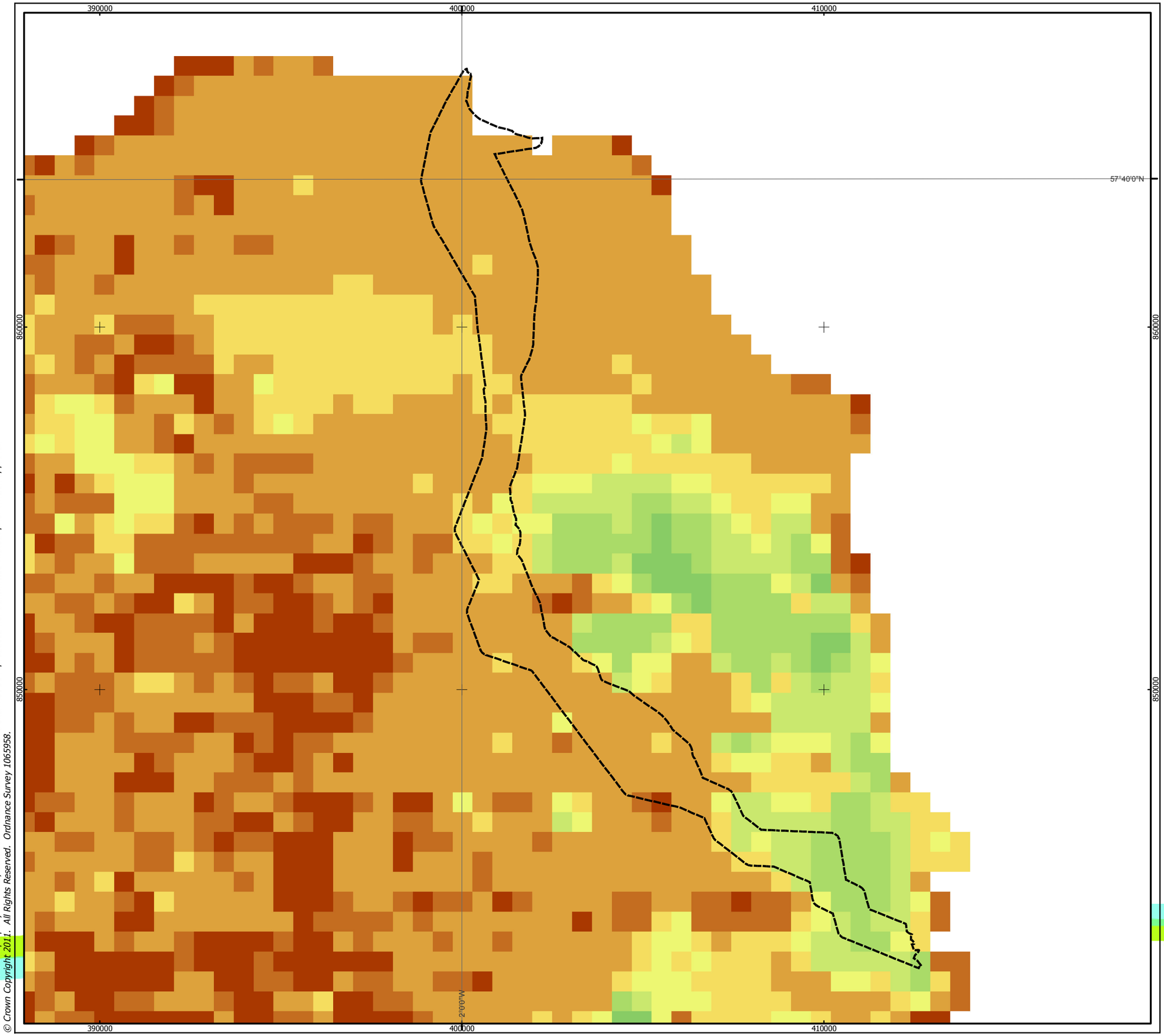
Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-106

Figure 6
SEPA Superficial Aquifer Map

Moray Offshore Renewables Ltd



edp renewables

REPSOL

Moray Offshore Renewables Ltd

Key

Cable Route

Vulnerability Class

- 5 (Most vulnerable)
- 4a
- 4b
- 4c
- 4d
- 3
- 2
- 1 (Least vulnerable)

Horizontal Scale: 1:100,000 A3 Chart

0 2,500 5,000 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

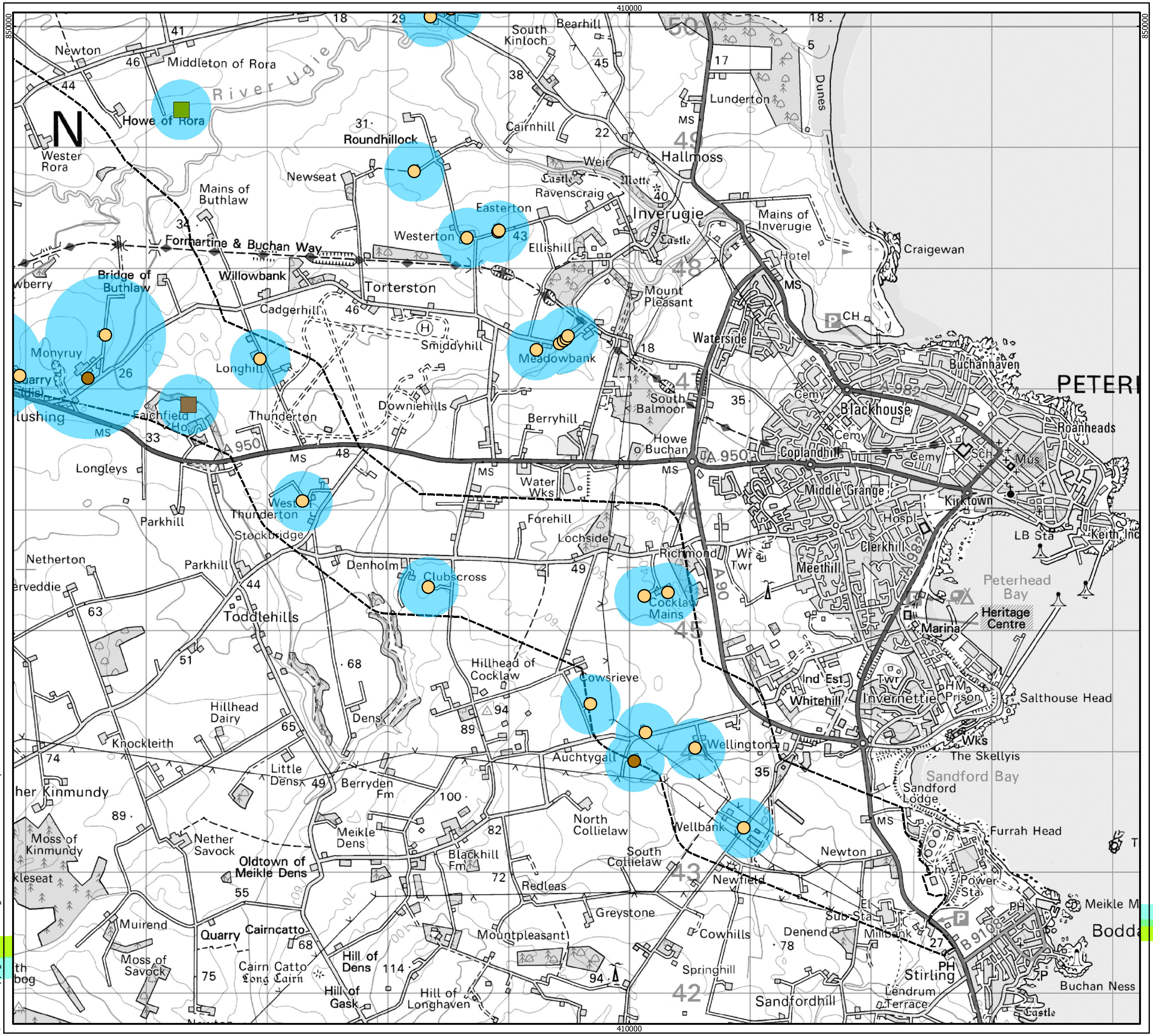
Produced: KAG
Reviewed: NB
Approved: PH

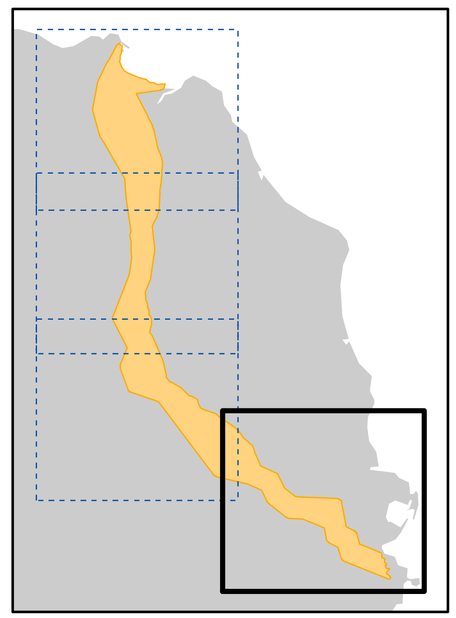
Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-107

Figure 7
SEPA Groundwater Vulnerability Map of the Uppermost Aquifer

Moray Offshore Renewables Ltd


River Ugie
Newton
Middleton of Rora
Howe of Rora
Wester Rora
Roundhillock
Newseat
Mains of Buthlaw
Formartine & Buchan Way
Willowbank
Bridge of Buthlaw
Monyruy
Longhill
Faichfield
Thunderton
Longleys
Torterston
Cadgerhill
Smiddyhill
Downiehills
Westerton
Easterton
Ellishill
Meadowbank
Berryhill
South Kinloch
Bearhill
Cairnhill
Hallmoss
Lunderton
Dunes
Ravenscraig
Inverugie
Mains of Inverugie
Craigewan
Mount Pleasant
Waterside
South Balmoor
Howe o Buchan
Buchanhaven
Blackhouse
Copland
Middle Grange
Roanheads
Kirktown
Clerkhill
Meethill
Peterhead Bay
Heritage Centre
Marina
Salthouse Head
Wellington
The Skellyis
Sandford Bay
Sandford Lodge
Furrah Head
Newton
Newfield
Cowhills
Springhill
Stirling
Sandfordhill
Buchan Ness
Lendrum Terrace
Parkhill
Netherton
West Thunderton
Stockbridge
Denholm
Clubscross
Water Wks
Forehill
Lochside
Richmond
Cocklaw Mains
Toddlehills
Knockleith
Hillhead Dairy
Dens
Hillhead of Cocklaw
Cowsrieve
Auchtygall
Little Dens
Berryden Fm
Moss of Kinmundy
Nether Savock
Oldtown of Meikle Dens
Meikle Dens
Blackhill Fm
Redleas
North Collielaw
South Collielaw
Wellbank
Greystone
Mountpleasant
Muirend
Moss of Savock
Quarry
Cairncatto
Cairn Catto
Long Cairn
Hill of Dens
Hill of Gask
Hill of Longhaven
Denend
Millbank
Sub-Sta
Power Sta
A 950
A 90
A 982
B 9108
PETERHEAD
410000
850000



Moray Offshore Renewables Ltd

Key

Cable Route

Private water supplies - Source

- Spring
- Well
- Unknown

Licensed abstractions - Purpose

- Agriculture
- Golf course
- Mining/quarrying

Potential impact zone

Horizontal Scale: 1:30,000 | A3 Chart

0 | 500 | 1,000 Meters

Geodetic Parameters: OSGB 1936 / British National Grid

Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-108

Figure 8
Abstractions and Water Supplies
Sheet (1 of 4)

Moray Offshore Renewables Ltd

400000

850000

Longhill
Burnside
Middlethird
Blackslack
Kindrought
Roundhillock
Corsend
Corse Fm
Swineden
Loch
Balearn
Boghead
Rowanhill
Camphill
Home Farm Kininmonth
Terryfield
Thistley Hillock
Blackhills
Newton Cott
Backfolds
St Ferg Moss
Mains of Kindrought
Nether Denend
Hillhead of Denend
North Ugie Water
A952
B9093
Sch
Leys
Quarry
Kirkton
Mains of Kininmonth
Croft of Cortiecram
Auchrynie
Nether Cabra
Denhead
Brownhill
Upper Cabra
East Pitscow
Sandhole
Pitscow
Newton of Hythie
Mill of Gaval
Gaval
Standing Stone
Rora Moss
Hythie
Middle Hythie
Cortiecram
Greenwards
Fetterangus
Braeside of Fetterangus
PH
Milltown of Gaval
Church
Forest of Deer
Den o'Howie
Toux
Dumbmill
Hardyards
Nether Hythie
Lintmill
Dumpston Mintlaw
Fortry
Cuttyhill
Drinnie's Wood
Observatory
Brakeshill
Boghead
Mains of Pitfour
Chapel Park Fm
Longmuir
South Dumpston
Ardlaw
Knaps of Auchlee
Sand & Gravel Pit
Mill of Rora
Woodside
Millbank
Wester Rora
Hillhead of Mintlaw
Pitfour Lake
Keplahill
Hotel
Mintlaw
Mintlaw Station
Aden Country Park
Farming Museum
Old Deer
Abbey
B9030
B9029
A950
Braehead
Bridgend
Auchlee
Strawberry Bank
Crookedneuk
Auchtydonald
Nether Aden
Baluss
Longside
Cairngall
Monyruy
Massie Brae
Greenbrae
Longside Fm
Cemy
Flushing
North Linshart
Biffie
Mains of Biffie
Mill of Aden
Knock
Easter Knock
Quartalehouse
Stuartfield
Yokieshill
Inverquhomery
Cairn
Drums
South Ugie Water

Moray Offshore Renewables Ltd

Key

- Cable Route

Private water supplies - Source

- Spring
- Well
- Unknown

Licensed abstractions - Purpose

- Agriculture
- Golf course
- Mining/quarrying

Potential impact zone

Context Plan

Horizontal Scale: 1:30,000 — A3 Chart — N

0 500 1,000 Meters

Geodetic Parameters: OSGB 1936 / British National Grid

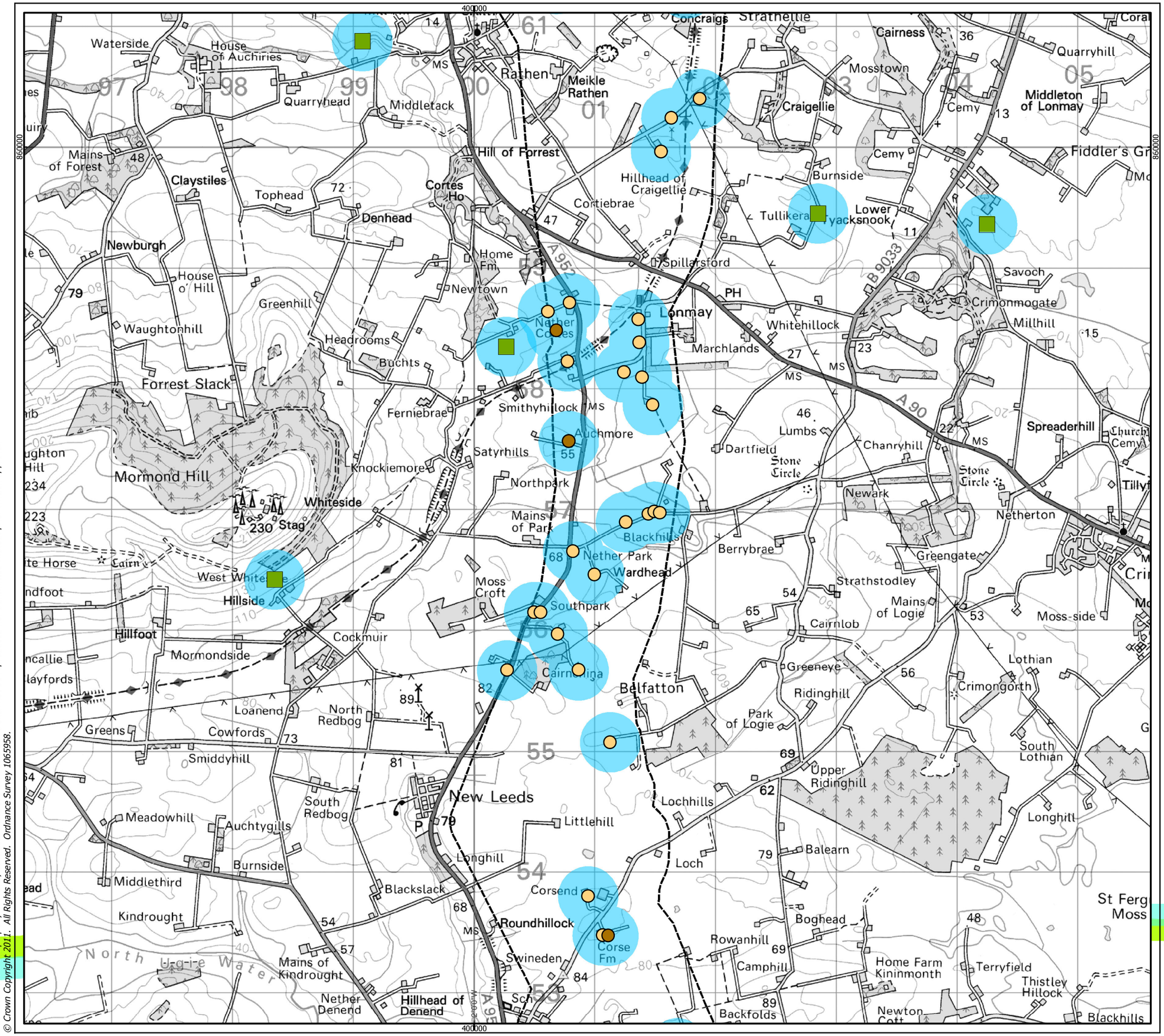
Produced: KAG
Reviewed: NB
Approved: PH

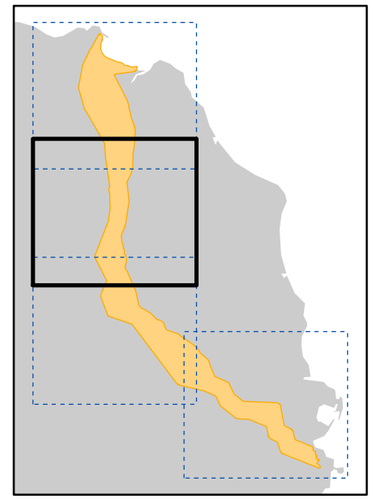
Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-110

Figure 8
Abstractions and Water Supplies
Sheet (2 of 4)

Moray Offshore Renewables Ltd





edp renewables

REPSOL

Moray Offshore Renewables Ltd

Key

Cable Route

Private water supplies - Source

- Spring
- Well
- Unknown

Licensed abstractions - Purpose

- Agriculture
- Golf course
- Mining/quarrying

Potential impact zone

Horizontal Scale: 1:30,000 A3 Chart

0 500 1,000 Meters

Geodetic Parameters: OSGB 1936 / British National Grid

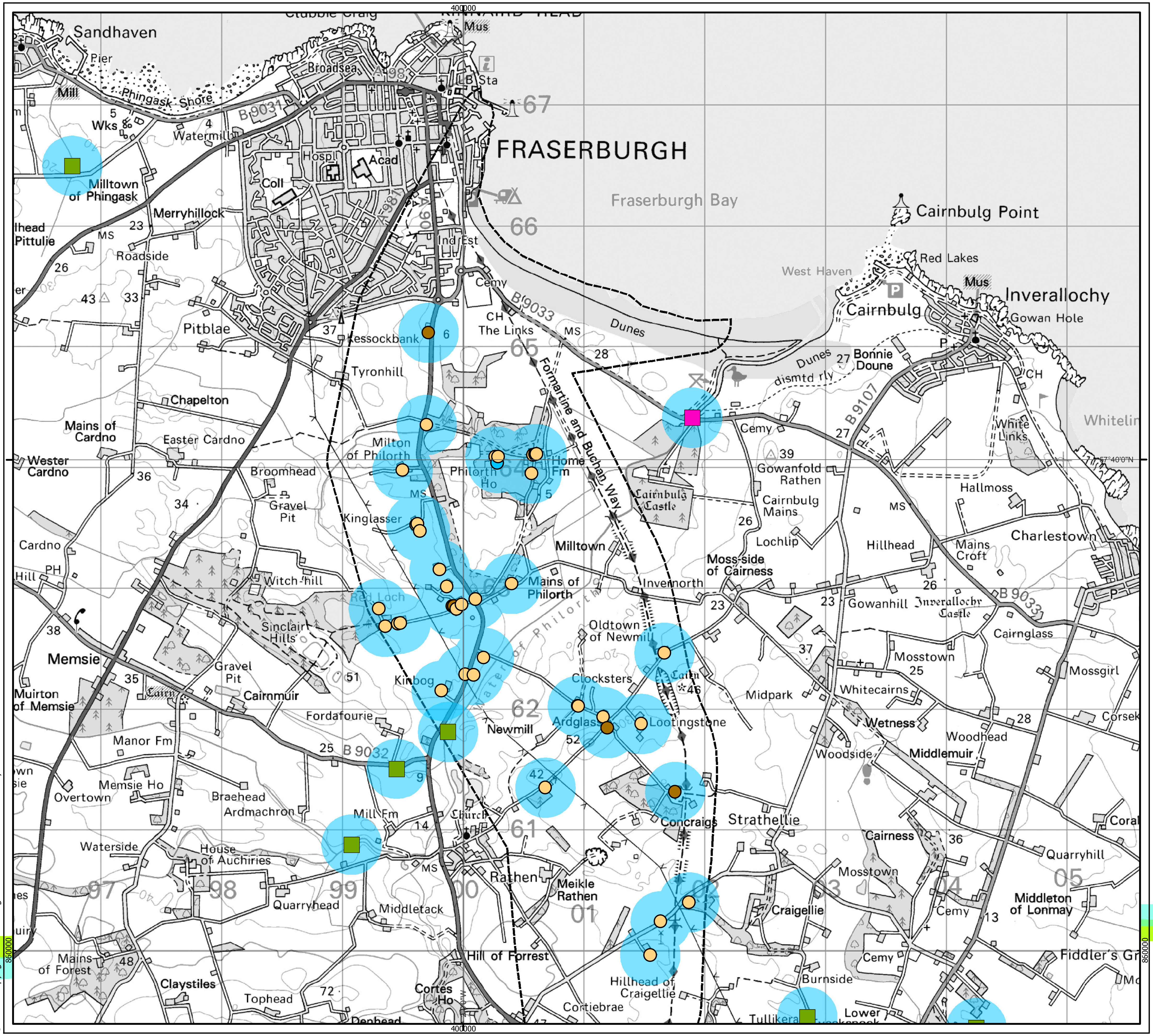
Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-111

Figure 8
Abstractions and Water Supplies
Sheet (3 of 4)

Moray Offshore Renewables Ltd



FRASERBURGH
Fraserburgh Bay
Cairnbulg Point
Sandhaven
Pier
Phingask Shore
Broadsea
Watermill
Milltown of Phingask
Merryhillock
Roadside
Pitblae
Kessockbank
Tyronhill
Chapelton
Mains of Cardno
Easter Cardno
Wester Cardno
Broomhead
Milton of Philorth
Philorth Ho
Home Fm
Gravel Pit
Kinglasser
Milltown
Mains of Philorth
Witch-hill
Red Loch
Sinclair Hills
Memsie
Muirton of Memsie
Cairnmuir
Fordafourie
Kinbog
Newmill
Manor Fm
Memsie Ho
Overtown
Braehead
Ardmachron
Mill Fm
Waterside
House of Auchiries
Quarryhead
Middletack
Rathen
Meikle Rathen
Hill of Forrest
Mains of Forest
Claystiles
Tophead
Cortes Ho
Denhead
Cortiebrae
Hillhead of Craigellie
Concraigs
Strathellie
Lootingstone
Ardglassie
Clocksters
Oldtown of Newmill
Invernorth
Moss-side of Cairness
Lochlip
Cairnbulg Mains
Cairnbulg Castle
Gowanfold Rathen
Cemy
Bonnie Doune
Dunes
dismtd rly
West Haven
Red Lakes
Cairnbulg
Inverallochy
Gowan Hole
White Links
Whitelink
Hallmoss
Charlestown
Mains Croft
Hillhead
Gowanhill
Inverallochy Castle
Cairnglass
Mosstown
Mossgirl
Whitecairns
Midpark
Wetness
Woodhead
Woodside
Middlemuir
Corsek
Cairness
Quarryhill
Mosstown
Craigellie
Middleton of Lonmay
Cemy
Burnside
Fiddler's Gr
Lower
Tullikera
Coral
Formartine and Buchan Way
Water of Philorth
The Links
Ind Est
Hospl
Acad
Coll
Mill
Wks
Pittulie
Cardno
Hill
Manor Fm
B9031
B9033
B9032
B9107
A98
A981
A90
400000
860000
57°40'0"N

edp renewables

REPSOL

Moray Offshore Renewables Ltd

Key

Cable Route

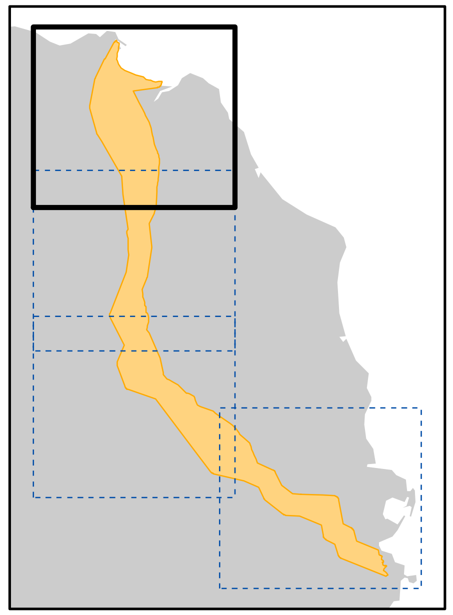
Private water supplies - Source

- Spring
- Well
- Unknown

Licensed abstractions - Purpose

- Agriculture
- Golf course
- Mining/quarrying

Potential impact zone



Context Plan

Horizontal Scale: 1:30,000 — A3 Chart

0 — 500 — 1,000 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-112

Figure 8
Abstractions and Water Supplies
Sheet (4 of 4)

Moray Offshore Renewables Ltd

410000

850000

North Ugie Water

Burn of Faichfield

Waterside

Coplandhill

PETERHEAD

Peterhead Bay

Sandford Bay

Boddam

410000

850000

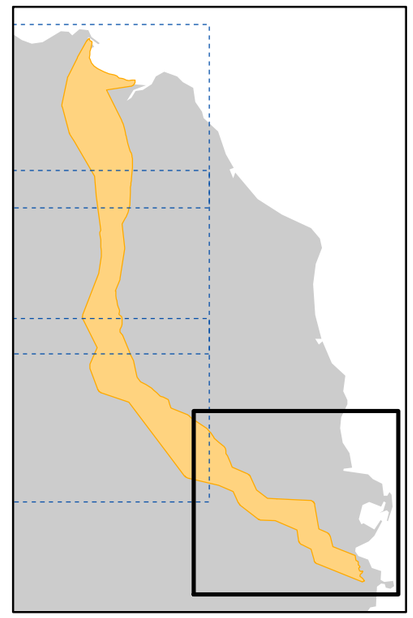
edp renewables

REPSOL

Moray Offshore Renewables Ltd

Key

- Cable Route
- Rivers & Burns
- Areas of Open Water



Context Plan

Horizontal Scale: 1:30,000 A3 Chart

0 500 1,000 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

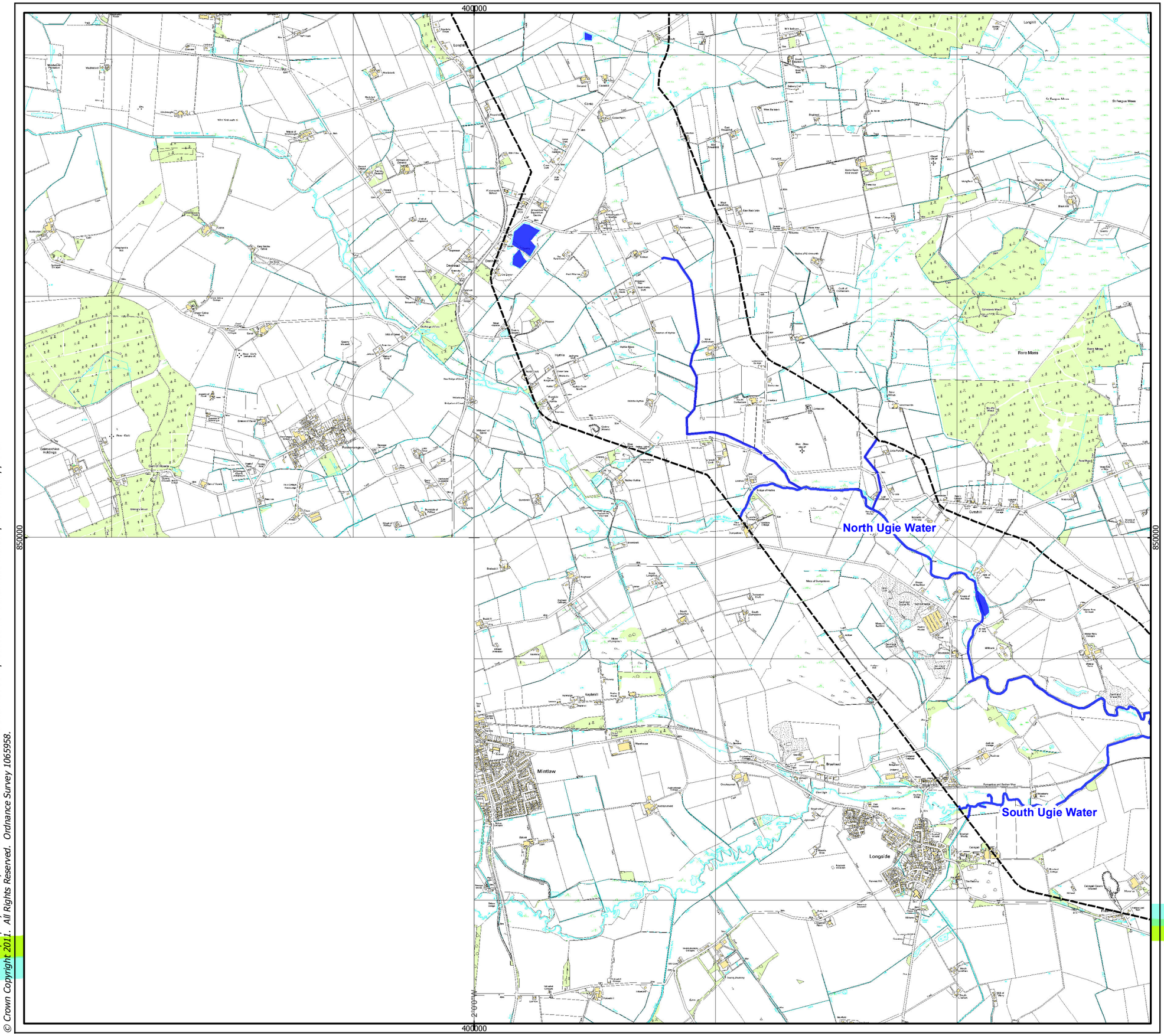
Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-113

Figure 9
Surface Water Features
Sheet (1 of 4)

Moray Offshore
Renewables Ltd



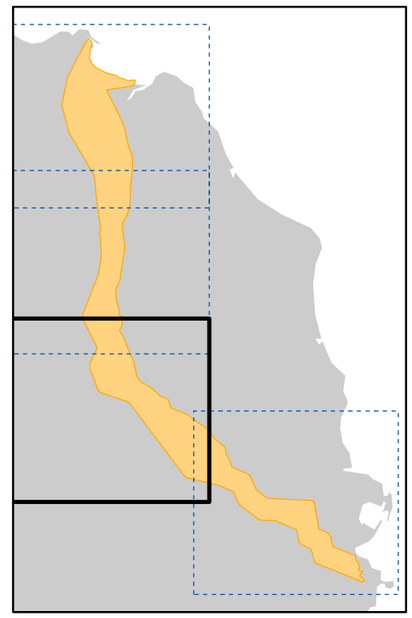
edp renewables

REPSOL

Moray Offshore Renewables Ltd

Key

- Cable Route
- Rivers & Burns
- Areas of Open Water



Context Plan

Horizontal Scale: 1:30,000 A3 Chart

0 500 1,000 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-115

Figure 9
Surface Water Features
Sheet (2 of 4)

Moray Offshore Renewables Ltd

400000

860000

Kilburnie Burn

Rathen

Cortes Village

Mormond Hill

Gellatton

New Leeds

Longhill

Fraserburgh

St Fergus Moss

North Ugie Water

400000

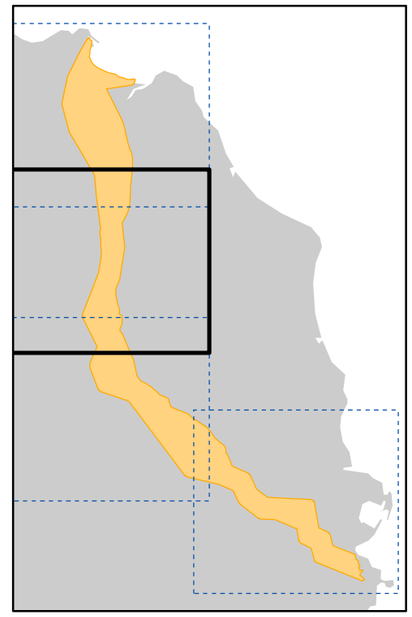
edp renewables

REPSOL

Moray Offshore Renewables Ltd

Key

- Cable Route
- Rivers & Burns
- Areas of Open Water



Context Plan

Horizontal Scale: 1:30,000 A3 Chart

0 500 1,000 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-116

Figure 9
Surface Water Features
Sheet (3 of 4)

Moray Offshore
Renewables Ltd

400000

FRASERBURGH

Fraserburgh Bay

College Burn

Water of Philorth

Cairnbulg

Mormond

Rathen

57°40'0"N

860000

400000

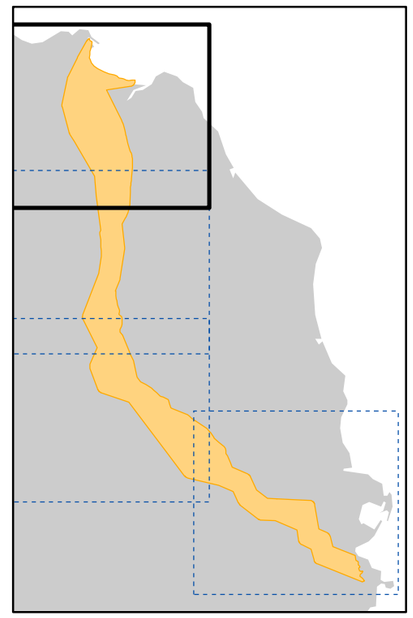
edp renewables

REPSOL

Moray Offshore Renewables Ltd

Key

- Cable Route
- Rivers & Burns
- Areas of Open Water



Context Plan

Horizontal Scale: 1:30,000 A3 Chart

0 500 1,000 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

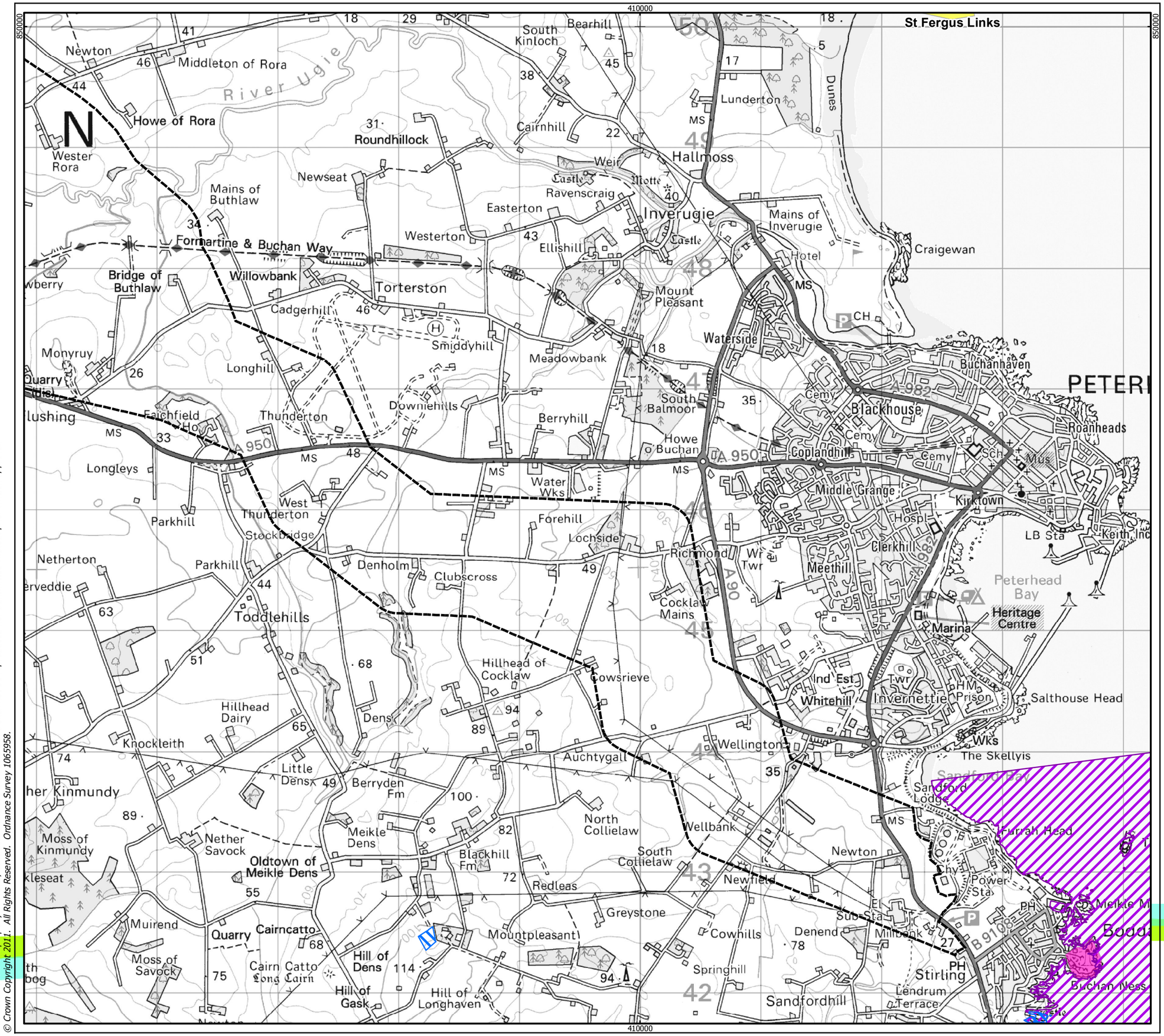
Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-117

Figure 9
Surface Water Features
Sheet (4 of 4)

Moray Offshore Renewables Ltd



edp renewables

REPSOL

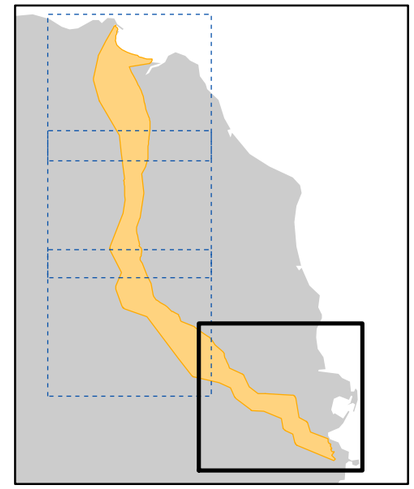
Moray Offshore Renewables Ltd

Key

- Cable Route

SESALL CODE

- Botany
- Entomology
- Geology
- Geomorphology
- Ornithology
- Special Protection Area (SPA)
- Site of Special Scientific Interest (SSSI)
- Country Park
- Local Nature Reserve (LNR)



Context Plan

Horizontal Scale: 1:30,000 A3 Chart N

0 500 1,000 Meters

Geodetic Parameters: OSGB 1936 / British National Grid

Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-118

Figure 10
Ecological & Geological Designated Sites
Sheet (1 of 4)

Moray Offshore Renewables Ltd

400000

850000

Middlethird
Burnside
Kindrought
Blackslack
Longhill
Corsend
Roundhillock
Swineden
Corse Fm
Loch
Balearn
Boghead
Rowanhill
Camphill
Home Farm Kininmonth
Terryfield
Thistley Hillock
St Ferg Moss
Mains of Kindrought
Nether Denend
Hillhead of Denend
North Ugie Water
Auchrynie
Nether Cabra
A952
B9093
Leys
Kirkhill (SSSI)
Backfolds
Newton Cott
Blackhills
Quarry
Denhead
Kirkton
Mains of Kininmonth
Croft of Corriecram
Upper Cabra
Brownhill
Sandhole
East Pitscow
Pitscow
Newton of Hythie
Mill of Gaval
Gaval
Standing Stone
Rora Moss
Cortiecram
Hythie
Middle Hythie
Greenwards
Fetterangus
Braeside of Fetterangus
PH
Milltown of Gaval
Church
Den o'Howie
Toux
Dumbmill
Hardyards
Nether Hythie
Lintmill
Fortry
Cuttyhill
Dumpston Mintlaw
Drinnie's Wood
Observatory
Chapel Park Fm
Mains of Pitfour
Brakeshill
Boghead
Longmuir
Hillhead of Mintlaw
South Dumpston
Ardlaw
Knaps of Auchlee
Mill of Rora
Sand & Gravel Pit
Woodside
Millbank
Wester Rora
Pitfour Lake
Keplahill
Hotel
Mintlaw
Mintlaw Station
Sch
A950
Braehead
Bridgend
Auchlee
Strawberry Bank
Crookedneuk
Auchtydonald
Nether Aden
Old Deer
B9029
Abbey
Baluss
Longside
Massie Brae
Cairngall
Monyruy
Quarry (Site)
Biffie
Mains of Biffie
Cemy
Mill of Aden
Knock
Easter Knock
Greenbrae
Longside Fm
Flushing
North Linshart
Quartalehouse
Stuartfield
Yokieshill
Inverquhomery
Cairn
Drums
South Ugie Water

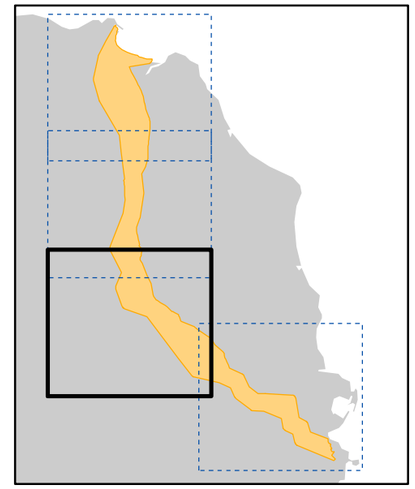
Moray Offshore Renewables Ltd

Key

- Cable Route

SESALL CODE

- Botany
- Entomology
- Geology
- Geomorphology
- Ornithology
- Special Protection Area (SPA)
- Site of Special Scientific Interest (SSSI)
- Country Park
- Local Nature Reserve (LNR)



Context Plan

Horizontal Scale: 1:30,000 — A3 Chart — N

0 500 1,000 Meters

Geodetic Parameters: OSGB 1936 / British National Grid

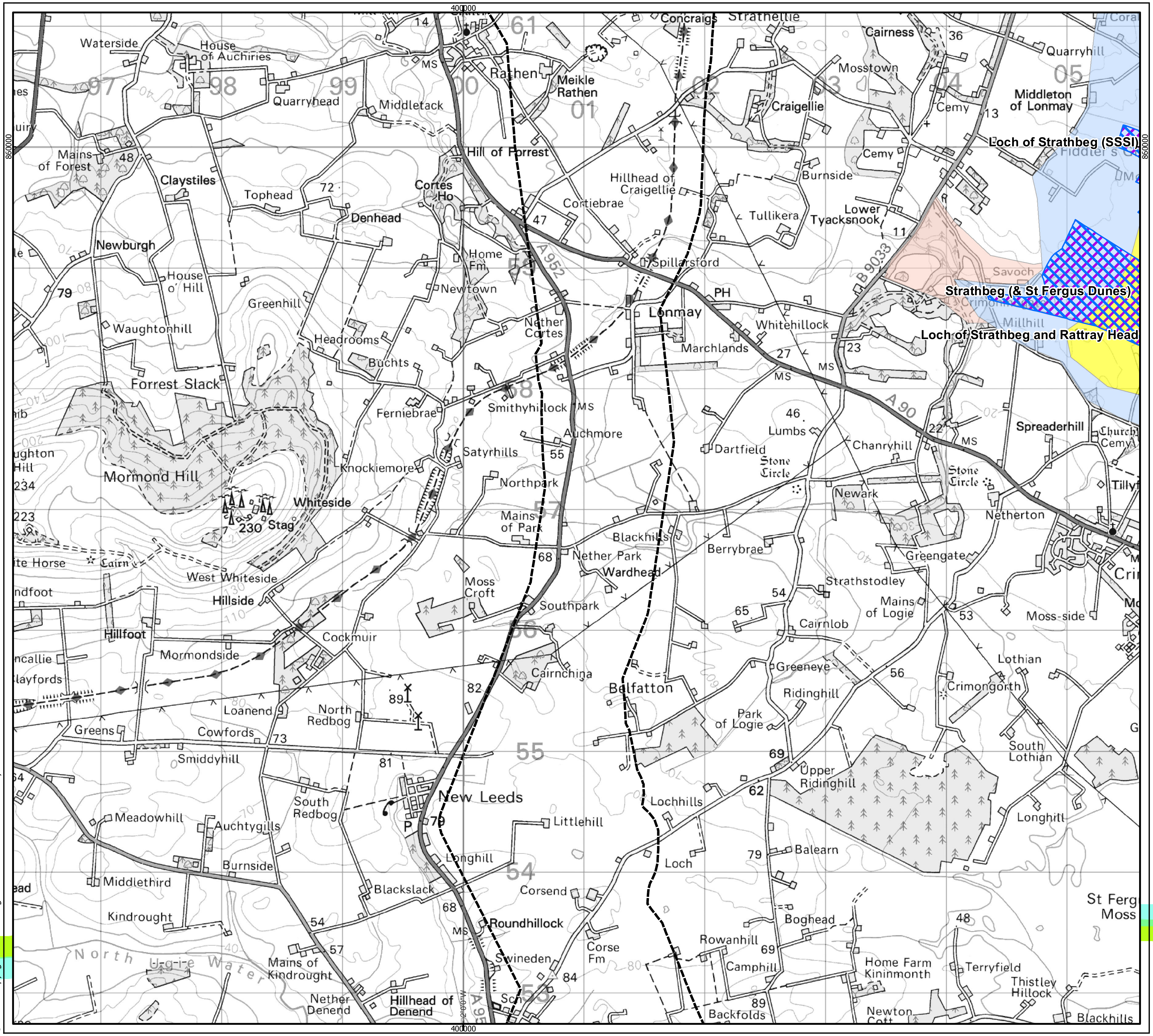
Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-120

Figure 10
Ecological & Geological Designated Sites
Sheet (2 of 4)

Moray Offshore Renewables Ltd



Waterside
House of Auchiries
Quarryhead
Middletack
Rathen
Meikle Rathen
Concraigs
Strathellie
Cairness
Mosstown
Quarryhill
Middleton of Lonmay
Craigellie
Cemy
Loch of Strathbeg (SSSI)
Mains of Forest
Claystiles
Tophead
Cortes Ho
Denhead
Hill of Forrest
Hillhead of Craigellie
Cortiebrae
Burnside
Tullikera
Lower Tyacksnook
Newburgh
House o' Hill
Home Fm
Newtown
Spillarsford
Savoch
Strathbeg (& St Fergus Dunes)
Crimonmogate
Millhill
Loch of Strathbeg and Rattray Head
Greenhill
Waughtonhill
Headrooms
Buchts
Nether Cortes
Lonmay
PH
Whitehillock
Marchlands
Forrest Slack
Ferniebrae
Smithyhillock
Auchmore
Lumbs
Dartfield
Stone Circle
Chanryhill
Spreaderhill
Church Cemy
Mormond Hill
Knockiemore
Satyrhills
Northpark
Whiteside
Stag
Mains of Park
Blackhills
Newark
Netherton
Nether Park
Wardhead
Berrybrae
Greengate
West Whiteside
Hillside
Moss Croft
Southpark
Strathstodley
Mains of Logie
Cairnlob
Moss-side
Hillfoot
Mormondside
Cockmuir
Cairnchina
Belfatton
Greeneye
Lothian
Ridinghill
Crimongorth
North Redbog
Loanend
Greens
Cowfords
Park of Logie
Smiddyhill
Upper Ridinghill
South Lothian
New Leeds
South Redbog
Meadowhill
Auchtygills
Littlehill
Lochhills
Longhill
Balearn
Burnside
Middlethird
Loch
Blackslack
Corsend
Kindrought
Roundhillock
Boghead
St Fergus Moss
Rowanhill
North Ugie Water
Mains of Kindrought
Swineden
Corse Fm
Camphill
Home Farm Kininmonth
Terryfield
Thistley Hillock
Nether Denend
Hillhead of Denend
Backfolds
Newton Cott
Blackhills
A 952
A 90
B9033
400000
860000

![edp renewables] ![REPSOL]

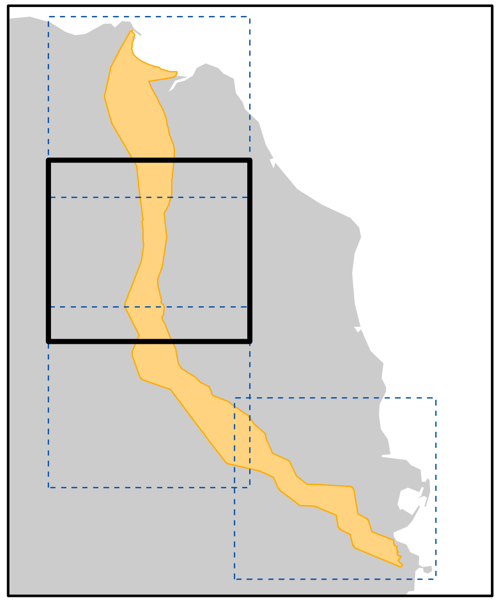
Moray Offshore Renewables Ltd

Key

- Cable Route

SESALL CODE

- Botany
- Entomology
- Geology
- Geomorphology
- Ornithology
- Special Protection Area (SPA)
- Site of Special Scientific Interest (SSSI)
- Country Park
- Local Nature Reserve (LNR)



Context Plan

Horizontal Scale: 1:30,000 A3 Chart

0 500 1,000 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

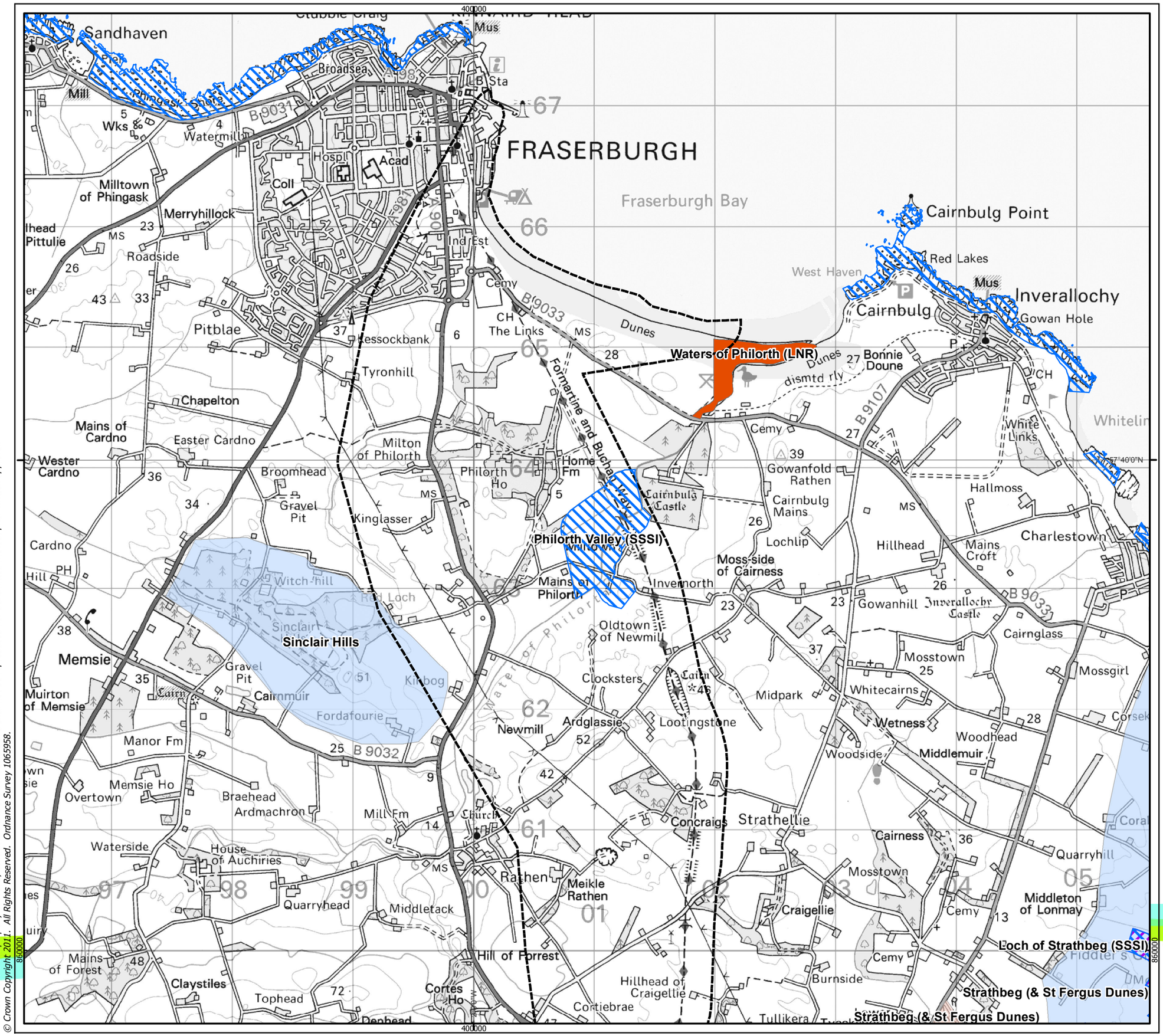
Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-121

Figure 10
Ecological & Geological Designated Sites
Sheet (3 of 4)

Moray Offshore Renewables Ltd



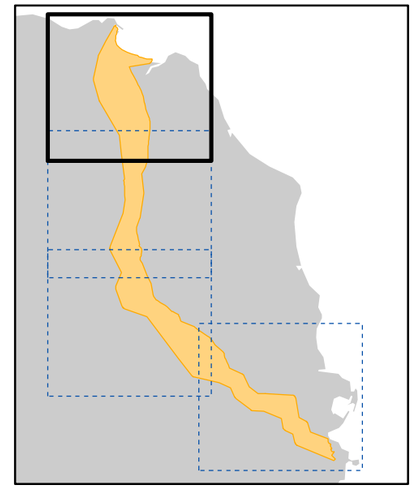
Moray Offshore Renewables Ltd

Key

- Cable Route

SESALL CODE

- Botany
- Entomology
- Geology
- Geomorphology
- Ornithology
- Special Protection Area (SPA)
- Site of Special Scientific Interest (SSSI)
- Country Park
- Local Nature Reserve (LNR)



Context Plan

Horizontal Scale: 1:30,000 A3 Chart

0 500 1,000 Meters

Geodetic Parameters: OSGB 1936 / British National Grid

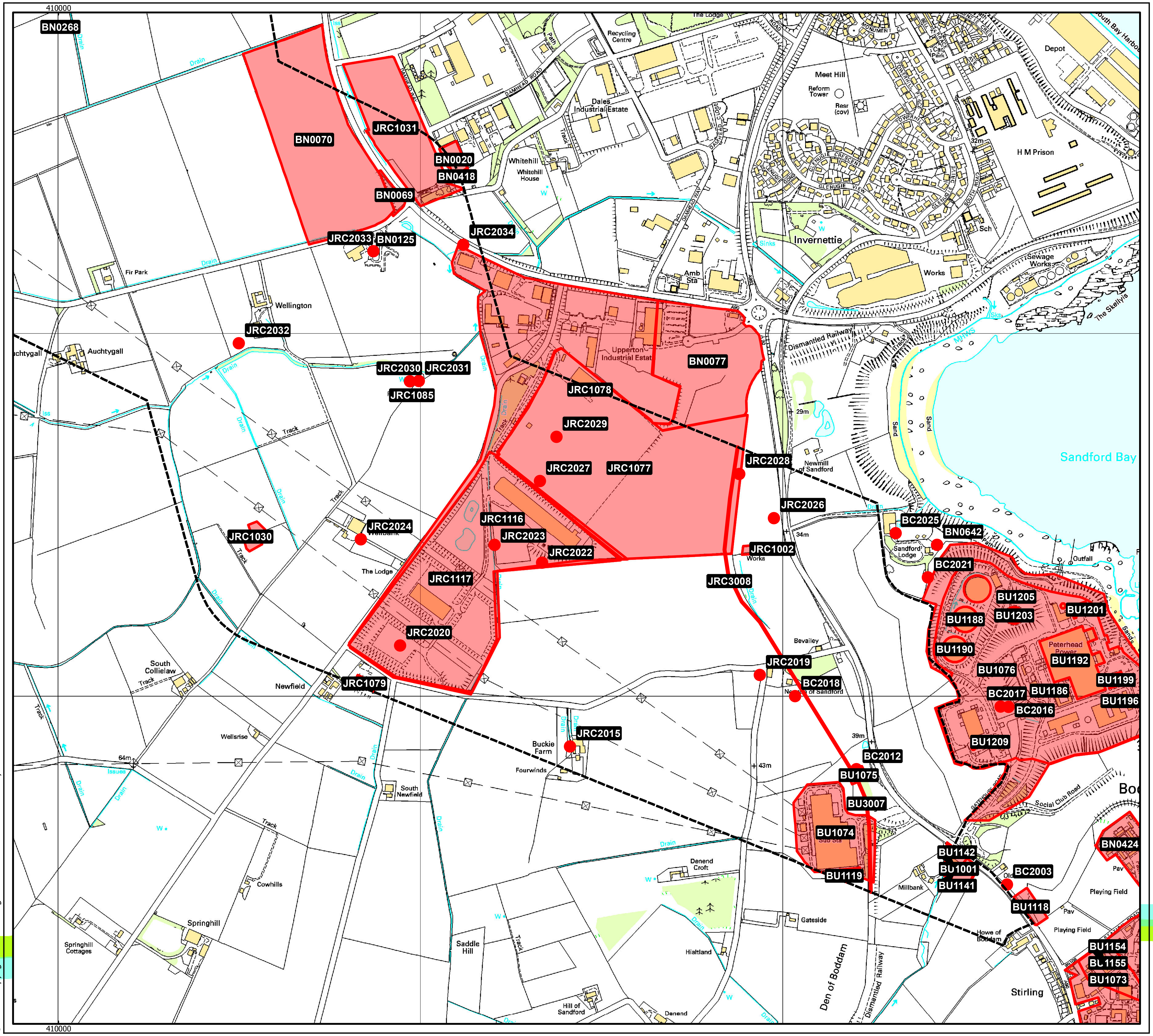
Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-122

Figure 10
Ecological & Geological Designated Sites
Sheet (4 of 4)

Moray Offshore Renewables Ltd

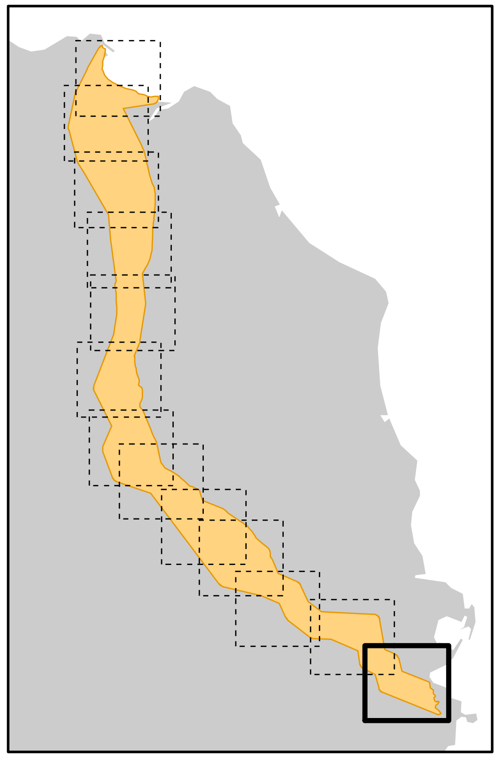


Moray Offshore Renewables Ltd

Key

Cable Route

Historical Sites, with Site ID



Context Plan

Horizontal Scale: 1:10,000 A3 Chart

0 250 500 Meters

Geodetic Parameters: OSGB 1936 / British National Grid

Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-123

Figure 11
Historic Sites
Sheet (1 of 13)

Moray Offshore Renewables Ltd

410000

FRC1181 RC1003 RC1087 RC2058 BN0837 RC2057 RC2056 BN0320 RC1067 RC1086 RC1064 BN0842 JRC1065 FRC1066 JRC2051 FRC2049 JRC2046 BN0835 BN0841 BN0840 JRC2045 FRC2043 FRC2042 BN0811 BN1382 BN1377 BN1378 JRC2048 JRC2047 JRC2039 JRC2040 JRC2038 BN1383 JRC2037 BN0268 BN0644 JRC1031 BN0070 JRC2035 JRC2036 BN0069 BN0125 JRC2033 JRC2032

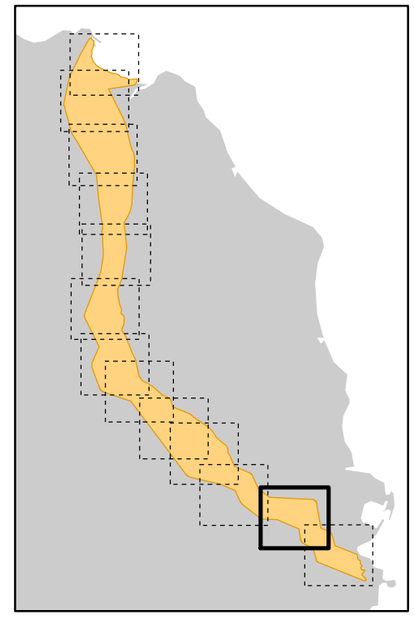
Decca Cottages
Camp Site (disused)
Reservoir
Sluice
Golf Driving Range
Roadside Cottage
Howe o'Buchan
Collie Burn
Hawthorn Cottage
Westhaven
Forehill Treatment Works
Wood End House
The Firs
Industrial Estate
Forehill
Richmond Farm
Lochside
Lochside Cottage
Burnside
Luskintyre
Windy Ridge
Davona
Richmondhill
Craigievar
Denholm
Clubscross Cottage
Clubscross
Gateside of Cocklaw
Cocklaw Cottages
Cocklaw Mains
Meg's Moss
Wester Clerkhill
Ppg Sta
East Den
Collieburn Cottage
Norman View
Cowsrieve
Cowsrieve Bungalow
East Den
East Dens Cottage
Highgrove
Hillhead Of Cocklaw
Cowsrieve Smithy
Lynall
East Dens
Rear (cov)
East Dens Croft
Ridgewood
BM 94.41m
Sherburn House
Cowsrieve Cottage
Cowsrieve Croft
Fir Park
Wellington
Sunnybrae
Westerton of Auchtygall
Auchtygall
Berryden
Pp Ho

Moray Offshore Renewables Ltd

Key

Cable Route

BC2003 Historical Sites, with Site ID



Context Plan

Horizontal Scale: 1:10,000 A3 Chart

0 250 500 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-124

Figure 11
Historic Sites
Sheet (2 of 13)

Moray Offshore Renewables Ltd

edp renewables

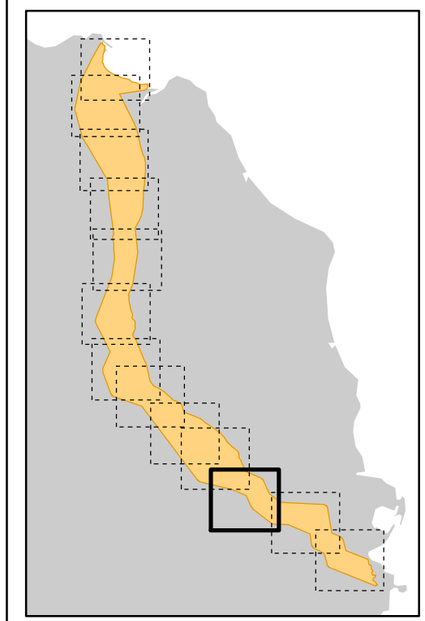
REPSOL

Moray Offshore Renewables Ltd

Key

Cable Route

BC2003 Historical Sites, with Site ID



Context Plan

Horizontal Scale: 1:10,000 A3 Chart

0 250 500 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

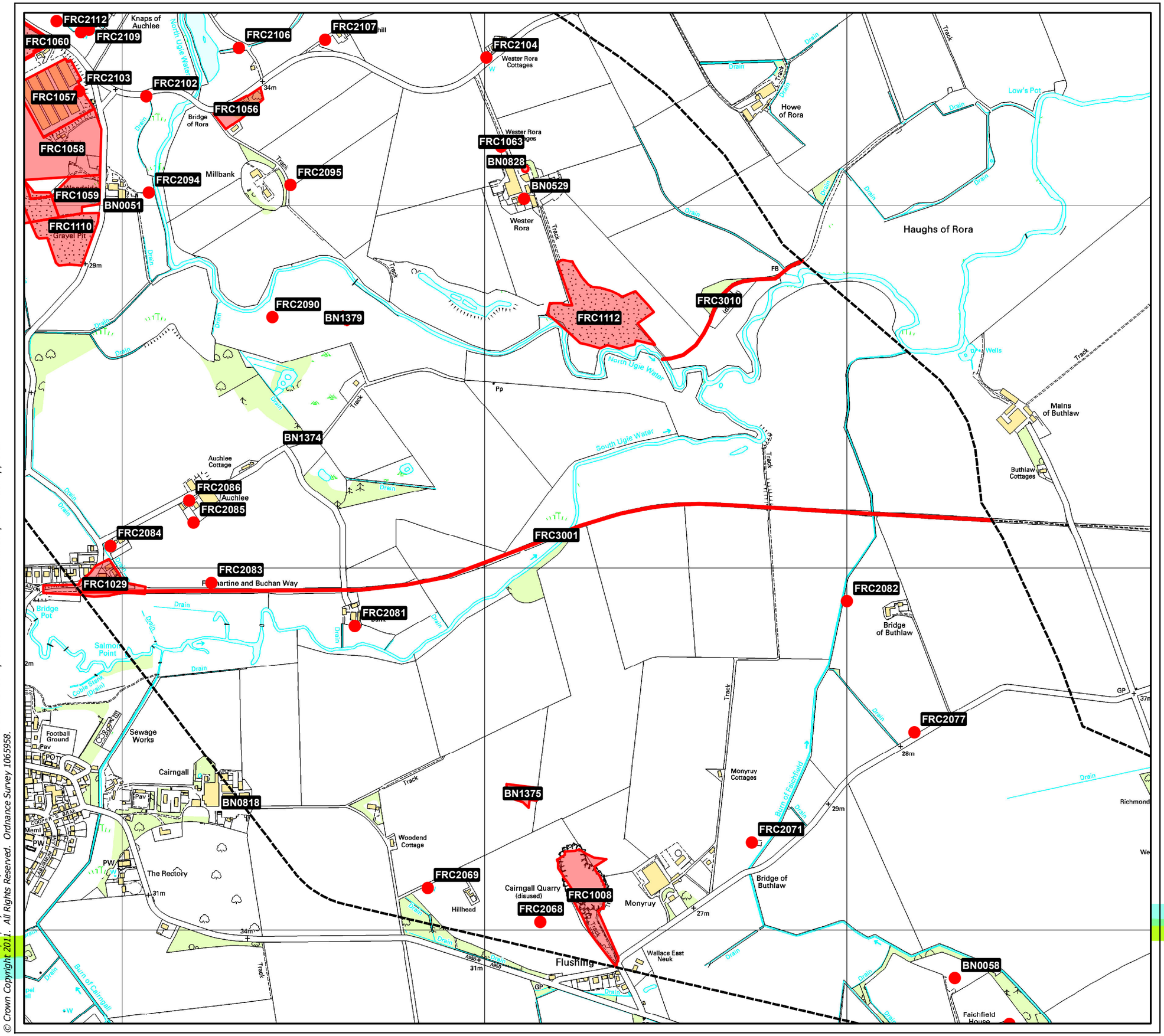
Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-130

Figure 11
Historic Sites
Sheet (3 of 13)

Moray Offshore Renewables Ltd



edp renewables

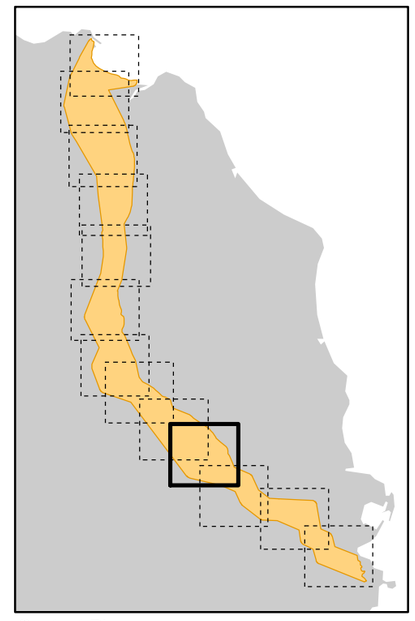
REPSOL

Moray Offshore Renewables Ltd

Key

Cable Route

BC2003 Historical Sites, with Site ID



Context Plan

Horizontal Scale: 1:10,000 A3 Chart

0 250 500 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-131

Figure 11
Historic Sites
Sheet (4 of 13)

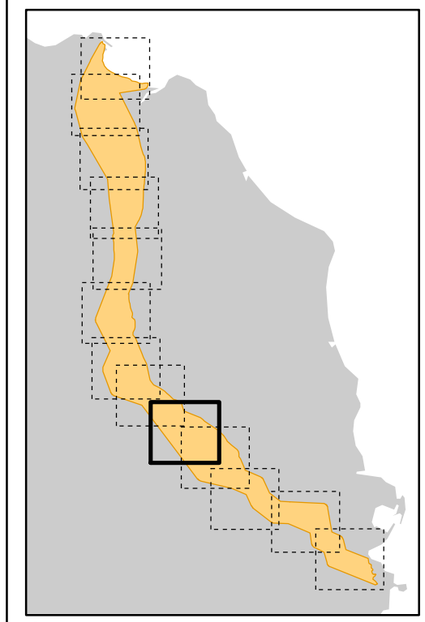
Moray Offshore Renewables Ltd

Moray Offshore Renewables Ltd

Key

Cable Route

BC2003 Historical Sites, with Site ID



Context Plan

Horizontal Scale: 1:10,000 A3 Chart

0 250 500 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

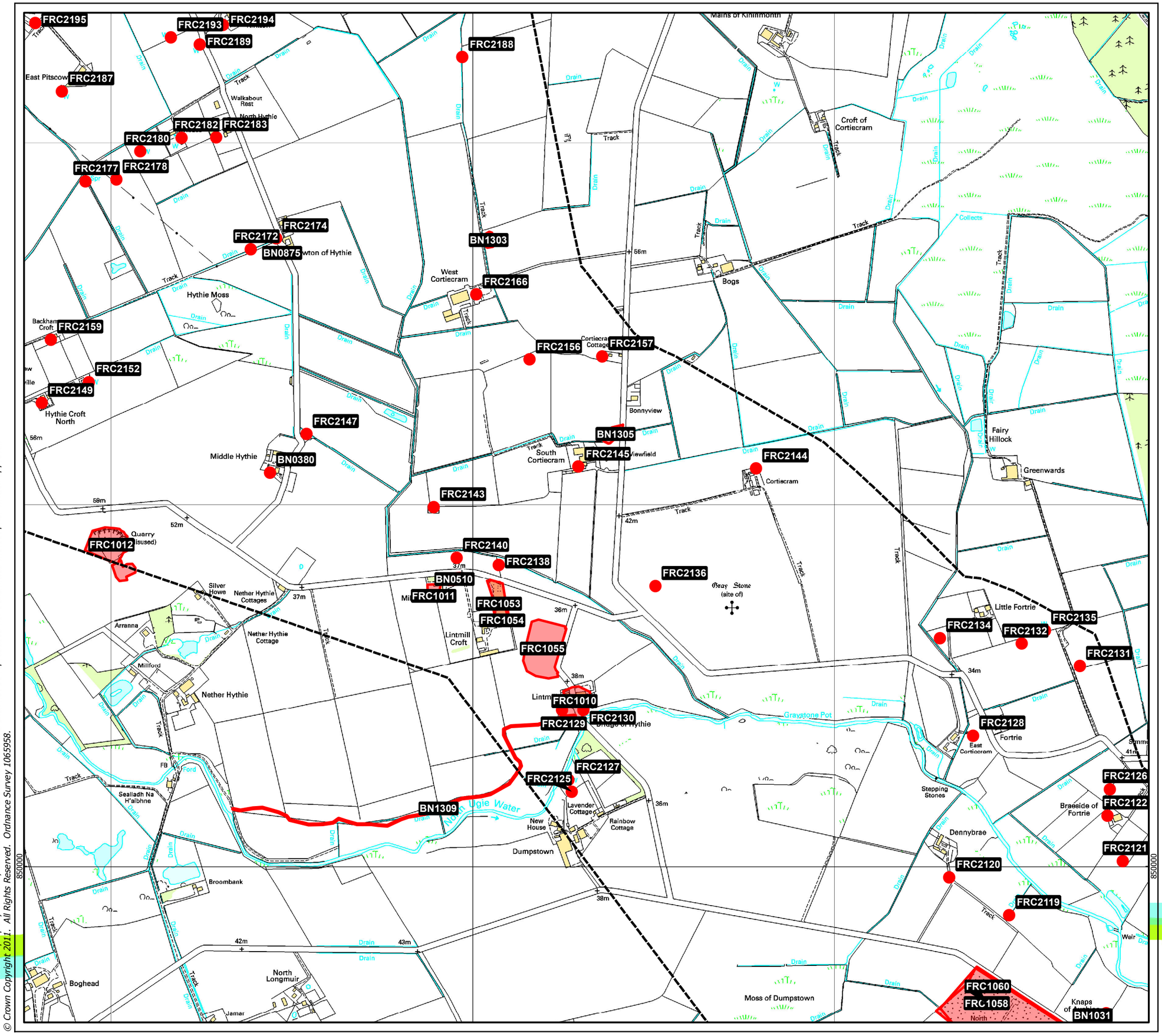
Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-132

Figure 11
Historic Sites
Sheet (5 of 13)

Moray Offshore Renewables Ltd

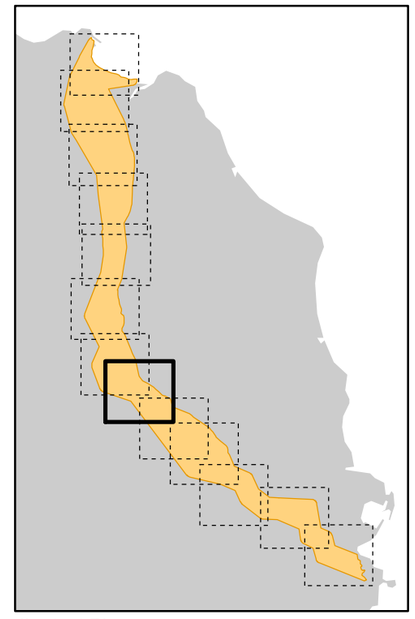


Moray Offshore Renewables Ltd

Key

Cable Route

BC2003 Historical Sites, with Site ID



Context Plan

Horizontal Scale: 1:10,000 A3 Chart

0 250 500 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

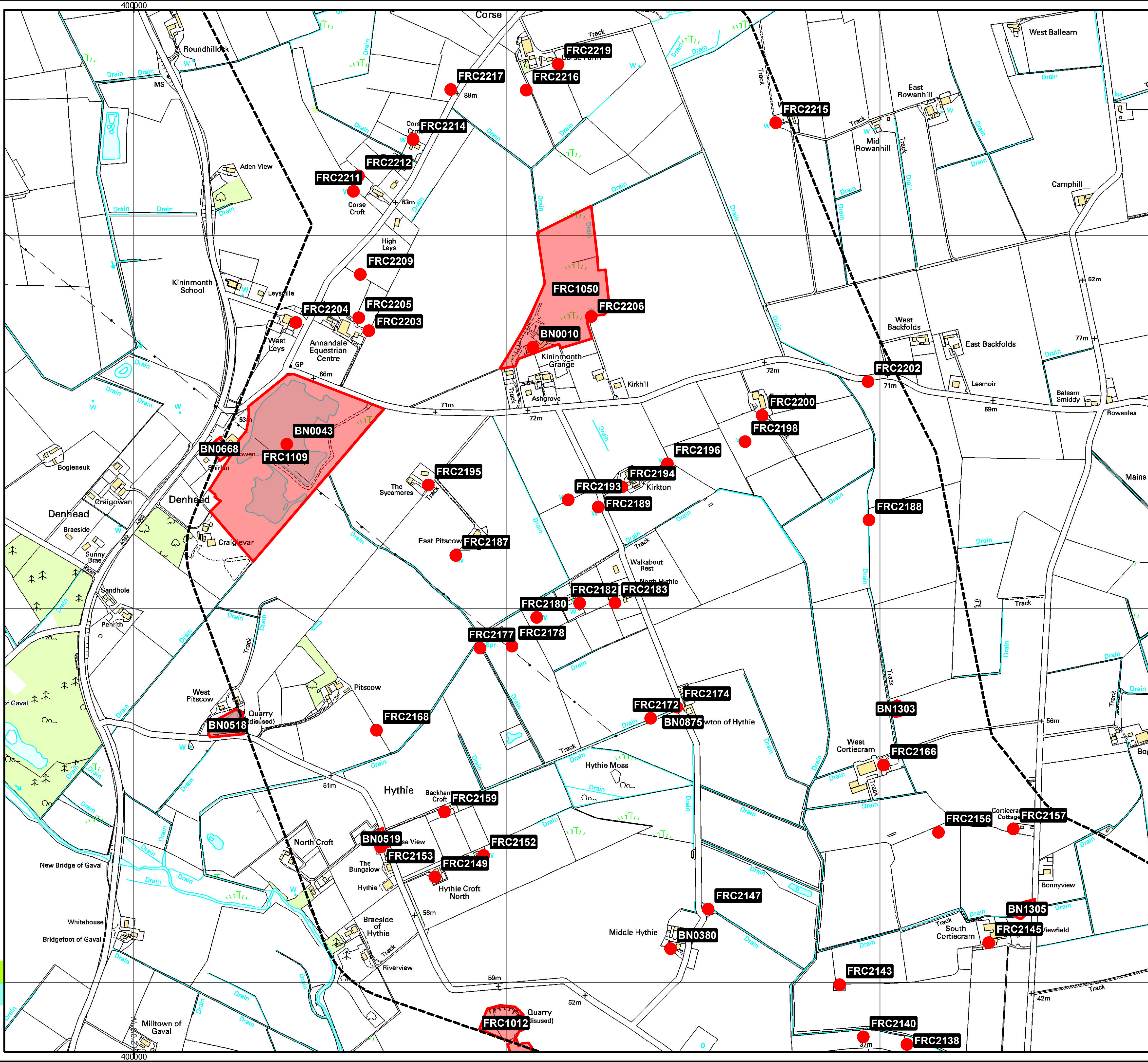
Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-133

Figure 11
Historic Sites
Sheet (6 of 13)

Moray Offshore Renewables Ltd


400000
Corse
Roundhillock
FRC2219
FRC2217
FRC2216
FRC2215
FRC2214
FRC2212
FRC2211
Aden View
Corse Croft
High Leys
FRC2209
Kininmonth School
Leyshille
FRC2204
FRC2205
FRC2203
West Leys
Annandale Equestrian Centre
FRC1050
FRC2206
BN0010
Kininmonth Grange
Ashgrove
Kirkhill
FRC2202
FRC2200
FRC2198
West Backfolds
East Backfolds
Lesmoir
Balearn Smiddy
Rowanlea
West Ballearn
East Rowanhill
Mid Rowanhill
Campbill
BN0043
BN0668
FRC1109
Bogieneuk
Denhead
Craigowan
Braeside
Sunny Brae
Craigievar
FRC2195
The Sycamores
FRC2196
FRC2194
FRC2193
FRC2189
Kirkton
FRC2188
Mains of Ki
East Pitscow
FRC2187
Walkabout Rest
North Hythie
FRC2182
FRC2183
FRC2180
FRC2177
FRC2178
Sandhole
Penrith
West Pitscow
Pitscow
Quarry (disused)
BN0518
FRC2168
FRC2174
FRC2172
BN0875
BN1303
FRC2166
West Cortiecram
Bogs
Hythie Moss
Hythie
Backhall Croft
FRC2159
FRC2156
FRC2157
Cortiecram Cottage
North Croft
BN0519
FRC2153
FRC2152
FRC2149
The Bungalow
Hythie Croft North
New Bridge of Gaval
Whitehouse
Bridgefoot of Gaval
Braeside of Hythie
Riverview
FRC2147
Middle Hythie
BN0380
BN1305
FRC2145
South Cortiecram
Viewfield
Bonnyview
FRC2143
Milltown of Gaval
FRC1012
FRC2140
FRC2138
Drain
Track

edp renewables

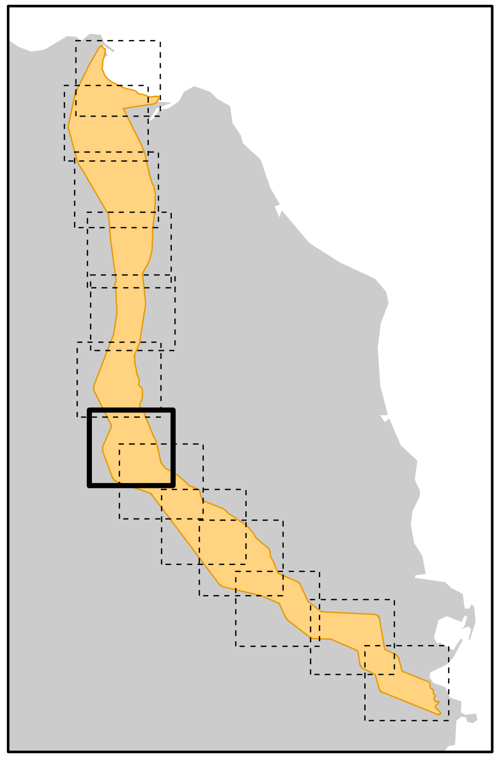
REPSOL

Moray Offshore Renewables Ltd

Key

Cable Route

BC2003 Historical Sites, with Site ID



Context Plan

Horizontal Scale: 1:10,000

A3 Chart

0 250 500 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

Produced: KAG
Reviewed: NB
Approved: PH

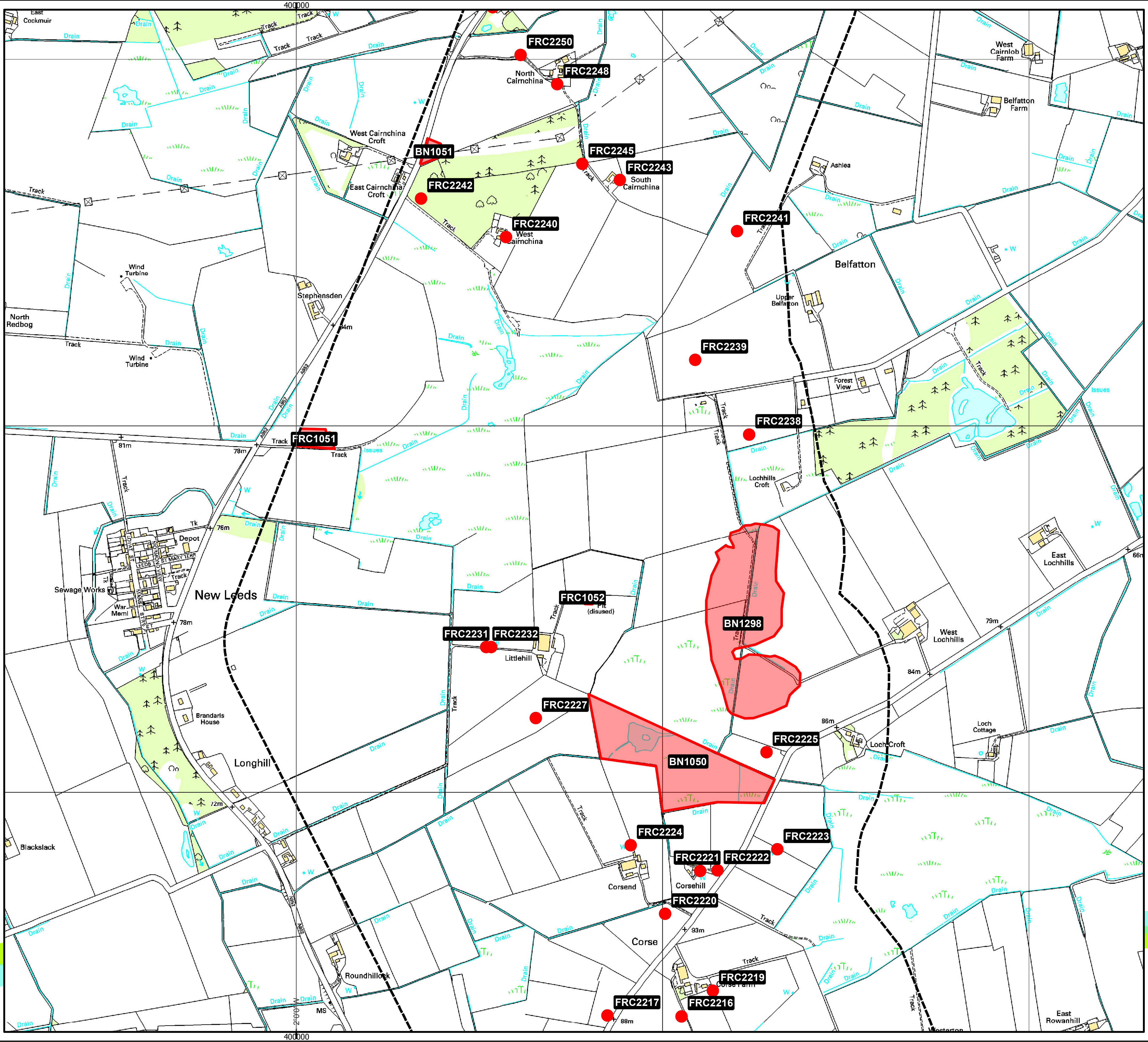
Date: 09/05/2012

Revision: C

REF: 8460001-PPW0200-RPS-MAP-134

Figure 11
Historic Sites
Sheet (7 of 13)

Moray Offshore Renewables Ltd



edp renewables

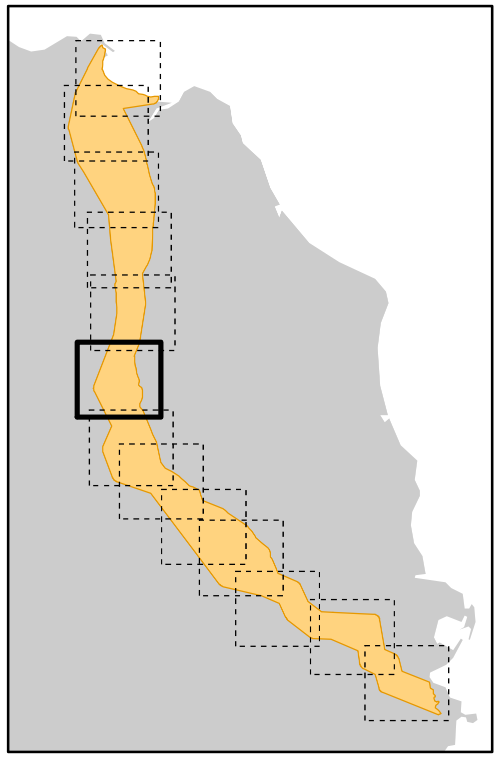
REPSOL

Moray Offshore Renewables Ltd

Key

Cable Route

BC2003 Historical Sites, with Site ID



Context Plan

Horizontal Scale: 1:10,000 — A3 Chart

0 — 250 — 500 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-135

Figure 11
Historic Sites
Sheet (8 of 13)

Moray Offshore Renewables Ltd

400000

FRC3003 FRC1014 FRC2263 FRC2262 FRC2261 FRC2260 FRC2259 BN1048 FRC2257 FRC1013 BN1047 FRC2256 FRC2255 FRC2254 FRC2252 FRC2250 FRC2248

Nether Cortes · Cortes Gardens · Woodside · St Margaret's · Marchlands · Touxlee · Rosebank · Whitehillock · Green Burn · Mizpah · Sunnyside Cottage · Little Mill · Blairmormond Cottages · Kilbirnie Farm · Kilbirnie · Woodside House · Smiddyhill · Eddren · Little Mormond · Auchmore · Satyrhills · Northpark · Caberfeidh · Park Smithy · Mains of Park · Nether Park · The Meadows · Wardhead · Mosspark · Southpark Cottage · North Cairnchina · Bauldycairn · Dartfield · West Mosstown · East Mosston · Blackhills School House · Blackhills Cottage · Blackhills · Berrybrae · Kilbirnie Burn · West Cairnlob Farm · Hillhead · Belfatton Farm · Stone Circle

57m · 67m · 58m · 53m · 66m · 46m · 42m · 49m

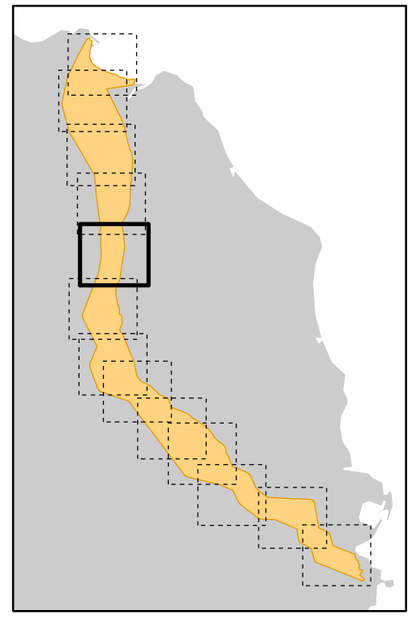
400000

Moray Offshore Renewables Ltd

Key

Cable Route

BC2003 Historical Sites, with Site ID



Context Plan

Horizontal Scale: 1:10,000 A3 Chart

0 250 500 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-136

Figure 11
Historic Sites
Sheet (9 of 13)

Moray Offshore Renewables Ltd

400000

860000

FRC2285
FRC2284
FRC2283
FRC1046
FRC2282
BB0261
FRC2279
FRC2281
FRC2280
FRC2278
FRC2277
FRC2276
FRC2275
FRC2274
FRC2273
FRC2272
FRC2271
FRC2270
FRC2269
BB1038
BB0533
FRC1016
BB0028
FRC2268
FRC3003
FRC2267
FRC2266
FRC2265
FRC1015
FRC2264
FRC1014

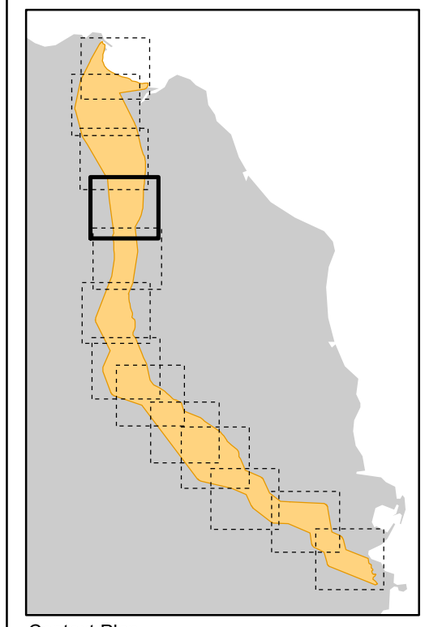
Rathen
Fordalehouse
Redhouse
Stonehouse
Meikle Rathen
Howe of Concraigs
South Concraigs
Milltown of Craigellie
Craiglands
West Lodge
Hill of Forrest House
Hill of Forrest
Hill of Forrest Cottage
The Leas
Hillhead House
Craigellie
Happy Hillocks
Cortes Den
Mains of Cortes
Cortes House
The Pleasance
Lakeside Cottage
Cortes Croft
Cortes Loch
Calridge House
Cortiebrae
Cortiebrae Cottage
Cortie Brae
East Cortes Lodge
Barnyards
Cortes Village
Hillhead Spillarsford
Spillarsford Cottages
Spillarsford
Spillars Bridge
Viewfield
Bridge House
Burnside
Woodside
Ban-car Hotel
Homelea
GP Fernbank
Newtown
The Bungalow
The Boat (Pond)
Cortes Gardens
Nether Cortes
Mizpah
Dismantled Railway
St Margaret's
Marchlands
Touxlee
Rosebank
Whitehillock

Moray Offshore Renewables Ltd

Key

Cable Route

BC2003 Historical Sites, with Site ID



Context Plan

Horizontal Scale: 1:10,000 A3 Chart

0 250 500 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

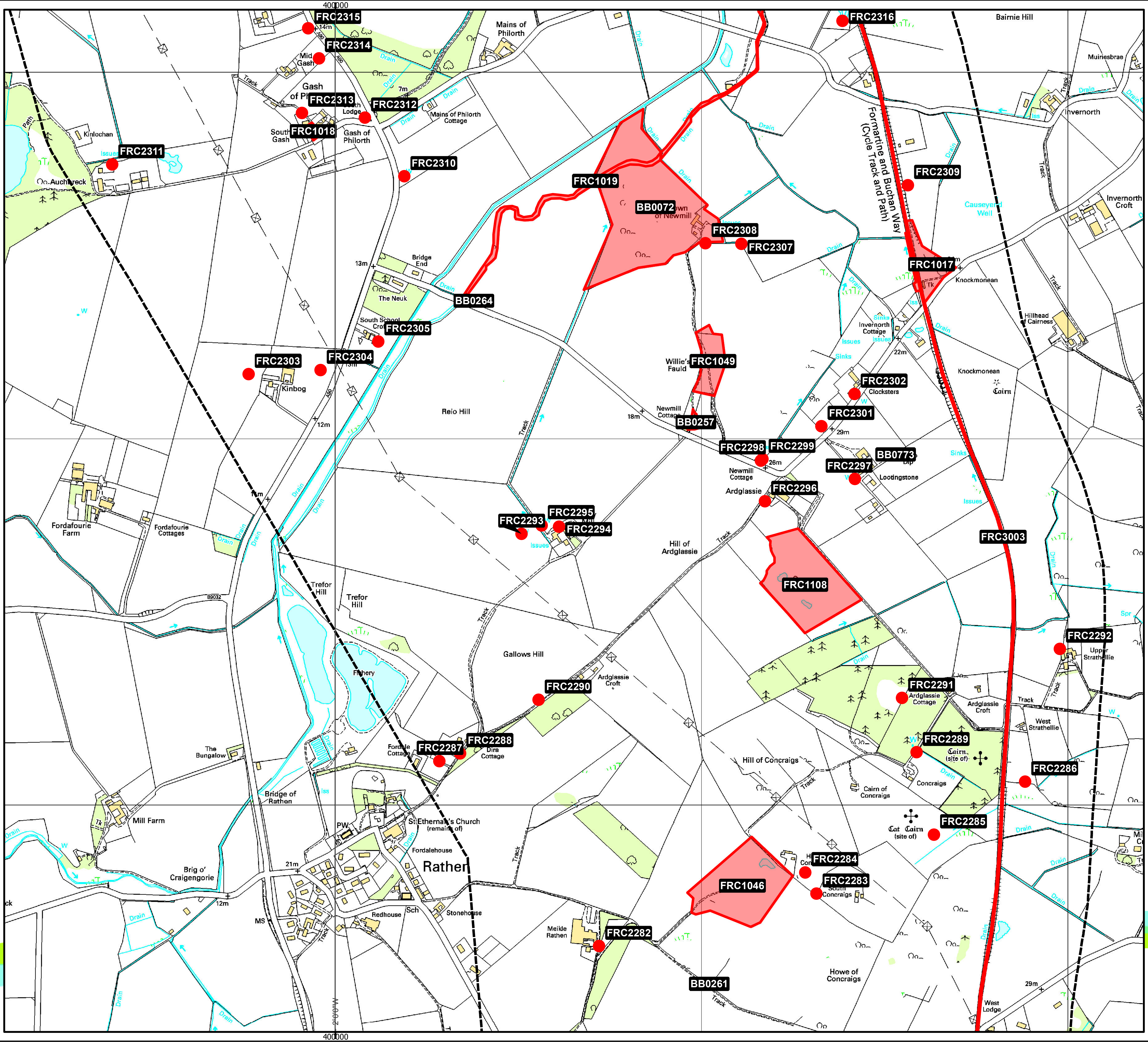
Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-137

Figure 11
Historic Sites
Sheet (10 of 13)

Moray Offshore Renewables Ltd

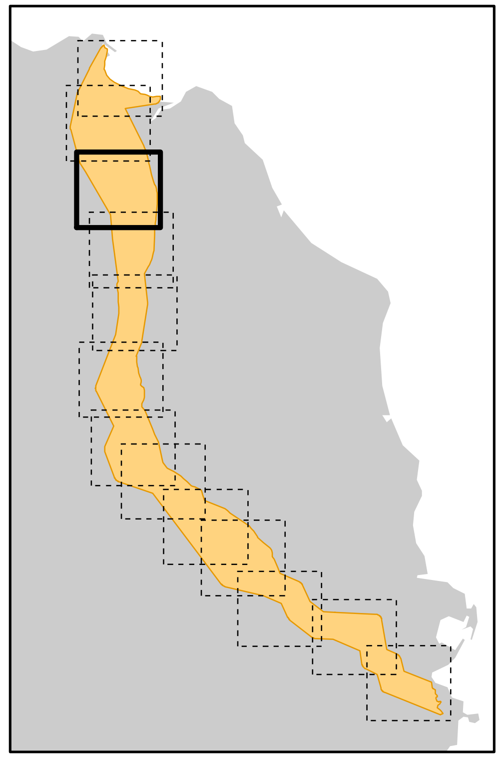

400000
FRC2315
FRC2314
FRC2313
FRC2312
FRC1018
FRC2311
FRC2310
FRC1019
BB0072
FRC2308
FRC2307
FRC2316
FRC2309
FRC1017
BB0264
FRC2305
FRC2303
FRC2304
FRC1049
BB0257
FRC2302
FRC2301
FRC2298
FRC2299
BB0773
FRC2297
FRC2296
FRC2293
FRC2295
FRC2294
FRC3003
FRC1108
FRC2292
FRC2290
FRC2291
FRC2287
FRC2288
FRC2289
FRC2286
FRC2285
FRC2284
FRC2283
FRC1046
FRC2282
BB0261
Mains of Philorth
Mid Gash
Gash of Philorth
Mains of Philorth Cottage
South Gash
Gash of Philorth
Kinlochan
Auchtireck
Bairnie Hill
Muirnesbrae
Invernorth
Formartine and Buchan Way (Cycle Track and Path)
Causeyend Well
Invernorth Croft
Knockmonean
Bridge End
The Neuk
South School Croft
Hillhead of Cairness
Invernorth Cottage
Knockmonean
Cairn
Willie's Fauld
Newmill Cottage
Clocksters
Kinbog
Reio Hill
Newmill Cottage
Ardglassie
Loodingstone
Fordafourie Farm
Fordafourie Cottages
Hill of Ardglassie
Trefor Hill
Trefor Hill
Gallows Hill
Fishery
Ardglassie Croft
Upper Strathellie
Ardglassie Cottage
Ardglassie Croft
West Strathellie
The Bungalow
Fordale Cottage
Dira Cottage
Cairn (site of)
Hill of Concraigs
Cairn of Concraigs
Concraigs
Bridge of Rathen
Mill Farm
St Ethernan's Church (remains of)
Fordalehouse
Rathen
Cat Cairn (site of)
Brig o' Craigengorie
Redhouse
Stonehouse
Meikle Rathen
South Concraigs
Howe of Concraigs
West Lodge
400000

Moray Offshore Renewables Ltd

Key

Cable Route

BC2003 Historical Sites, with Site ID



Context Plan

Horizontal Scale: 1:10,000

A3 Chart

0 250 500 Meters

Geodetic Parameters: OSGB 1936 / British National Grid

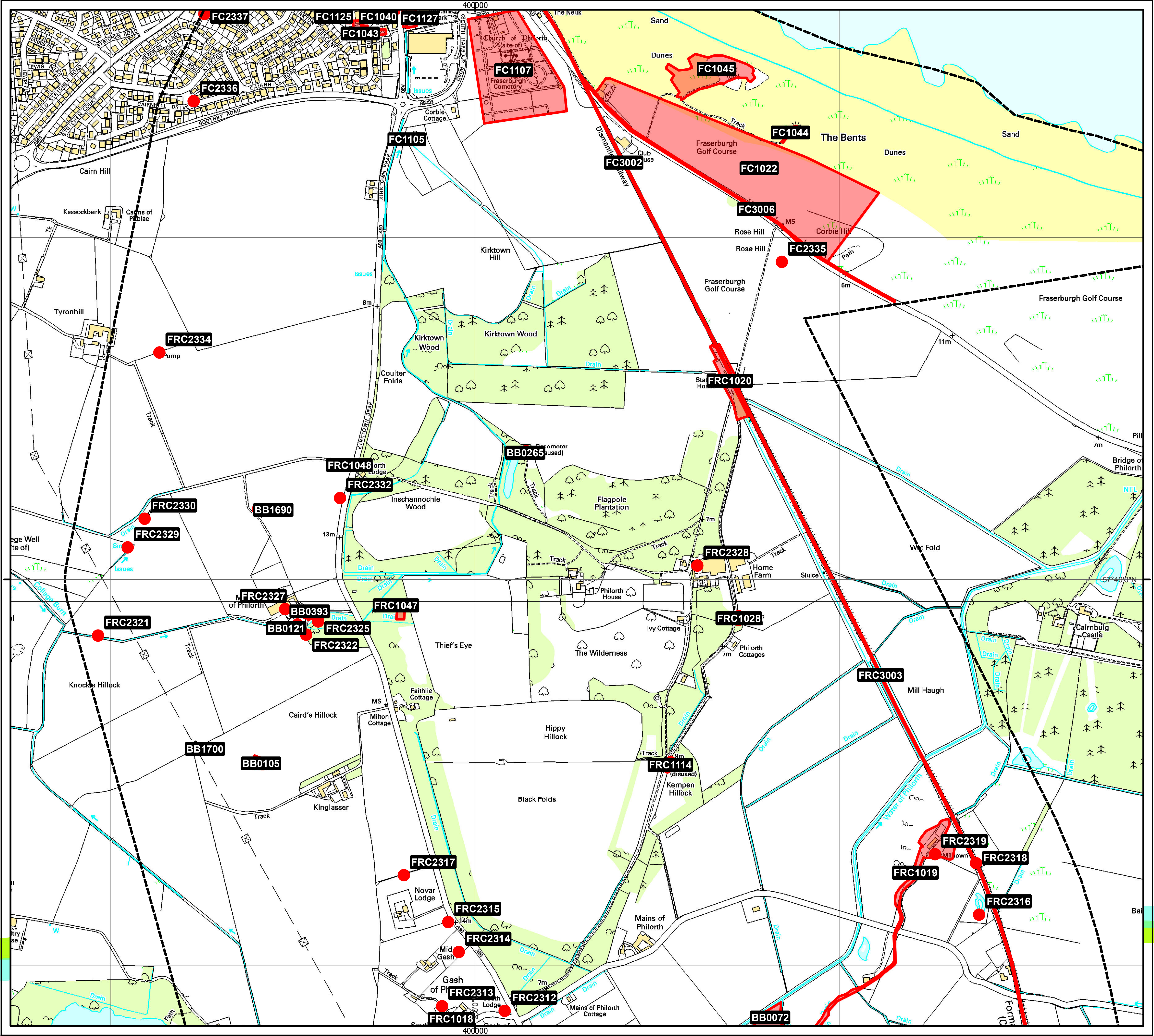
Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-138

Figure 11
Historic Sites
Sheet (11 of 13)

Moray Offshore Renewables Ltd



renewables

REPSOL

Moray Offshore Renewables Ltd

Key

Cable Route

BC2003 Historical Sites, with Site ID

Context Plan

Horizontal Scale: 1:10,000 A3 Chart

0 250 500 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 Revision: C

REF: 8460001-PPW0200-RPS-MAP-139

Figure 11
Historic Sites
Sheet (12 of 13)

Moray Offshore Renewables Ltd

400000

FC1025 FC1024 FC1152 FC1153 FC1023 FC1151 FC1131 FC1145 FC1147 FC1093 FC1136 FC1021 FC1094 FC1146 FC2355 FC1133 FC1095 FC1135 FC1098 FC2352 FC1026 FC2351 FC3004 FC2350 FC2349 FC1035 FC1037 FC2344 FC1121 FC1122 FC1027 FC1167 BB0251 FC1042 FC1036 FC1166 FC1039 FC1171 FC1124 FC1040 FC2337 FC1125 FC1127 FC1043 FC1107 FC2336 FC1105 FC1045 FC1044 FC3002 FC1022 FC3006 FC2335 FRC3003 FRC1020

Balaclava Harbour
Balaclava Pier
Inch Rocks
North Harbour
Balaclava Breakwater
Outer Harbour
Burnett Pier
South Breakwater
Walker Quay
Fraserburgh Academy
Leisure Centre
Playing Fields
Cricket Ground
Miniature Railway
The Neuk
Sand
Dunes
Church of Phurth (site of)
Fraserburgh Cemetery
Corbie Cottage
Dismantled Railway
Fraserburgh Golf Course
Club House
The Bents
Kirktown Hill
Kirktown Wood
Coulter Folds
Rose Hill
Corbie Hill
Fraserburgh Bay

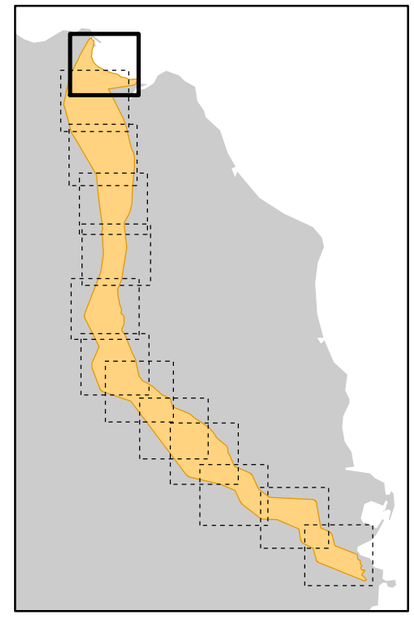
400000

edp renewables
REPSOL
Moray Offshore Renewables Ltd

Key

Cable Route

BC2003 Historical Sites, with Site ID



Context Plan

Horizontal Scale: 1:10,000 A3 Chart

0 250 500 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

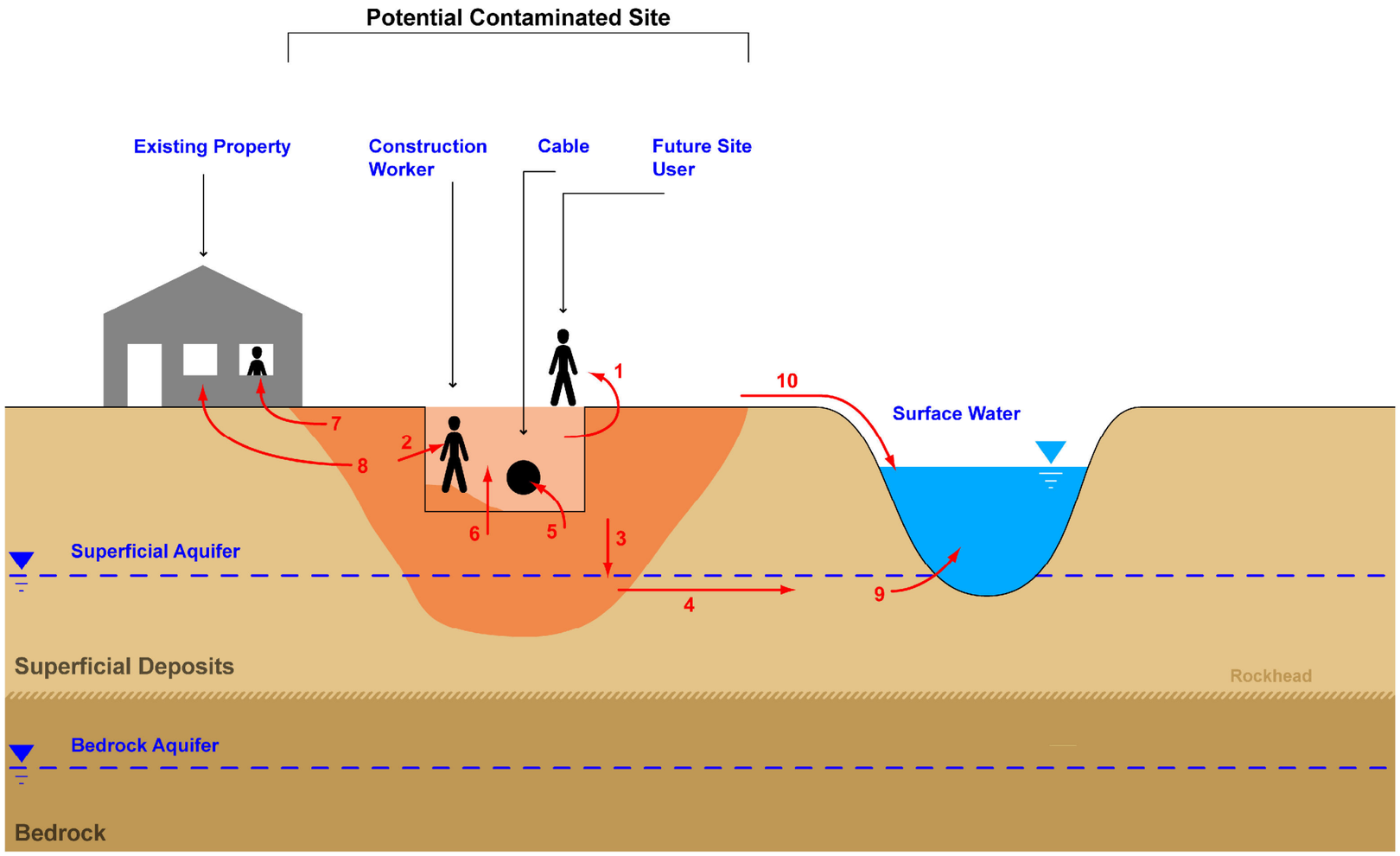
Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-140

Figure 11
Historic Sites
Sheet (13 of 13)

Moray Offshore Renewables Ltd



Linkages Applicable To All Sites

Linkage 1 - Direct exposure (dermal contact, ingestion or inhalation) of contaminated soils to future site users;

Linkage 2 - Direct exposure (dermal contact, ingestion or inhalation) of contaminated soils to construction workers;

Linkage 3 - Migration of soil leachate/liquids through the unsaturated zone to underlying groundwater;

Linkage 4 - Migration of mobile contamination/solutes through the saturated zone to groundwater off site;

Linkage 5 - Direct contact with cable materials; and

Linkage 6 - Build up of soil gases/vapours in confined spaces (e.g. excavations) and inhalation/asphyxiation of construction workers.

Linkages Applicable To Sites Depending On Location

Linkage 7 - Inhalation of indoor vapours by future users of existing properties on or adjacent to the sites;

Linkage 8 - Migration of soil gases to indoor air and subsequent asphyxiation or explosion, on or in the vicinity of the sites;

Linkage 9 - Migration of mobile contamination/solutes through the saturated zone to surface water; and

Linkage 10 - Direct run off of contaminated materials to surface water receptors on or adjacent to the sites.

edp renewables

REPSOL

Moray Offshore Renewables Ltd

Key

Source (Contaminant Mass)

1 Linkage

Blue Text Receptor

Horizontal Scale: Not To Scale A3 Chart

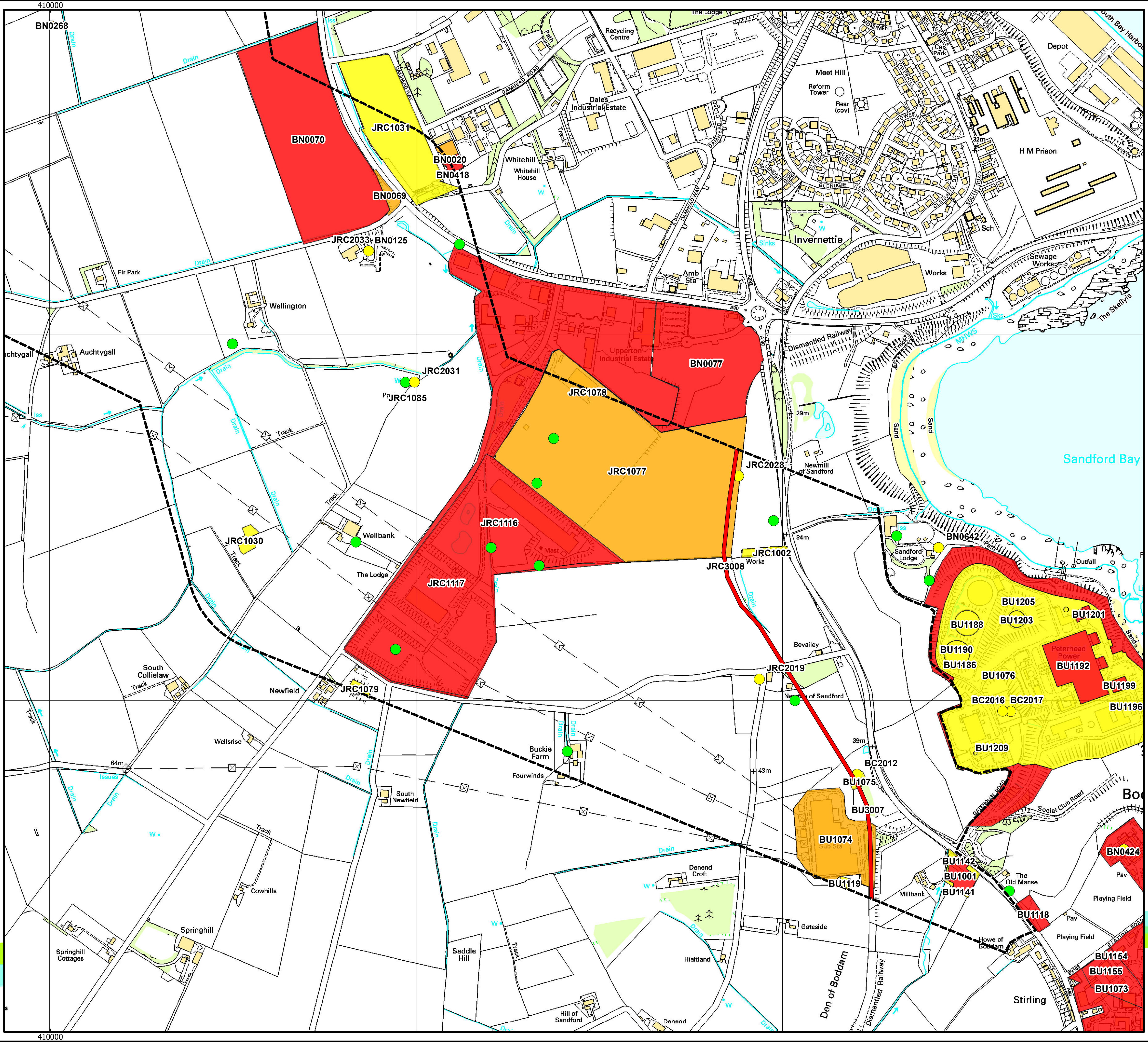
Produced: KAG
Reviewed: Reviewed
Approved: PH

Date: 18/01/2012 | Revision: B

REF: 8460001-PPW0200-RPS-MAP-141

Figure 12
Conceptual Site Model

Moray Offshore Renewables Ltd



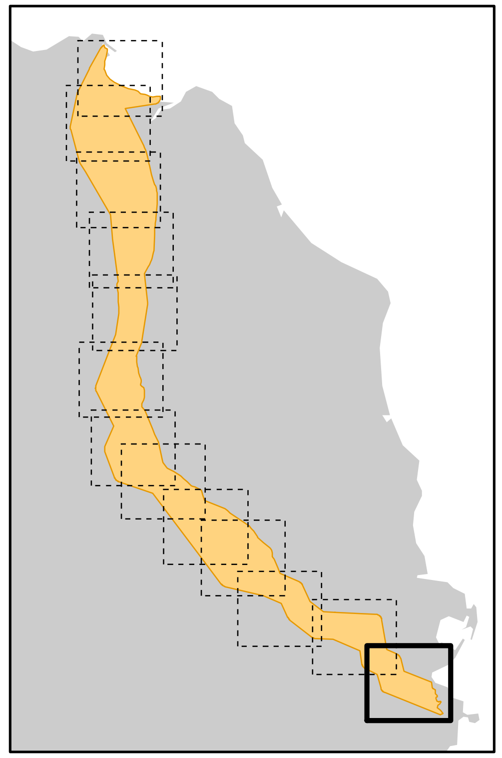
Moray Offshore Renewables Ltd

Key

Cable Route

Risk Ranking

- High (showing Site ID)
- Moderate (showing Site ID)
- Low - Moderate (showing Site ID)
- Low



Context Plan

Horizontal Scale: 1:10,000 A3 Chart

0 250 500 Meters

Geodetic Parameters: OSGB 1936 / British National Grid

Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 Revision: C

REF: 8460001-PPW0200-RPS-MAP-142

Figure 13
Potentially Contaminated Land
Sheet (1 of 13)

Moray Offshore Renewables Ltd

410000

FRC1181 RC1003 RC1087 BN0837 BN0320 RC1067 RC1086 RC1064 JRC1065 FRC1066 BN0842 BN0835 BN0841 BN0840 BN1382 BN0811 BN1377 BN1378 JRC2048 BN1383 BN0644 BN0268 BN0070 BN0069 JRC1031 JRC2033 BN0125

Decca Cottages · Kilwhang · Camp Site (disused) · Berryhill Villa · Reservoir · Sluice · Camp Site (disused) · Golf Driving Range · Roadside Cottage · Howe o'Buchan · Collie Burn · Hawthorn Cottage · Westhaven · Forehill Treatment Works · Wood End House · The Firs · Camp Site (disused) · Industrial Estate · Forehill House · Howemuir · Richmond Farm · Lochside · Burnside · Burnside View · Luskintyre · Windy Ridge · Davona · Lochside Cottage · Gateside of Cocklaw · Richmondhill · Denholm · Craigievar · Clubscross Cottage · Clubscross · Cocklaw Cottages · Cocklaw Mains · Meg's Moss · Wester Clerkhill · Ppg Sta · East Den · Collieburn Cottage · Norman View · Cowsrieve · Cowsrieve Bungalow · East Dens Cottage · Highgrove · Hillhead Of Cocklaw · Cowsrieve Smithy · Lynall · East Dens · Res (cov) · Auchtygall Croft · East Dens Croft · BM 94.41m · Sherburn House · Ridgewood · Cowsrieve Cottage · Cowsrieve Croft · Fir Park · Wellington · Sunnybrae · Westerton of Auchtygall · Auchtygall · Berryden

410000

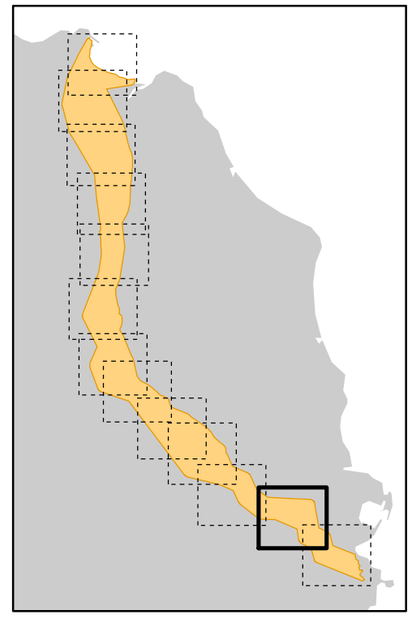
Moray Offshore Renewables Ltd

Key

Cable Route

Risk Ranking

- High (showing Site ID)
- Moderate (showing Site ID)
- Low - Moderate (showing Site ID)
- Low



Context Plan

Horizontal Scale: 1:10,000 A3 Chart N

0 250 500 Meters

Geodetic Parameters: OSGB 1936 / British National Grid

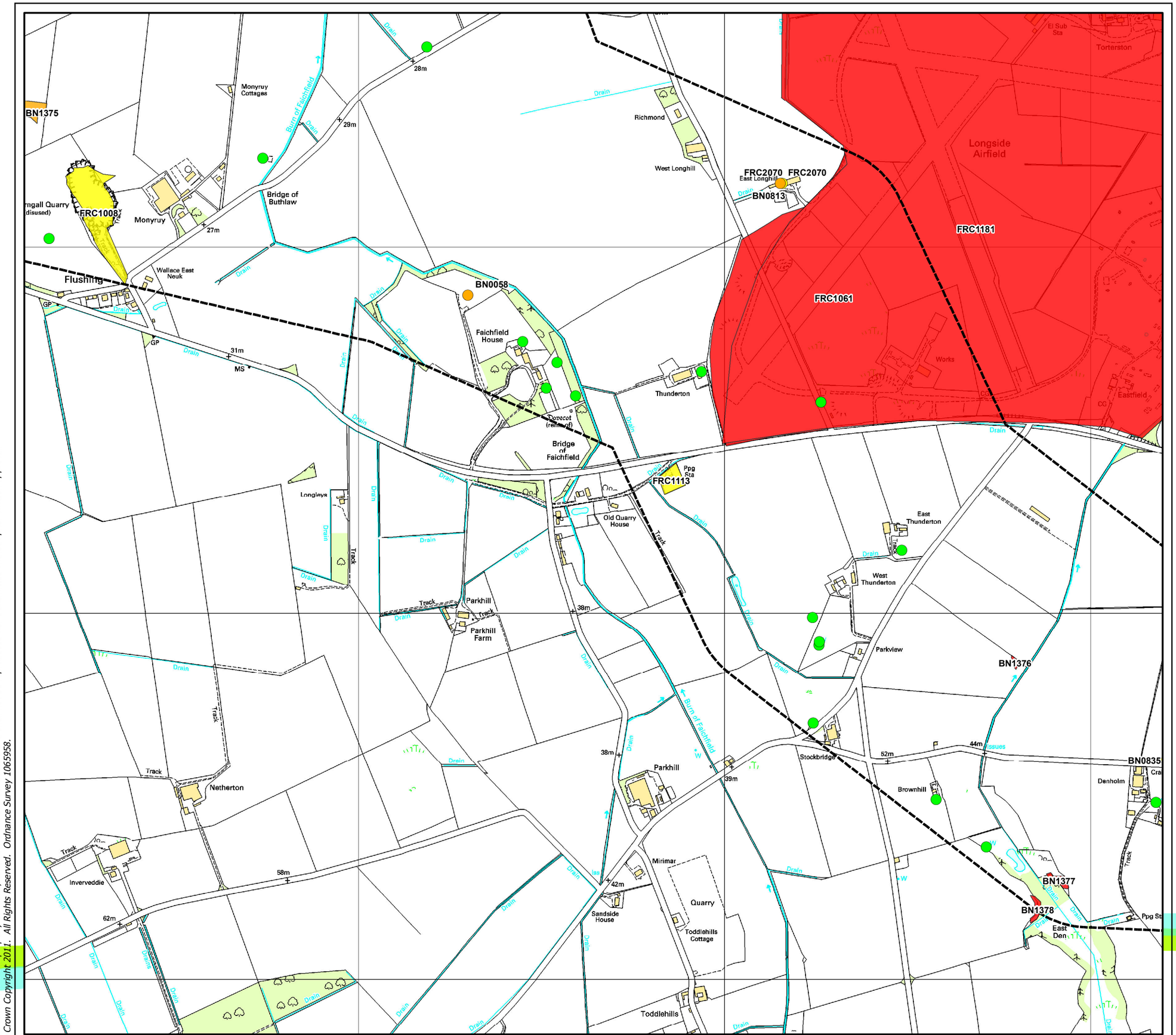
Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-143

Figure 13
Potentially Contaminated Land
Sheet (2 of 13)

Moray Offshore Renewables Ltd



edp renewables

REPSOL

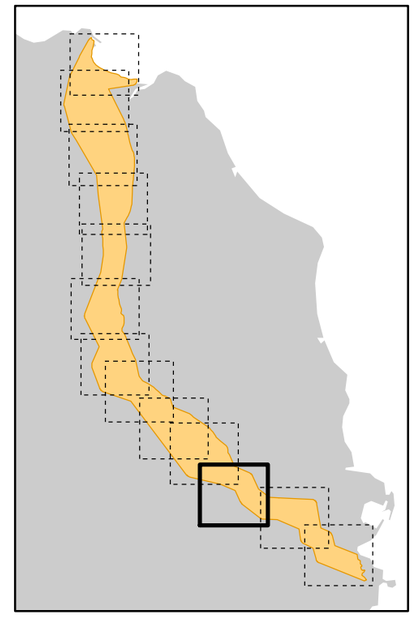
Moray Offshore Renewables Ltd

Key

Cable Route

Risk Ranking

- High (showing Site ID)
- Moderate (showing Site ID)
- Low - Moderate (showing Site ID)
- Low



Context Plan

Horizontal Scale: 1:10,000 A3 Chart

0 250 500 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-149

Figure 13
Potentially Contaminated Land
Sheet (3 of 13)

Moray Offshore Renewables Ltd

edp renewables

REPSOL

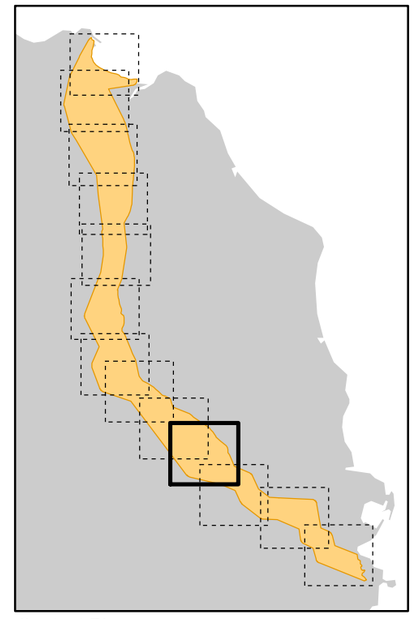
Moray Offshore Renewables Ltd

Key

Cable Route

Risk Ranking

- High (showing Site ID)
- Moderate (showing Site ID)
- Low - Moderate (showing Site ID)
- Low



Context Plan

Horizontal Scale: 1:10,000 A3 Chart

0 250 500 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

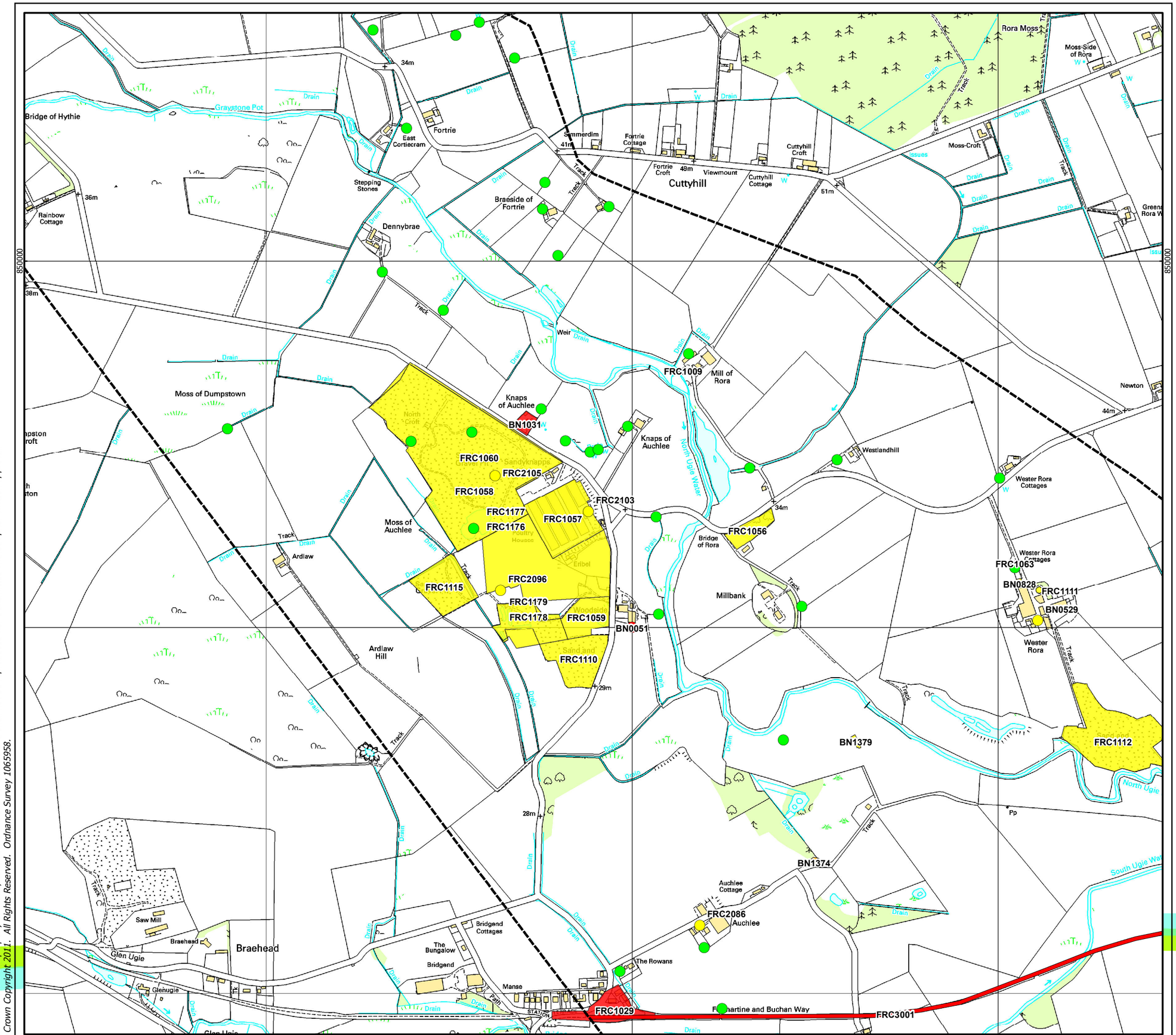
Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-150

Figure 13
Potentially Contaminated Land
Sheet (4 of 13)

Moray Offshore
Renewables Ltd



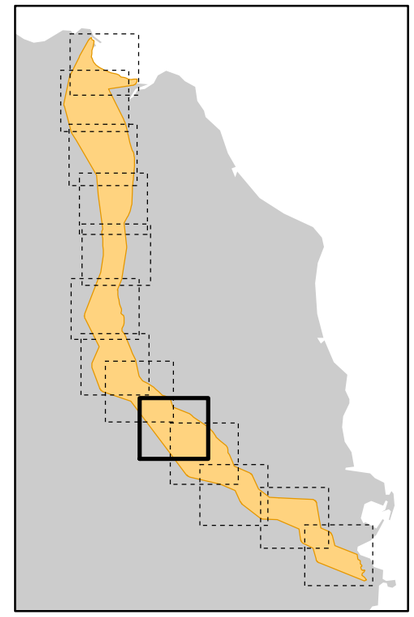
Moray Offshore Renewables Ltd

Key

- Cable Route

Risk Ranking

- High (showing Site ID)
- Moderate (showing Site ID)
- Low - Moderate (showing Site ID)
- Low



Context Plan

Horizontal Scale: 1:10,000 A3 Chart

0 250 500 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

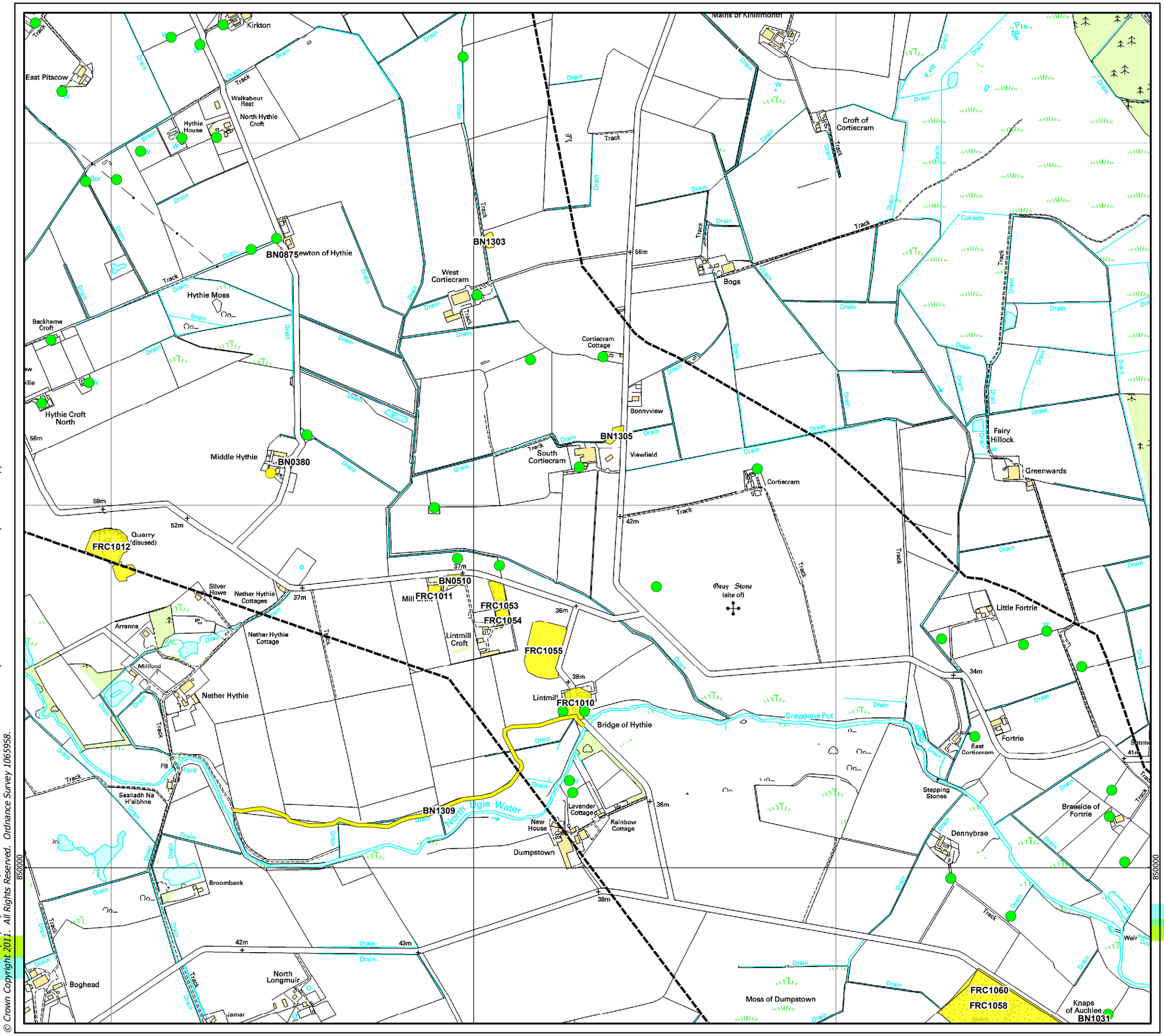
Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-151

Figure 13
Potentially Contaminated Land
Sheet (5 of 13)

Moray Offshore Renewables Ltd



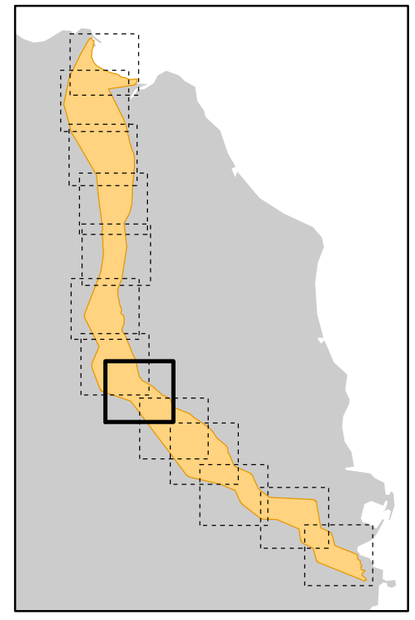
Moray Offshore Renewables Ltd

Key

Cable Route

Risk Ranking

- High (showing Site ID)
- Moderate (showing Site ID)
- Low - Moderate (showing Site ID)
- Low



Context Plan

Horizontal Scale: 1:10,000 A3 Chart

0 250 500 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

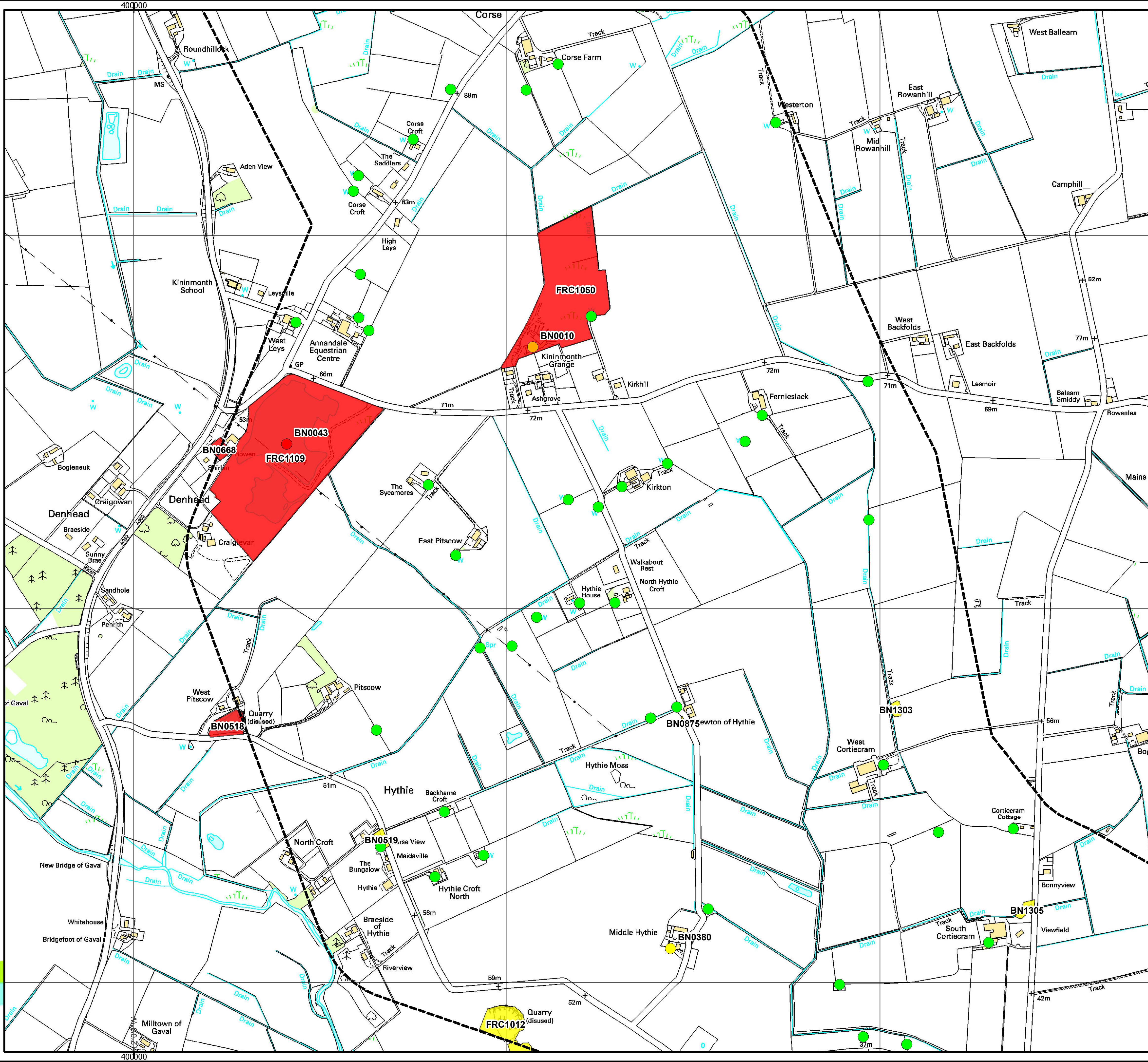
Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-152

Figure 13
Potentially Contaminated Land
Sheet (6 of 13)

Moray Offshore Renewables Ltd



![edp renewables] ![REPSOL]

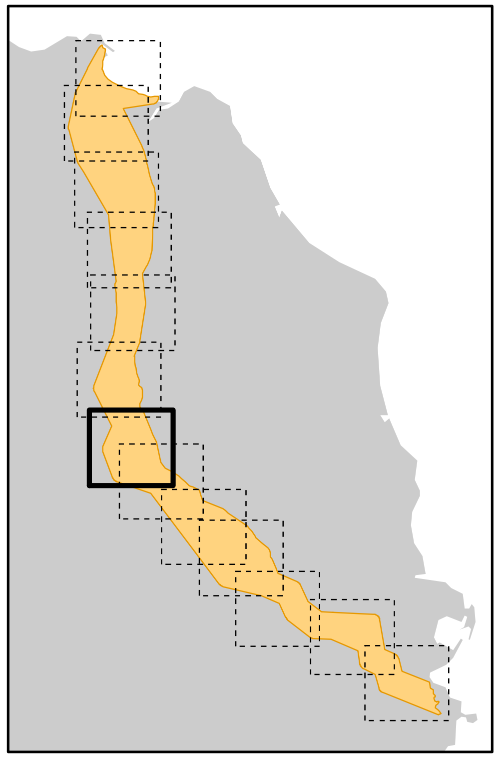
Moray Offshore Renewables Ltd

Key

Cable Route

Risk Ranking

- High (showing Site ID)
- Moderate (showing Site ID)
- Low - Moderate (showing Site ID)
- Low



Context Plan

Horizontal Scale: 1:10,000 A3 Chart

0 250 500 Meters

Geodetic Parameters: OSGB 1936 / British National Grid

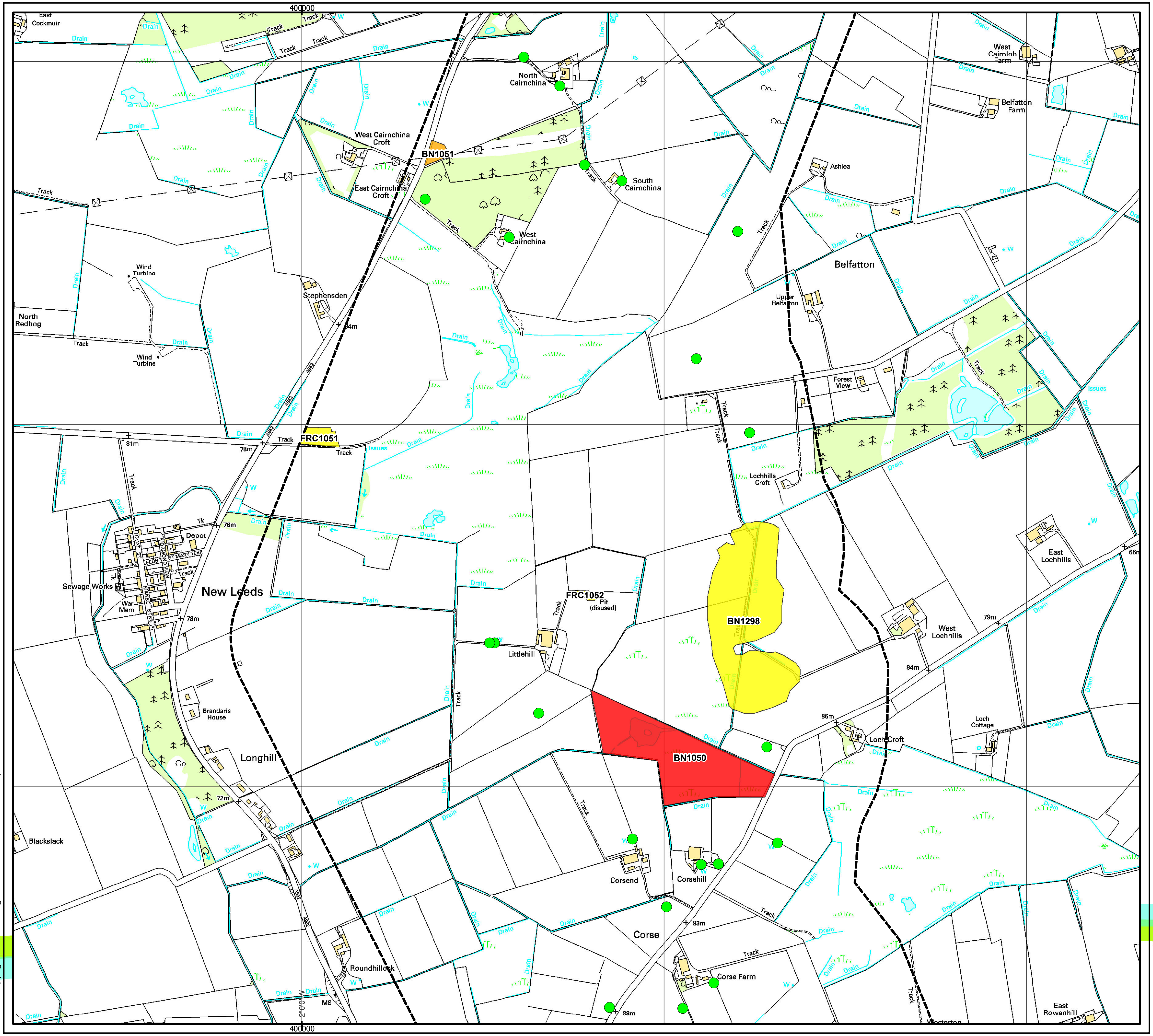
Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 Revision: C

REF: 8460001-PPW0200-RPS-MAP-153

Figure 13
Potentially Contaminated Land
Sheet (7 of 13)

Moray Offshore Renewables Ltd



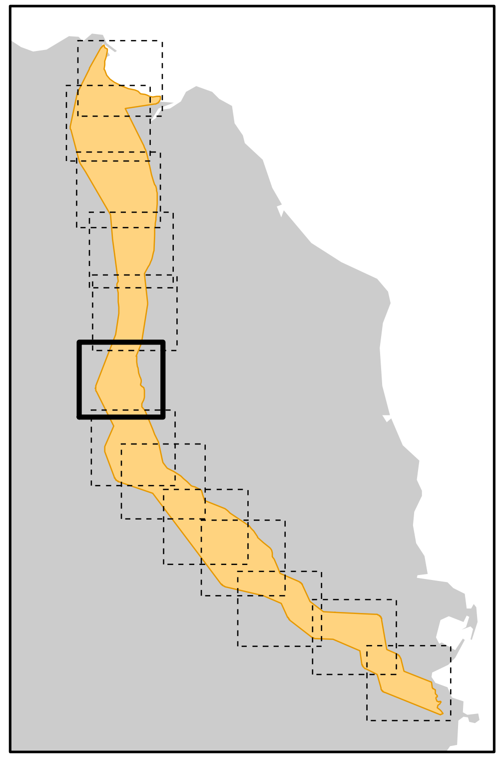
Moray Offshore Renewables Ltd

Key

Cable Route

Risk Ranking

High (showing Site ID)
Moderate (showing Site ID)
Low - Moderate (showing Site ID)
Low



Context Plan

Horizontal Scale: 1:10,000 A3 Chart

0 250 500 Meters

Geodetic Parameters: OSGB 1936 / British National Grid

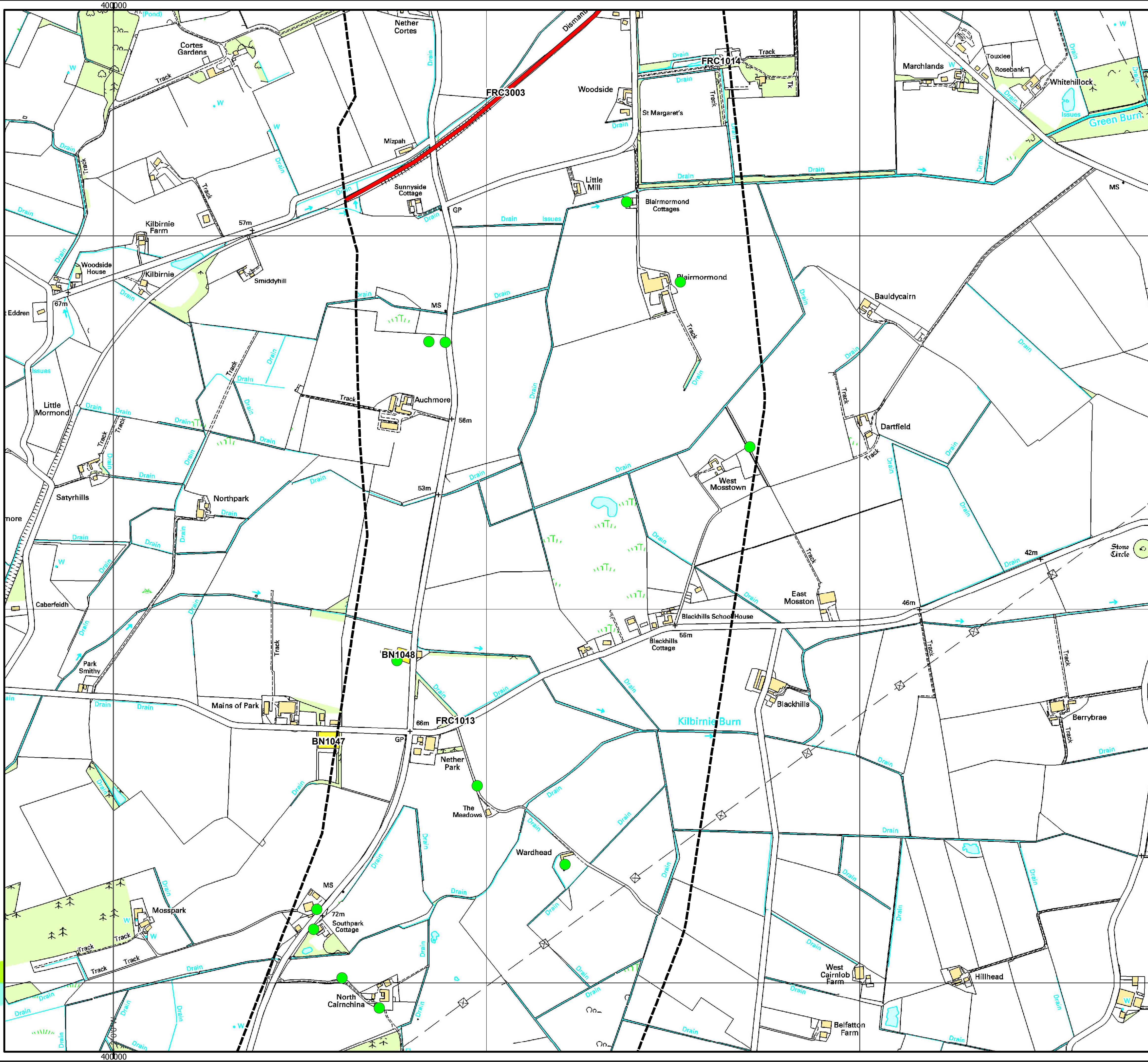
Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-154

Figure 13
Potentially Contaminated Land
Sheet (8 of 13)

Moray Offshore Renewables Ltd



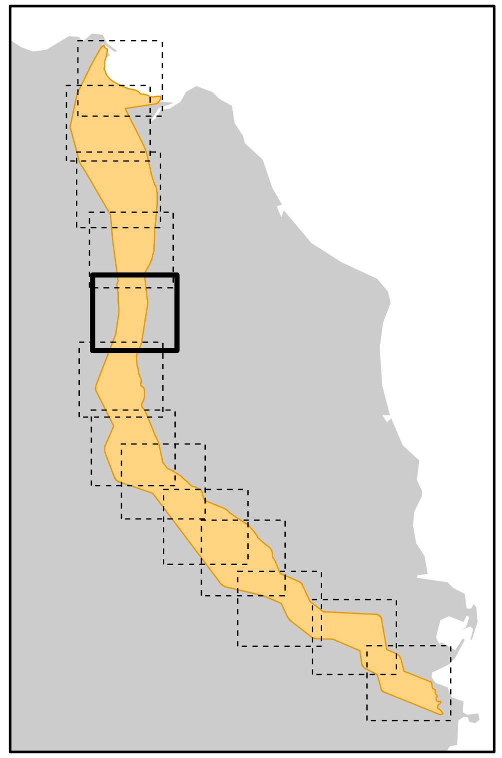
Moray Offshore Renewables Ltd

Key

Cable Route

Risk Ranking

- High (showing Site ID)
- Moderate (showing Site ID)
- Low - Moderate (showing Site ID)
- Low



Context Plan

Horizontal Scale: 1:10,000 A3 Chart

0 250 500 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

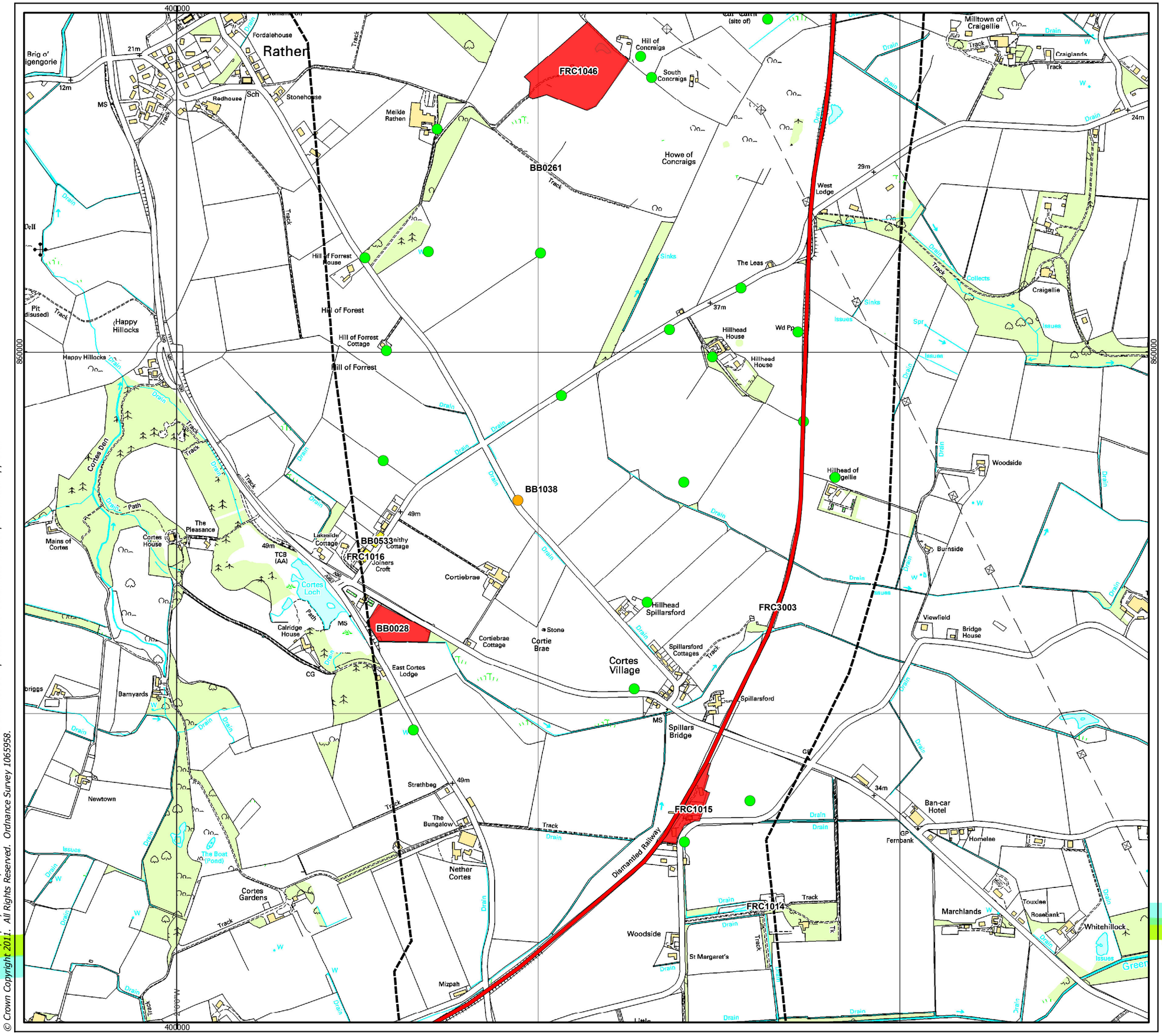
Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-155

Figure 13
Potentially Contaminated Land
Sheet (9 of 13)

Moray Offshore Renewables Ltd



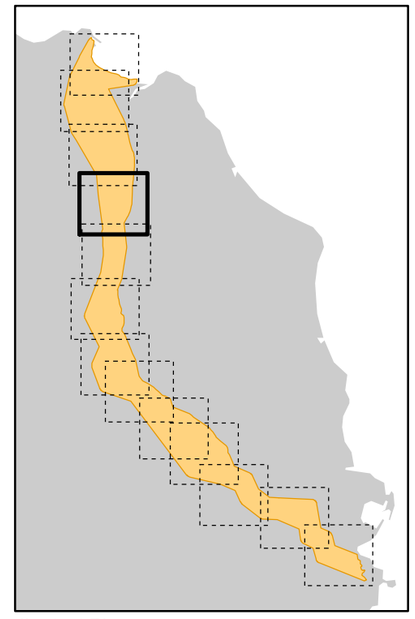
Moray Offshore Renewables Ltd

Key

Cable Route

Risk Ranking

- High (showing Site ID)
- Moderate (showing Site ID)
- Low - Moderate (showing Site ID)
- Low



Context Plan

Horizontal Scale: 1:10,000 A3 Chart

0 250 500 Meters

N

Geodetic Parameters: OSGB 1936 / British National Grid

Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-156

Figure 13
Potentially Contaminated Land
Sheet (10 of 13)

Moray Offshore Renewables Ltd

400000

Mains of Philorth
Bairnie Hill
Mid Gash
Gash of Philorth
South Gash
FRC1018
South Lodge
Mains of Philorth Cottage
Muiriesbrae
Invernorth
Kinlochan
Auchlyreck
FRC1019
BB0072
Formartine and Buchan Way (Cycle Track and Path)
Causeyend Well
Invernorth Croft
FRC1017
Knockmonean
Bridge End
The Neuk
BB0264
South School Croft
Hillhead of Cairness
Invernorth Cottage
Kinbog
Willie's Fauld
FRC1049
Clocksters
Reio Hill
Newmill Cottage
BB0257
Knockmonean Cairn
FRC2299
BB0773
Lootingstone
Ardglassie
Fordafourie Farm
Fordafourie Cottages
New Mill
Hill of Ardglassie
FRC3003
FRC1108
Trefor Hill
Gallows Hill
Fishery
Ardglassie Croft
Upper Strathellie
Ardglassie Cottage
West Strathellie
The Bungalow
Fordale Cottage
Dira Cottage
Hill of Concraigs
Cairn (site of)
Cairn of Concraigs
Concraigs
Bridge of Rathen
Mill Farm
St Ethernan's Church (remains of)
Cat Cairn (site of)
Fordalehouse
Rathen
Brig o' Craigengorie
FRC1046
Hill of Concraigs
South Concraigs
Redhouse
Stonehouse
Meikle Rathen
Howe of Concraigs
BB0261
West Lodge

400000

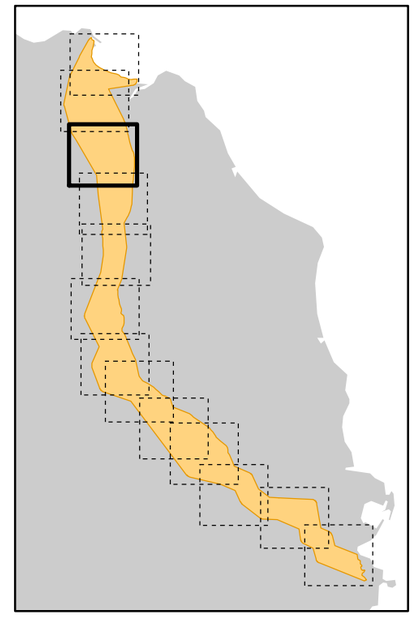
Moray Offshore Renewables Ltd

Key

- Cable Route

Risk Ranking

- High (showing Site ID)
- Moderate (showing Site ID)
- Low - Moderate (showing Site ID)
- Low



Context Plan

Horizontal Scale: 1:10,000 A3 Chart

0 250 500 Meters

Geodetic Parameters: OSGB 1936 / British National Grid

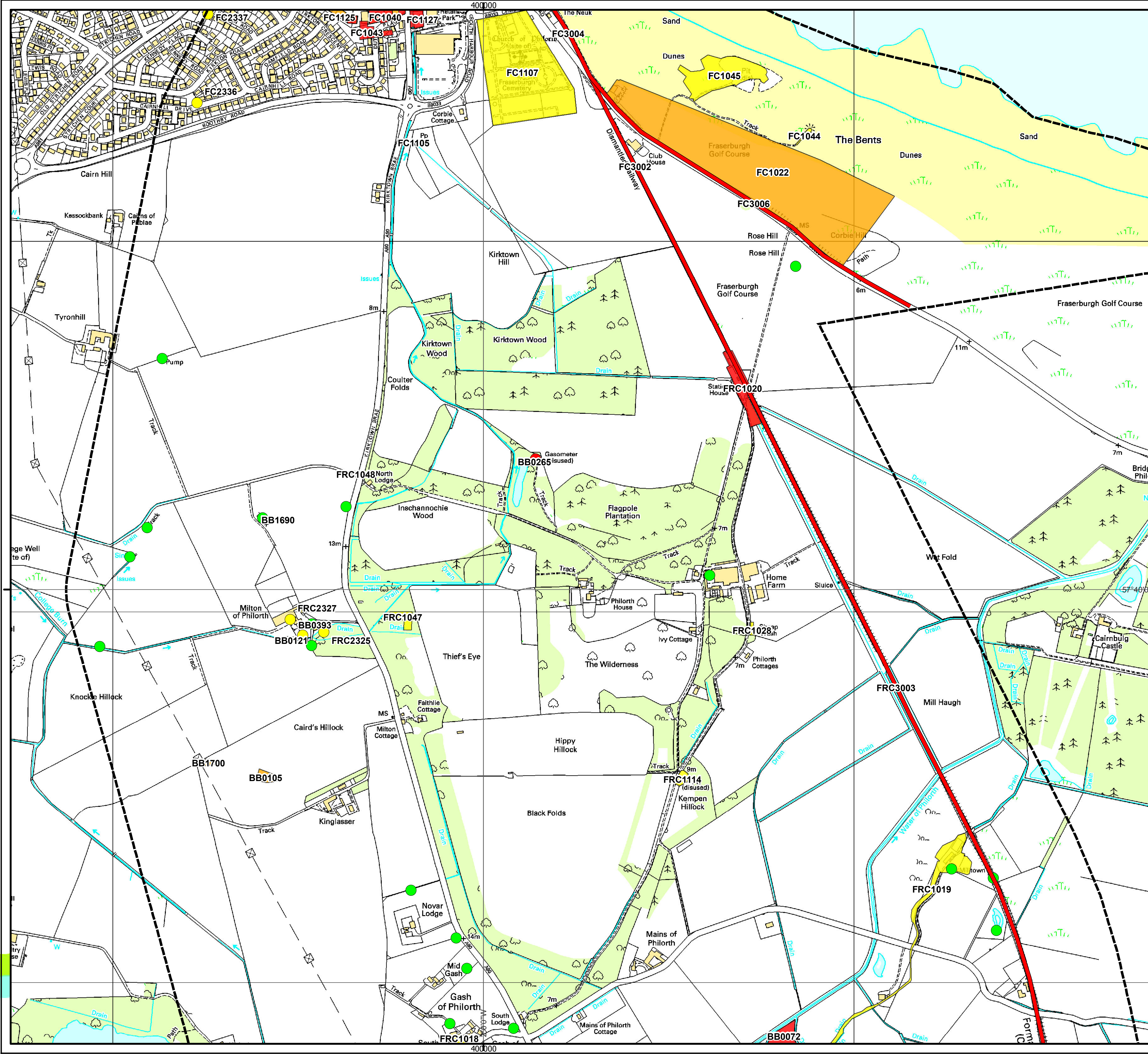
Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-157

Figure 13
Potentially Contaminated Land
Sheet (11 of 13)

Moray Offshore Renewables Ltd



edp renewables

REPSOL

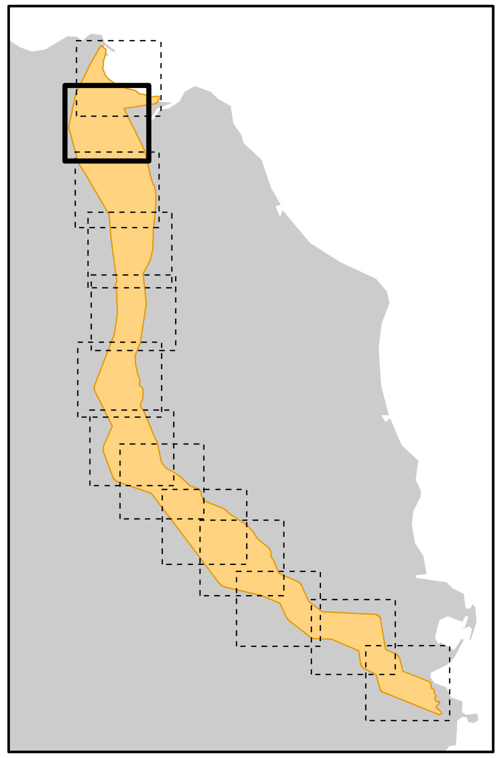
Moray Offshore Renewables Ltd

Key

Cable Route

Risk Ranking

- High (showing Site ID)
- Moderate (showing Site ID)
- Low - Moderate (showing Site ID)
- Low



Context Plan

Horizontal Scale: 1:10,000 — A3 Chart

0 — 250 — 500 Meters

Geodetic Parameters: OSGB 1936 / British National Grid

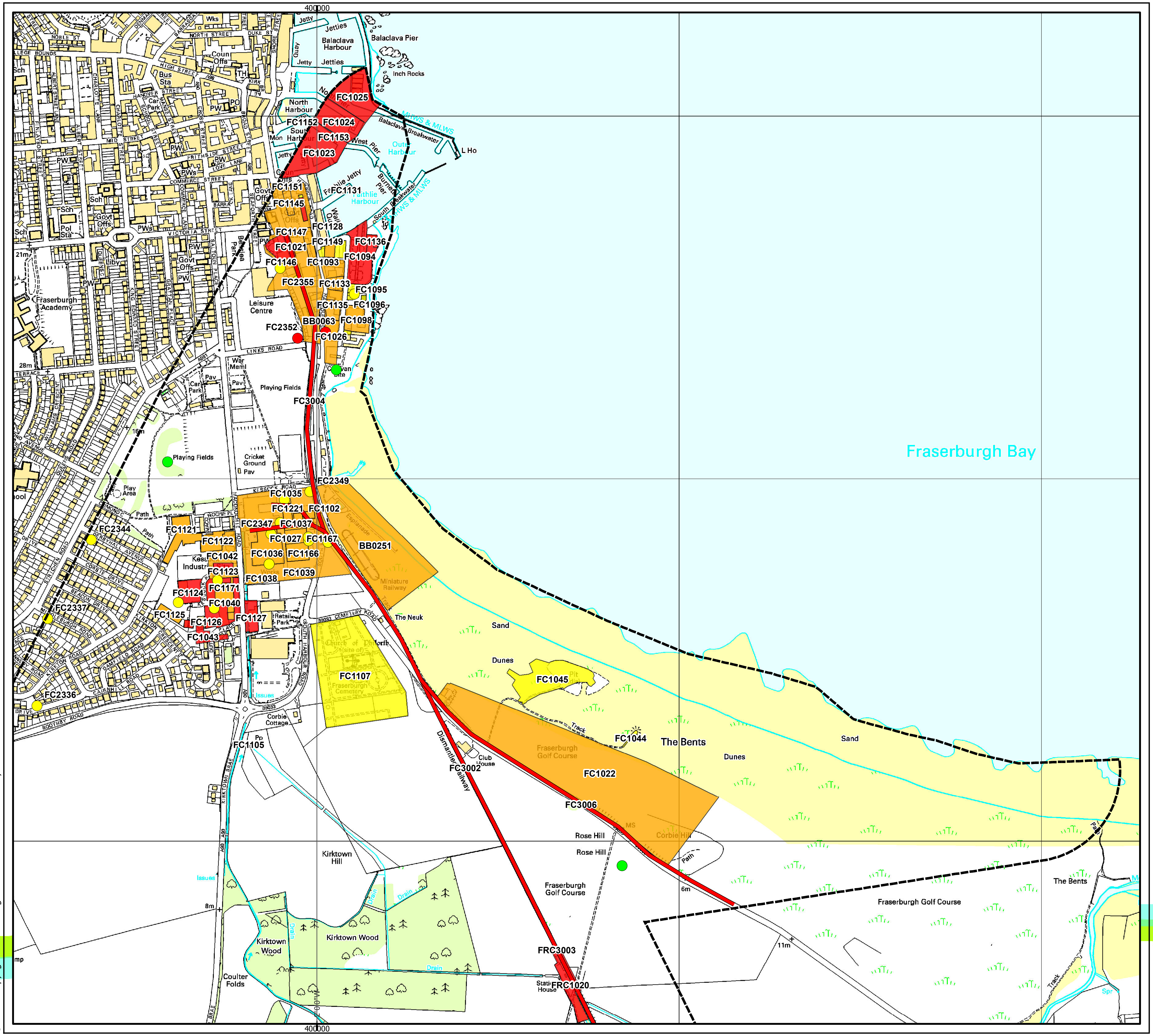
Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-158

Figure 13
Potentially Contaminated Land
Sheet (12 of 13)

Moray Offshore Renewables Ltd

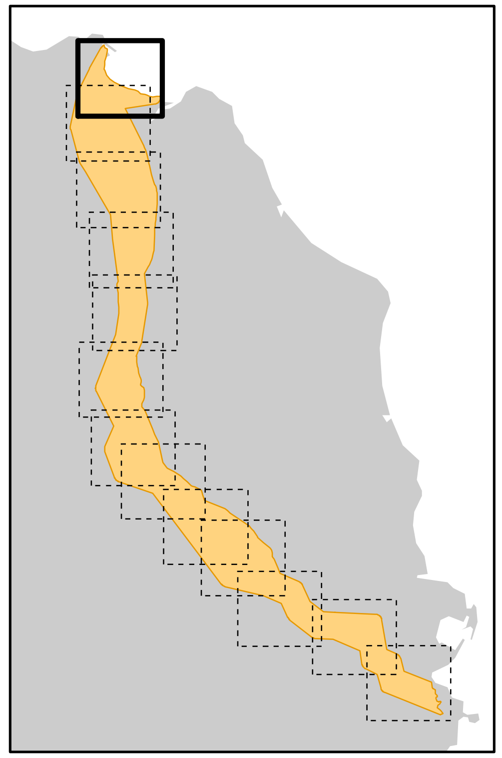


Key

Cable Route

Risk Ranking

- High (showing Site ID)
- Moderate (showing Site ID)
- Low - Moderate (showing Site ID)
- Low



Context Plan

Horizontal Scale: 1:10,000 A3 Chart

0 250 500 Meters

Geodetic Parameters: OSGB 1936 / British National Grid

Produced: KAG
Reviewed: NB
Approved: PH

Date: 09/05/2012 | Revision: C

REF: 8460001-PPW0200-RPS-MAP-159

Moray Offshore Renewables Ltd

Figure 13
Potentially Contaminated Land
Sheet (13 of 13)

Moray Offshore Renewables Ltd

Appendix 2 – BGS Borehole Records (Available on Request as Electronic File)

Appendix 3 – SEPA & SNH Datasheets (Available on Request as Electronic File)

Appendix 4 – Consultation Responses (Available on Request as Electronic File)

Appendix 5 – Historical Map Index (Available on Request as Electronic File)

Appendix 6 – Walkover Records (Available on Request as Electronic File)

Appendix 7 – Walkover Photographs (Available on Request as Electronic File)

Appendix 8 – Historic Sites Record (Available on Request as Electronic File)

Appendix 9 – GIS Shapefiles (Available on Request as Electronic File

This page has been intentionally left blank.