OIL EMERGENCY RESPONSE PLAN

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AMENDMENTS/VERSION CONTROL/REVIEW RECORD

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1.0	February 2015	Oil Emergency Response Plan	Stuart Ball	Jacqui Semple	Alan McKeown	Published
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GLOSSARY

ABBREVIATION	DEFINITION
BESL	Briggs Environmental Services
BPEO	Best Practical Environmental Option
CCA	Civil Contingencies ACT 2004
CEC	Council Emergency Centre
CPSO	Counter Pollution and Salvage Officer
EG	Environmental Group
GRT	Gross Registered Tons
IPIECA	International Petroleum Industry Environmental Conservation Association
ITOPF	The International Tanker Owners Pollution Federation Limited
JNCC	Joint Nature Conservation Committee
LRP	Local Resilience Partnership
MCA	Maritime and Coastguard Agency
NCP	National Contingency Plan
NNR	National Nature Reserve
OEG	Operational Environment Group
OPEP	Oil Pollution Emergency Plan
OPRC	Oil Pollution Preparedness, Response and Co-operation Convention
POLREP	Pollution Report
PON	Petroleum Operations Notice
PPE	Personal Protective Equipment
RIB	Rigid Inflatable Boat
RRP	Regional Resilience Partnership
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SAR	Search and Rescue
SEG	Standing Environment Groups
SEPA	Scottish Environment Protection Agency
SPA	Special Protection Area
SPSP	Shoreline Protection Strategy Plan
SRC	Shoreline Response Centre
SSSI	Site of Special Scientific Interest
STAC	Scientific & Technical Advice Cells
SCU	Salvage Control Unit
UKBAP	United Kingdom Biodiversity Action Plan

1 PROCEDURES

1.1 INTRODUCTION

This Oil Emergency Response Plan has been compiled by Briggs Environmental Services Ltd on behalf of Angus Council to serve as a response document in the event of an oil pollution emergency. The current condition of the shoreline within the Angus Council area has been documented in the Angus Council: Shoreline Management Plan (Volume 1&2). As such, this document will provide an indication of the likely response options in the event of an incident and provide direction on the responsibilities of Angus Council during such an event.
This Oil Emergency Response Plan contains a Shoreline Protection Strategy Plan (SPSP). This is aimed at detailing key locations from where a shoreline response may be initiated to minimise, and where possible prevent, damage to environmental and socio-economic resources. The information contained within this strategy and the Shoreline Management Plans should only form a guide as to vulnerabilities along the coastline.

Advice should be sought from nature conservation agencies, such as NatureScot, Scottish Environment Protection Agency (SEPA) etc., to ensure that clean-up operations will not adversely impact the sensitive habitats they are aimed at protecting.

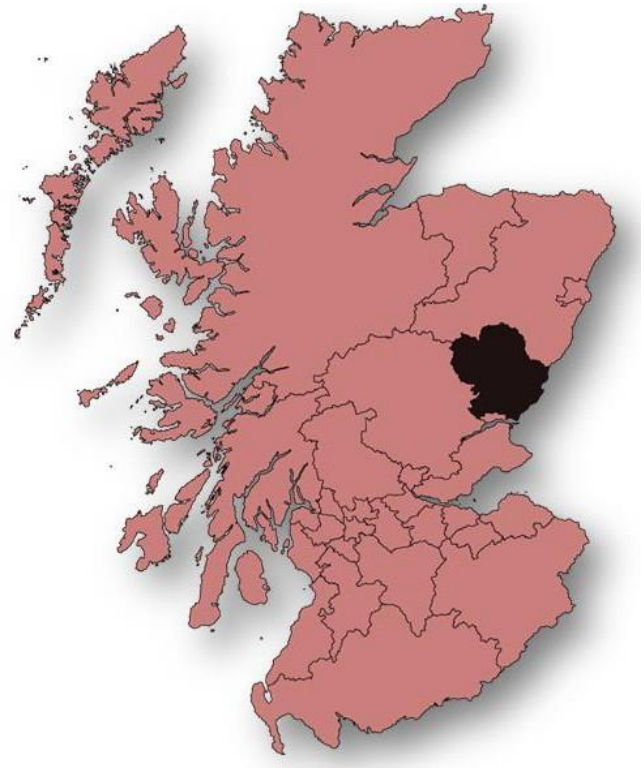


Figure 1: Oil Emergency Response Plan encompasses the coastline and jurisdiction of Angus Council

1.2 CONSULTEES

This plan has been produced in consultation with:

- Aberdeen City Council
- Aberdeenshire Council
- Angus Council
- Dundee City Council
- Fife Council
- Maritime & Coastguard Agency
- NHS Tayside
- Perth & Kinross Council
- Police Scotland
- Scottish Ambulance Service
- Scottish Environment Protection Agency
- Scottish Fire and Rescue Service
- Scottish Natural Heritage
- Tayside Local Resilience Partnership
- The Moray Council

1.3 PURPOSE

This plan will come into force when a significant oil pollution incident occurs which requires Angus Council to set up a Shoreline Response Centre (SRC) or where there is a significant on land spill that requires a Tier 2 response. A major pollution incident is expected to arise from an offshore source although is it possible minor incidents may arise from on shore sources such as road tanker overturn or loss of containment of a shore-based oil storage tank.

In a significant maritime incident, there are five main areas of command and control:

- search and rescue (SAR);
- recovering the survivors;
- the salvage of the ship/ road tanker;
- dealing with the pollution at on water;
- dealing with the pollution on land.

1.4 AIM AND OBJECTIVE

AIM

The aim of this plan is to set out arrangements to minimise the impact of a coastal pollution incident within the Angus area.

OBJECTIVE

The objective of this plan is to inform responder organisations of the emergency response roles and responsibilities required to produce an effective and efficient pollution response within the Angus area and to ensure that the Tayside Local Resilience Partnership response is co-ordinated with the MCA National Contingency Plan.

1.5 HAZARD IDENTIFICATION

The Civil Contingencies Act (CCA) (2004) requires each area to develop a Community Risk Register (CRR) based upon generic hazard descriptions and impact assessments. The hazards relating to coastal pollution are detailed in Table 1:

Incident	Description
S4 Pipeline incident	Gas or Crude Oil major accident hazard pipelines within Tayside area. Explosion due to mechanical damage on land. Potentially up to 10 fatalities / up to 50 casualties - Affecting a 1KM Area. NYNAS - Product Pipelines to and from ships / tankers at Dundee Harbour.
S6 Coastal contamination (petro-chemical or other).	Spillage of 85 000 tonnes of crude oil into the sea polluting up to 50km of Tayside coastline.
S7 Inland pollution, inc land, water sources / courses.	Major pollution incident (e.g. industrial or sewage spillage) impacting on the water environment leading to persistent and/or extensive effect on water quality impacting on human health, aquatic ecosystems, potable water abstractions and public amenity.

Table 1: Community Risk Register Hazards

1.6 INTERFACE WITH OTHER DOCUMENTS AND PLANS

Figure 2: The interfaces between Angus Council Oil Emergency Response Plan and other local, national, and international guidance.

ANGUS COUNCIL COASTAL POLLUTION RESPONSE

1.7 PLAN ACTIVATION

In most circumstances initial notification of a pollution event at sea will be to the MCA. The level of response required will be determined by the MCA Duty Counter Pollution and Salvage Officer (CPSO). The MCA will issue a Pollution Report (POLREP) for all pollution incidents, a copy of which is contained within the local authority arrangements. If the CPSO determines that the threat of pollution is significant and justifies a national or regional response, the Secretary of State Representative (SOSREP) will be informed. On being issued a POLREP by the MCA, Angus Council will inform all relevant council services, and the Tayside Local Resilience Partnership members depending on the scale of the incident.

1.8 ROLES, RESPONSIBILITIES AND ACTIONS OF CONCERNED AUTHORITIES

Within the UK there is an adopted structure and procedure for response to marine oil spills, which clearly defines the roles and responsibilities of industry, UK Government (including environmental agencies) and local maritime authorities. Each statutory body has a designated area of jurisdiction within zones extending from the High-Water Mark to 200 nmiles or the UK Territorial Limit. The competent National Authority designated to oversee all matters pertaining to the OPRC convention under the Merchant Shipping Act 1995 and the Merchant Shipping and Maritime Security Act 1997 is the Maritime and Coastguard Agency (MCA).

The overall control of an incident will be carried out by the Government's Maritime & Coastguard Agency (MCA) from its Maritime Emergency Information Room (MEIR). Pollution at sea will be dealt with by the Counter Pollution Section of the MCA from its Marine Response Centre (MRC) at the appropriate Coastguard centre. If salvage of the ship is required, this will be controlled by MCA's Salvage Control Unit (SCU). Dealing with the pollution onshore is the task of the Shoreline Response Centre (SRC) managed and co-ordinated by Angus Council.

Emergency Response Organisations are required by the CCA 2004 to identify sites and scenarios within their area, where an emergency, (as defined by the Civil Contingencies Act), could potentially occur. Once these areas are identified, the Act requires responders to develop emergency plans based on a risk assessment. The Maritime and Coastguard Agency (MCA) are the national competent authority for the UK with the responsibility for dealing with marine pollution. This responsibility is met by the National Contingency Plan for Marine Pollution from Shipping and Offshore Installations (NCP). Local authorities have no specific responsibility for dealing with the effects of oil spills but have accepted responsibility for shoreline clean-up and have powers to incur expenditure to alleviate the effects of an emergency. This plan details the initial procedures which should be followed by the plan participants in the event of a threat of coastal pollution. The role of the Secretary of State's Representative (SOSREP) is to prevent pollution offshore. In the event of an offshore pollution event the SOSREP will direct the response to minimise the impact of the pollution. Local authorities have accepted a non-statutory responsibility for the clean-up of pollution affecting the coastline. The Tayside Local Resilience Partnership will focus on any consequences which may arise from the pollution event. There may also be implications for other neighbouring local authorities, such as Aberdeenshire, Aberdeen City, Moray, Fife, Dundee City and Perth & Kinross councils. This would require a response from the North of Scotland Resilience Partnership, and representation from all affected local authority areas would be represented within a shoreline response centre.

a. LEAD RESPONDER

The Resilience Partnership Generic Emergency Response and Recovery Framework requires that a "Lead Responder" organisation is appointed for every type of emergency. For a pollution incident, Angus Council is the local Lead Responder. The framework also requires discussion between member organisations when there is the potential for consequences to affect more than one member organisation and the response is likely to exceed an operational level of response. Coastal pollution incidents will require close co-operation between the MCA and local authorities. Where pollution is on such a scale that a local authority is unable to deal with all the consequences using its own resources, it can request that the Maritime and Coastguard Agency (MCA) establish a Shoreline Response Centre (SRC). The MCA will decide whether the response warrants the setting up of a SRC. The response to the pollution incident and the requirement to form a Resilience Partnership Coordinating Group will be based on this plan. If the pollution impacts on the coastline of more than one local authority area, a decision will be made by the Chief Executives of the affected local

authorities on which local authority will act as the Lead Responder to establish the Shoreline Response Centre, and the lead Resilience Partnership.

b. INITIAL ACTION

The initial action of the local authority will be to convene the Tayside Local Resilience Partnership Tactical Coordinating Group.

c. SCALES OF RESPONSE

The MCA definitions for scales of pollution are described in Section 3 of the National Contingency Plan (NCP):

Title	Definition	Requirement for additional support
Tier 1 - Local	Within capabilities of a single local authority or harbour authority.	Minimal partner support required. Local Authority leads response on behalf of LRP. Harbourmaster has responsibility for escalating any incident from Tier 1 to Tier 2.
Tier 2 – Regional	Beyond capabilities of a single local authority. (For pollution within harbours, all Harbours in Angus covered by OPRC regulations are required to have a capability to respond to a Tier 2 incident. LA owned harbours in Angus covered by OPRC regulations meet this requirement through a contract with Briggs Marine).	Determined by CPSO. Regional MCA assets required. Local Authority leads coordination of LRP response.
Tier 3 - National	Requiring the resources of the (Government) national stockpile.	Determined by CPSO. National MCA assets required. Some, or all, "Response Units" may be required as per the national pollution plan, these are the: • Salvage Control Unit; • Marine Response Centre; • Shoreline Response Centre; • Environment Group. Local Authority leads coordination of SCG response and support to the Response Units.

*(OPRC) International Convention on Oil Pollution Preparedness, Response and Co-operation

Table 2: Scales of Oil Spill Response

d. Response Groups which may be established

The NCP details the various groups that may be required in a Tier 3 National Response. The MCA would also be kept informed, or take an active role, in a Tier 1 or Tier 2 response. The CCA provides a framework to coordinate a multi-agency response to any type of incident in the UK. Each part of the UK coastline falls within a Regional Resilience Partnership or, Local Resilience Forum (England & Wales) area. To deliver the requirements of the NCP, within the emergency response structures determined by the CCA and Preparing Scotland (Scottish Guidance on implementing the CCA) outlines the groups may be established. The NCP explains that not all the national groups may be required. This would be determined by the CPSO and SOSREP.

<table>
<tr><th colspan="2">Tier 1:</th></tr>
<tr><td colspan="2">Local Authority Incident Management Team
May assemble depending on the size and nature of the incident to manage the responders.
Responsible for coordinating all aspects of the response to the incident on behalf of the MCA.
Partner involvement mainly at operational level.
For non-local authority harbours, the relevant harbour board/trust would deal with the incident.</td></tr>
<tr><th colspan="2">Tier 2:</th></tr>
<tr><td colspan="2">Local Authority Tactical Incident Management Team
Responsible for coordinating the authority response and any support activities within the area.</td></tr>
<tr><td colspan="2">Tayside LRP Tactical Coordinating Group
Due to the greater number of agencies involved, the LRP may activate a Tactical Coordinating Group to support the multi-agency aspects of the response.
Local Authority appointed as “Lead Responder” responsible for coordinating all aspects of the response to the incident will chair the group.
Partner involvement, (particularly MCA), may be more significant, hence requirement for coordinated management at a tactical level.</td></tr>
<tr><td colspan="2">Briggs Environmental Services Limited (BESL)
Provision of Tier 2 resources will be from Briggs Environmental Services Limited. BESL will mobilize within 1 hour of notification and arrival on site will be achieved as soon as possible.</td></tr>
<tr><th colspan="2">Tier 3:</th></tr>
<tr><td>Scientific & Technical Advice Cells (STAC)
Preparing Scotland STAC guidance recommends the use of the Cabinet Office generic term “STAC” for any of the expert advice groups required by several national plans, including the NCP.
Tayside LRP Generic Emergency Response and Recovery Framework explains how STACs, and other types of specialist advice groups, communicate their advice to the LRP and contribute to a coordinated response.</td><td>Tayside LRP (Strategic)
Chaired by Chief Executive of lead Local Authority.
Responsible to elected representatives of local area for all local onshore aspects of the response.
Main point of contact for SOSREP to ensure appropriate level of local participation in the response, (which may extend into other LRP areas).
Main point of contact for Scottish Government.
Manage the media response.
Work with the Angus Council Strategic Incident Management Team to ensure coordinated strategic management</td></tr>
<tr><td>Marine Response Centre (MRC)
Led by MCA.
Coordinates clean-up operations at sea.
May require local authority support for reception of material onshore.</td><td>Salvage Control Unit (SCU)
Led by Secretary of State’s Representative (SOSREP).
Responsible to UK Government for all aspects of salvage operation which may extend beyond one SCG area.</td></tr>
<tr><td>Shoreline Response Centre (SRC)
Led by Local Authority.
Coordinates shorelines clean up.</td><td>Environment Group
Advises all groups on environmental and public health aspects of the pollution.</td></tr>
<tr><td colspan="2">Tayside LRP Tactical Coordinating Group and Angus Council Tactical Incident Management Team
Provide tactical management of the response.</td></tr>
</table>

Table 3: Angus response groups

1.9 STATUTORY RESPONSIBILITIES

Location	Authority	Responsibilities
Harbour Limits	Harbour Authority	All operations within Harbour Limits
HWS out with harbour limits	Local Authority	Coastal OSR out of Harbour Limits
<12 nmiles from shore	MCA	OSR – Monitor & Advise
<12 nmiles from shore	MCA (HMCG)	Search & Rescue
200m – 12 nmiles from shore	NatureScot, JNCC, SEPA	Conservation of the Marine Environment
<12 nmiles from shore	Marine Scotland	Protection of the Marine Environment and Fisheries
<3 nmiles from shore	SEPA	Water Quality
<12 nmiles from shore	HMRC	Import Duty

Table 3: Statutory Jurisdiction

Contact details for those likely stakeholders to be involved are at listed in Section 1.7.

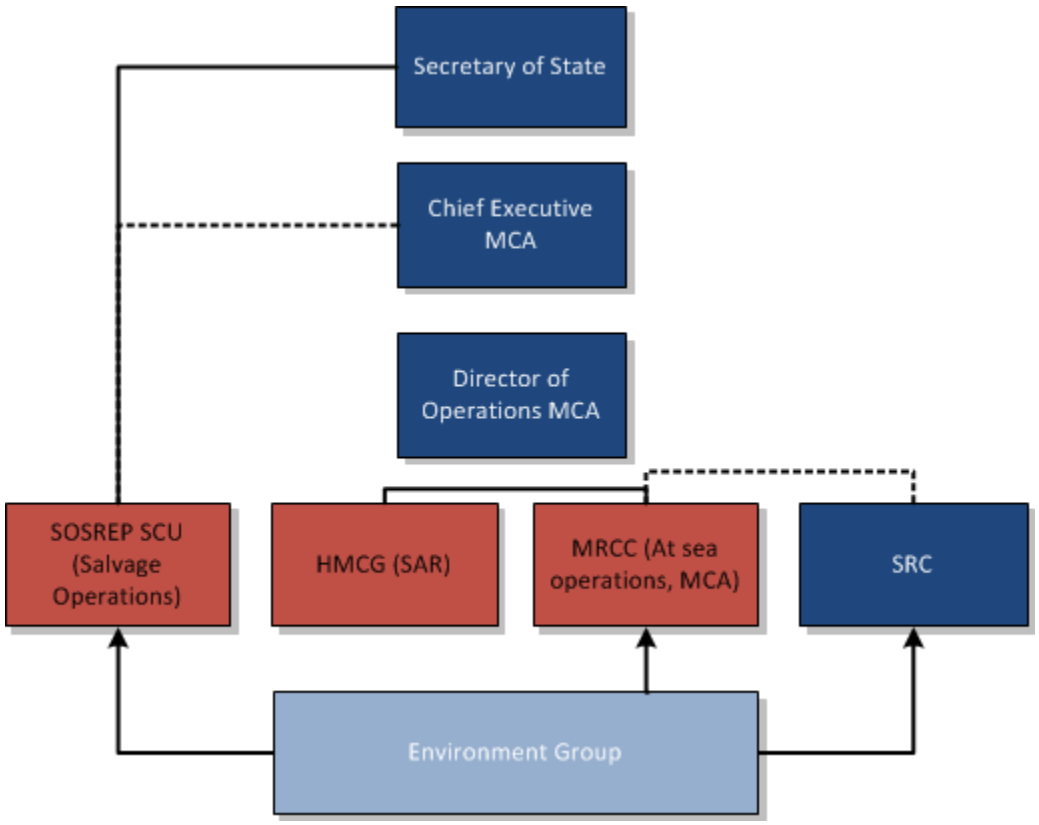


Figure 3: Communication Channels

a. OFF-SHORE RESPONSE

At sea response will be co-ordinated by the Maritime and Coastguard Agency. The Marine Counter Pollution and Salvage Unit will enact the National Contingency Plan (NCP) and assume control of any incident considered to be out with the individual response of private response contractors, offshore operators or those responsible for the pollution incident – should they be identified.

b. ONSHORE RESPONSE

Local authorities currently have no statutory duty to clean up the shoreline but have accepted a voluntary commitment to do so. However, the Government is considering Lord Donaldson's recommendation that they should be given a statutory duty to prepare contingency plans and clean up after a spill, and the Merchant Shipping Act 1995, as amended by the Merchant Shipping and Maritime Security Act 1997, contains an enabling clause to this effect. Meanwhile, local authorities have powers under section 83 of the Local Government etc. (Scotland) Act 1973 to incur expenditure when dealing with emergencies.

c. PORTS AND HARBOURS

The Merchant Shipping (Oil Pollution, Prevention and Response Convention) Regulations 1998 require ports handling tankers over 150 gross registered tons (GRT) or ships over 400 grt to produce an oil contingency plan. In this case, Angus Council have produced an Oil Spill Contingency Plan for the council owned Arbroath Harbour. An Oil Spill Contingency Plan exists for Montrose Port Authority which lies in the jurisdiction of Angus Council. In the event of an oil spill originating from one of these harbours, the relevant OSCP should be initiated in the first instance with the appropriate personnel named in the Shoreline Protection Plan placed on standby in the event oil pollution threatens the shoreline.

1.10 ANGUS COUNCIL'S RESPONSIBILITY

Local Authorities generally accept a responsibility to respond to spills occurring within their unitary area. Angus Council is responsible for;

- producing Oil Spill Contingency plans for all Council owned and operated ports, harbours and jetties as covered by the OPRC Guidelines;
- producing a shoreline response plan for all its coastline;
- requesting the setting up of a Shoreline Response Centre;
- disposing of oily waste; and
- training relevant staff in oil pollution response methods.

Within Angus Council the authority to set up a SRC lies with the Angus Council Regulatory and Protective Services, in conjunction with the Strategic Director of Communities .In the event of a spill the Angus Council Oil pollution Officer would take the lead. The lead agency is Angus Council with Headquarters at Angus House, Forfar. The plan preparation, updating and implementation will be the responsibility of the Councils Regulatory and Protective Services.

A tier 2 or 3 spill would result in the mobilisation of Briggs Environmental Services Limited (BESL).

The following personnel should also be mobilised and be ready to assist in any response actions. In the event of a Tier 2 or 3 spills which have the potential to impact on the shoreline the following personnel should be activated:

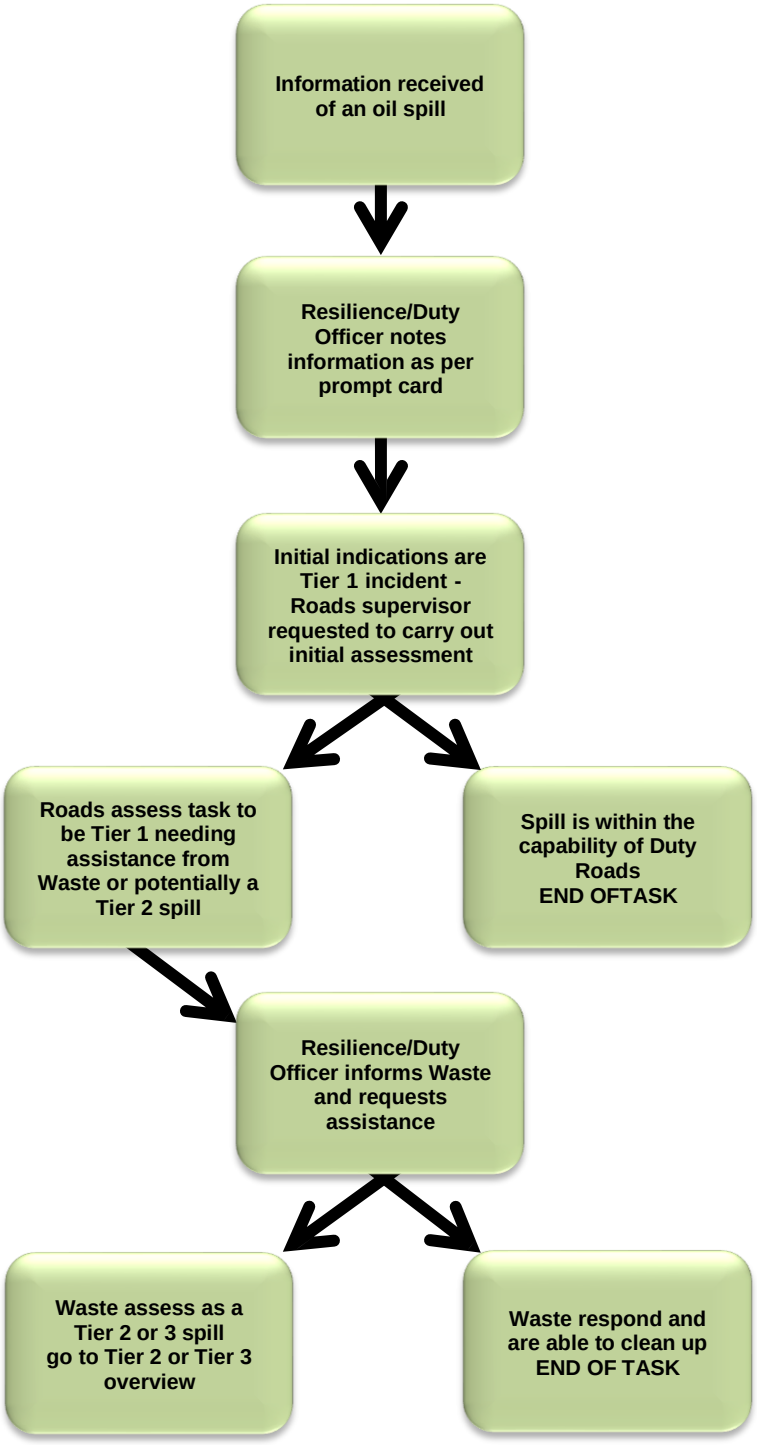
- Roads
- Environmental Manager - Waste
- Arbroath Harbour
- Health & Safety
- Legal & Democratic Services
- Financial Services
- Communications
- Resilience Service
- Montrose Port Authority

1.11 Angus Council Activation

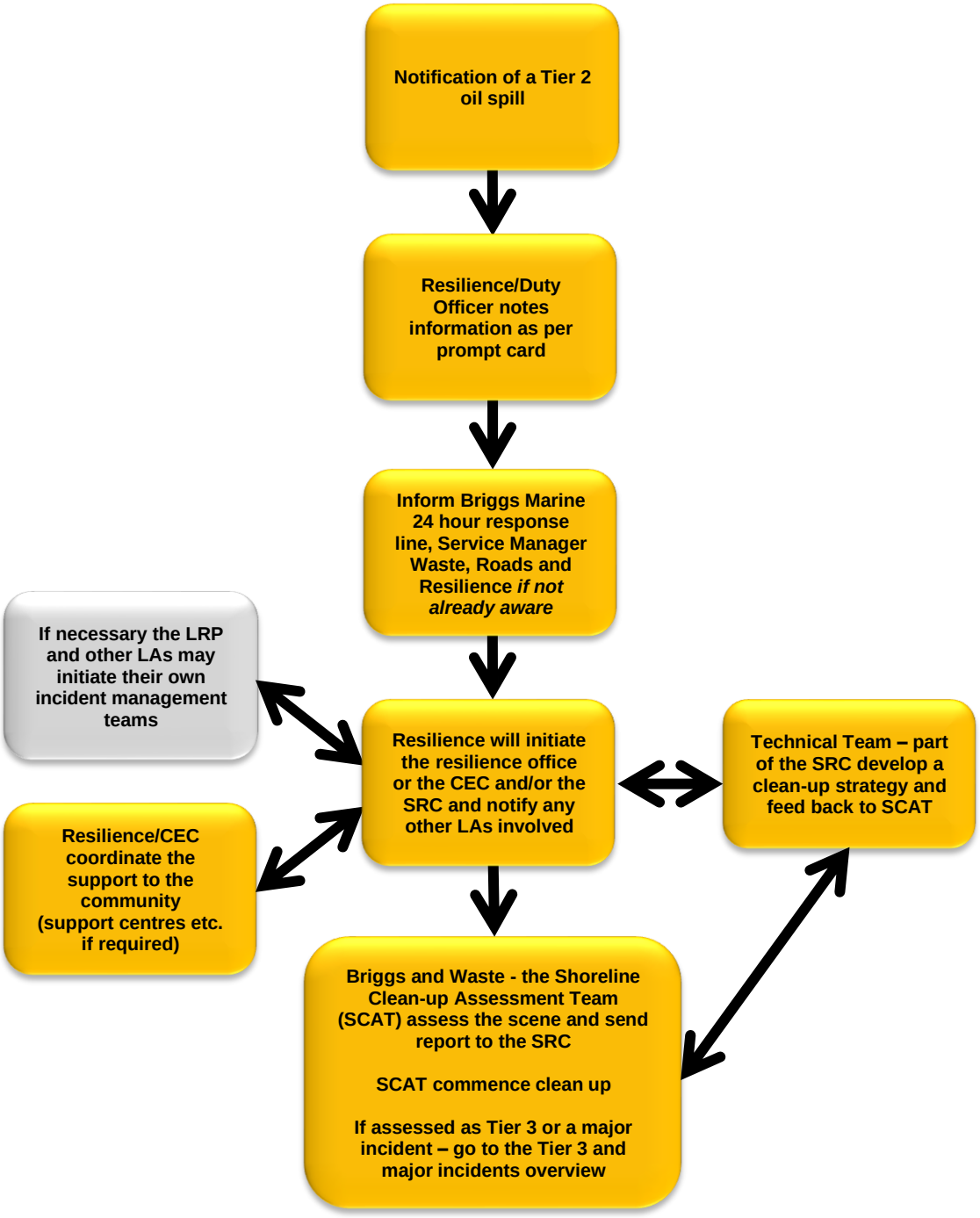
Notifications of oil pollution incidents during office hours should be made to the Resilience Manager or Officer. Outside office hours, notifications should be made to the On Call Emergency Planning officer using the On Call Pager.

An overview of the activation process is shown at 1.11a-c, a prompt card to assist resilience or the Duty Officer to gather the initial information is at 1.11d, an overview of the main parties concerned with spills in Angus is shown at 1.11e and a table of key Angus activation contacts is at 1.11f.

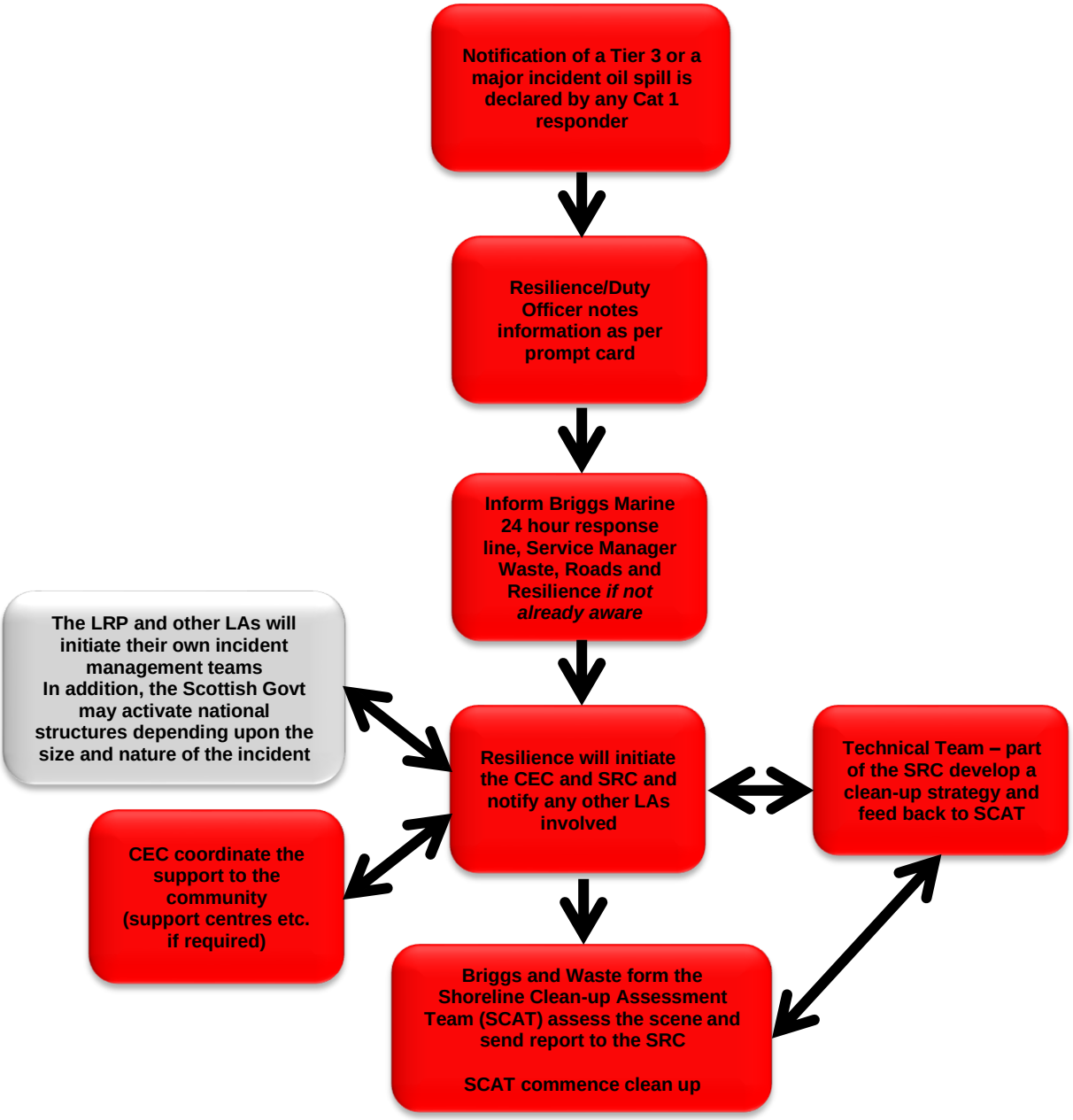
1.11a Tier 1 Incident Activation Overview



1.11b Tier 2 Incident Activation Overview



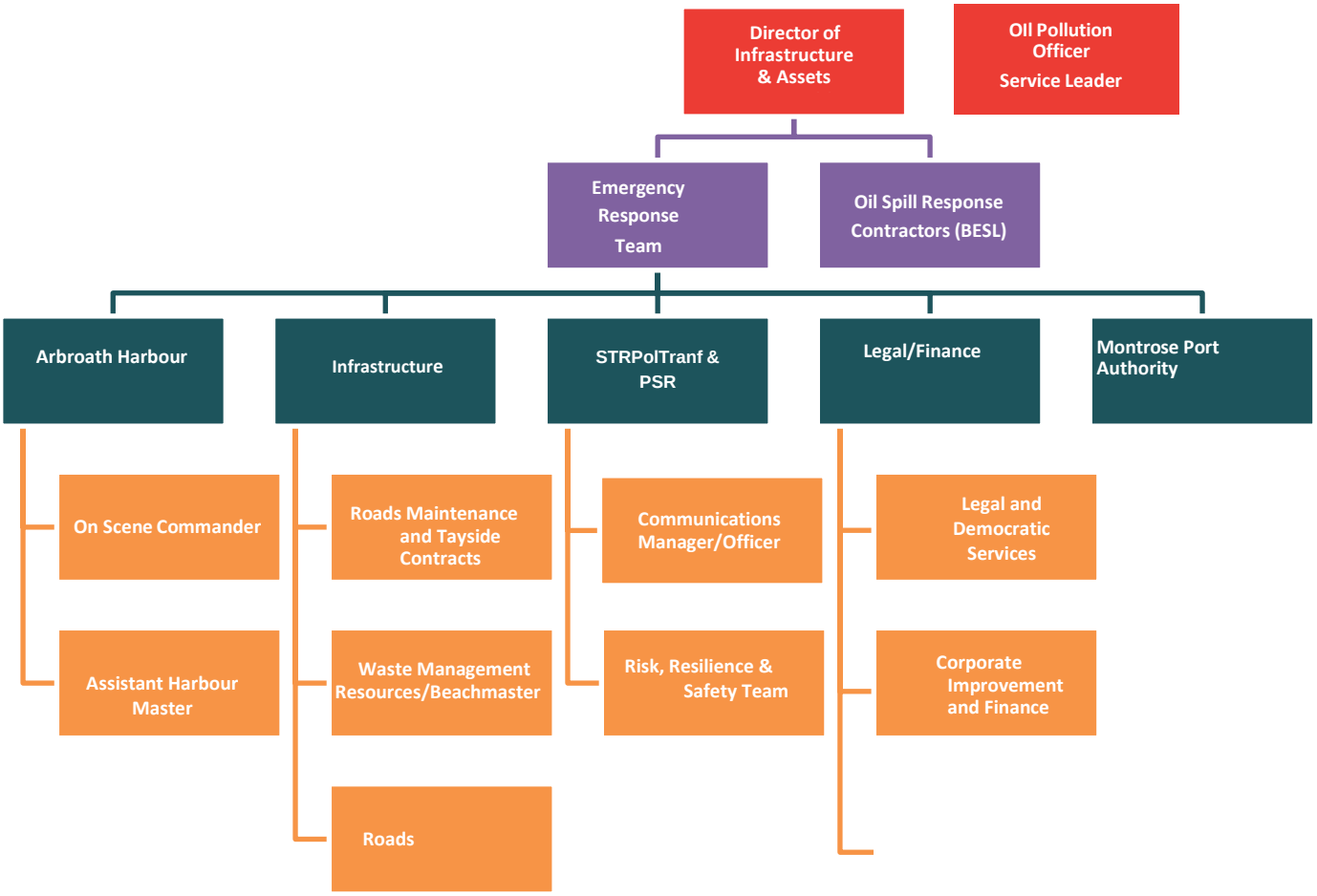
1.11c Tier 3 Incident Activation Overview



1.11d Resilience/Duty Officer Initial Notification of Oil Pollution Prompt Card

POLLUTION INCIDENT – RESILIENCE/DUTY OFFICER NOTIFICATION PROMPT CARD **On receipt of callout confirm and action the following;**	
Name of person in charge	
Police control room co-ordinating the incident and the senior officer in charge	
Contact Telephone numbers	
Nature of incident Location – *include the coastline or harbour affected or likely to be impacted* Time & date of incident ☐ Tier 1 ☐ Tier 2 ☐ Tier 3	
Likely timescale	
Location of assembly point – *if required*	
Rendezvous point – *if required*	
Approach route – *If required*	
Resources and support requested from the Council	
☐ Contact the Resilience Manager or Officer if required ☐ Contact Roads if required ☐ Contact Waste if required	
REMEMBER TO START LOG OF EVENTS	

1.11e Angus Concerned Parties in the Event of a Spill



1.11 f Angus Activation Contacts

SERVICE	POST	OFFICE HOURS	OUT OF HOURS CONTACT	ROLE
Risk, resilience & Safety	Manager	07801 317126	On call Emergency Planning pager 07623 377479	Coordination of Angus Council response
Arbroath Harbour	Harbourmaster	01241 872166 07753 397199	07753 397199	Arbroath Harbour coordination and control and Oil
Infrastructure(Waste)	Service Manager	01307 492429 07774 138601	07774 138601	Beachmasters and waste management
	Team Leader - Waste	01241 464551 07801 020009	07801 020009	
Roads	Manager	07950358586	Maintenance Emergency Mobile 07850 703564	Resources and roads management
	24-hour Maintenance Emergency Mobile	07850 703564		
Health & Safety	Team Leader	01307 491873 07833 255420	07833 255420	Angus Council health and safety support and advice
	Advisor	07584461586	07584461586	
	Advisor	07500 996268	07500 996268	
Communications	Manager	07342 072509	07342 072509	Angus Council communications
	Officer	07766327314	07766327314	
	Officer	07920 413885	07920 413885	
Montrose Port Authority	Harbourmaster	01674 672302 07766 160152	07766 160152	Montrose Harbour coordination and
Financial Services	Director of Finance	01307 4921762		Angus Council financial support including procurement
	Service Manager (Financial Services)	01307 492285		
Legal & Democratic Services	Head of Service	01307 492546	07585 103080	Angus Council legal support
	Service Leader	07585 10319	07585 10319	

1.12 ENVIRONMENT GROUP

The **Environment Group** provides a single advisory line on public health and environmental issues at sea to all other response cells. Where the incident poses a significant threat to health or the environment on land the Local Resilience Partnership (LRP) may establish a Science and Technical Advice Cell (STAC) and this may be integrated with the Environment Group.

a. SCOPE OF ENVIRONMENT GROUP

The scope of EG functions will be directly proportional to the scale and nature of the incident, its geographical location, extent, severity, pollutant involved, potential hazard to human health and the environmental sensitivities. The scale of incident and response and their constituent phases are likely to evolve over time and the functions of the EG will need to be graduated to meet changing requirements,
escalating or diminishing in the input to each phase over time.

Standing Environment Groups (SEG) cover the entire coastline of the UK but since March 2003, a single SEG has covered all of Scotland. The SEG is now normally led by Marine Scotland (chair is the Head of Licensing Operations and Emergency Response or their nominated deputy) and comprises a number of core organisations representing the key departmental and agency interests. In the event of a significant pollution incident the SEG would establish an **Operational Environment Group** (OEG) for which the SEG will decide the terms of reference and work programmes. However,they will not normally be different from those of the SEG.

b. ENVIRONMENT GROUP CORE MEMBERSHIP

The minimum core membership will include representatives of:

- Public health body
- The environmental regulator
- The statutory nature conservation body
- The fisheries department
- MCA

Environmental Regulator	Statutory Nature		Public Health Body
SEPA	NatureScot (+ JNCC >12 nmiles offshore)	Marine Scotland	Health Protection Scotland

Table 4: The responsible organisations providing the core members under the Scottish devolved administration

The core membership may choose to invite:

- Sea Fisheries Committee
- National Park Authorities
- Local Health Authority
- HSE
- Health Protection Scotland
- Animal Welfare bodies - SSPCA
- Bird casualty record collation - RSPB
- NGOs
- Local Wildlife Trusts
- Local Animal Welfare Trusts
- Marine Scotland

1.13 ESTABLISHING A SHORELINE RESPONSE CENTRE (SRC)

The Shoreline Response Centre (SRC) will be established in the Council Emergency Centre (CEC) located at the ground floor Training Suite (A, B & C), Board Room, Angus House, Orchardbank Business Park, Forfar. This shall be done in accordance with the Angus Council Emergency Plan and will be led by Angus Council with support from the Maritime and Coastguard Agency.

a. ROLE OF THE SRC

The role of the SRC is to co-ordinate and lead the onshore response by:

- Determining the extent of the problem
- Agreeing a strategy and priorities
- Initiating response
- Obtaining and allocate resources
- Determining methods of waste disposal
- Monitoring progress
- Briefing elected members, Ministers, VIPs, media

b. STRUCTURE OF THE SRC

The SRC will be formed of three primary functional teams plus support teams as required. The SRC shall always be headed by an Angus Council representative and it is important that the SRC acts as a single unit. See MCA STOp notice 3/2009 for further information on the Shoreline Response Centre. (http://www.coastguardrescue.org.uk/stop_3_src_sept_09-5.pdf)

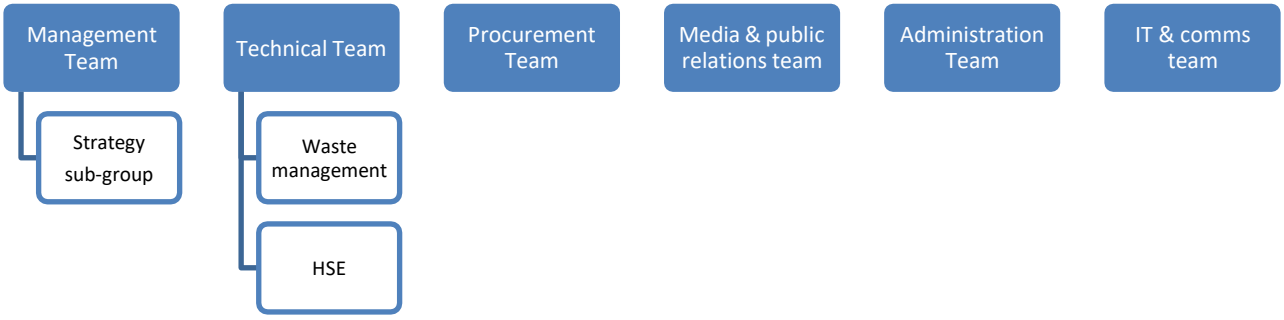


Figure 4: Structure of the Shoreline Response Centre

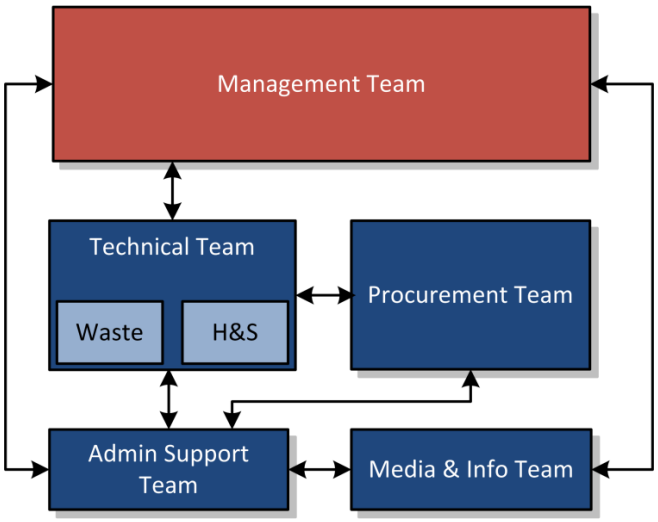


Figure *5:* Communication Links Between SRC Teams

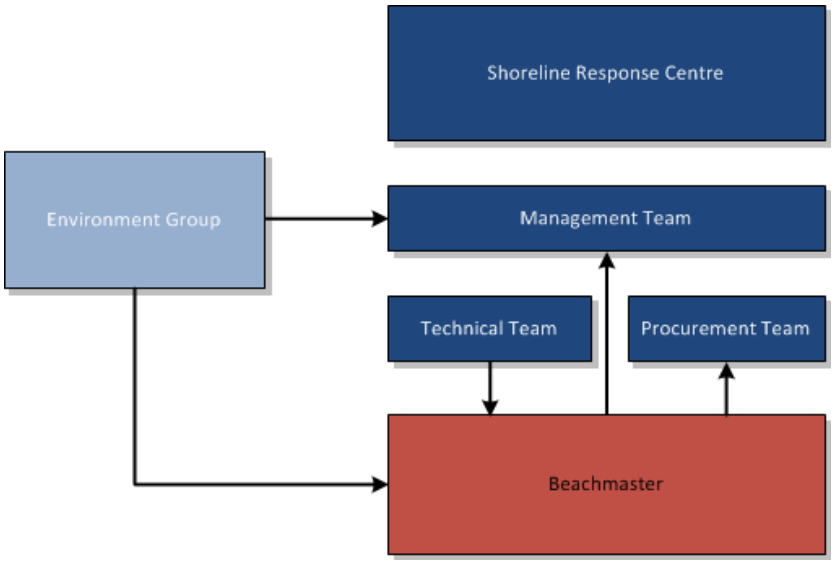


Figure 6: Communication routes in shoreline clean-up

1.14 ACTION CARDS

BEACHMASTER		
Task	Action	Actioned
1.	Attend SRC briefings as requested.	□
2.	Determine communication links with the SRC (Landline, mobile and radio links).	□
3.	Obtain data sheet on the pollutant, including the effects of weathering, emulsification, etc.	□
4.	Ensure that H&S issues are a priority. All accidents and incidents must be recorded and reported as necessary.	□
5.	Identify PPE requirements and request through the Procurement Team.	□
6.	Determine level of knowledge and experience within your squads.	□
7.	Liaise with the SRC regarding setting up appropriate documentation, systems and procedures for monitoring and managing operations.	□
8.	Carry out site based risk assessments and relay information to the appropriate squads.	□
9.	Implement the clean-up strategy as agreed in the SRC.	□
10.	Consider all health & safety actions regarding working near water with heavy machinery etc.	□
11.	Consider the safety of the public in terms of proximity to beach clean-up operations, exposure to contaminated beaches, the safety implications of rescuing oiled birds and the provision of appropriate advice and warning signs	□
12.	Take a record of hours worked and equipment used by each team.	□
13.	Report numbers of live/contaminated wildlife to the SRC.	□

OIL POLLUTION OFFICER		
Task	Action	Actioned
1.	Ascertain/verify all available information and determine level of response required, identify if SRC is required.	□
2.	Activate Briggs Marine Contract.	□
3.	Notify/activate and brief all appropriate services.	□
4.	Arrange for beach surveys to be carried out and for samples of the pollutant to be collected and recorded.	□
5.	Liaise with Finance to keep track of all expenditure.	□
6.	Formulate instructions for implementation of clean up strategy.	□
7.	Nominate Deputy for times you must be away from the SRC.	□
8.	Identify and arrange for Forward Control Centres to be established	□

ANGUS COUNCIL RESILIENCE MANAGER /OFFICER		
Task	Action	Actioned
1.	For Tier 2 and 3 Spills establish with the Council Oil Pollution Officer as to whether there is a requirement to mobilise the SRC.	□
2.	Report to the MRC and make yourself known to the Senior MCA representative	□
3.	Establish communications with the neighbouring councils through the Tayside LRP.	□
4.	Establish links with the Chairs of the Technical Team and Environmental Group	□
5.	Consult with the Oil Pollution Officer to arrange a replacement to cover for your absence from the MRC	□
6.	Provide advice and guidance on emergency planning matters,and ensure the co-ordination of the council's response to the pollution incident.	□
7.	Report to SRC established by a neighbouring local authority as appropriate.	□
8.	Make yourself known to the local authority Oil Pollution Officer.	□
9.	Establish links and reporting procedures with Oil Pollution Officer.	□

ANGUS COUNCIL SERVICE LEADER, ENVIRONMENTAL SERVICES		
Task	Action	Actioned
1.	Establish all available details and whether a Shoreline Response Centre (SRC) will be set up.	□
2.	For Tier 2 and 3 Spills the Council's Director of Vibrant Communities, has to establish whether their presence is required in the office.	□
3.	Arrange regular briefings to ensure the flow of information throughout the incident.	□
4.	Keep the council elected members briefed at all times.	□
5.	This position is responsible for making corporate decisions regarding contracts, media reporting and liaising with underwriters.	□

ANGUS COUNCIL CHIEF EXECUTIVE		
Task	Action	Actioned
1.	Establish all available details and whether a Shoreline Response Centre (SRC) will be set up.	□
2.	Arrange venue, date and time for the first Management Team meeting.	□
3.	Liaise with Council Media Rep to issue initial press release.	□
4.	Liaise with Chief Financial Officer to prepare a report on Councils financial reserves.	□
5.	Advise Emergency Response Co-ordinators of ongoing situation.	□
6.	Arrange Liaison with Tourist Board.	□

ANGUS COUNCIL HEALTH & SAFETY ADVISOR		
Task	Action	Actioned
1.	Obtain a copy of the Safety Data Sheet for the material spilled.	□
2.	Identify PPE for handing polluted material, etc.	□
3.	Arrange for risk assessments to be carried out before work commences on each site.	□
4.	Advise on hygiene, sanitary and welfare arrangements for staff.	□
5.	Set up accident reporting procedure and maintain records of all incidents or sickness.	□
6.	Advise on the safety implications of working within the environment e.g. near water, on beaches and the implications of working with recovery equipment etc.	□
7.	Ensure that there is adequate first aid provision e.g., qualified personnel and first aid kits and equipment.	□

ANGUS COUNCIL ADMINISTRATIVE MANAGER		
Task	Action	Actioned
1.	Call out admin support as necessary, taking into accounted extended hours of working, e.g. longer days, weekends, etc. and set up administrative facilities.	□
2.	Liaise with Functional Team Chairs and specialist individuals within the SRC regarding setting up of appropriate documentation, system.	□
3.	Ensure that all log books, incident logs, beach report forms, minute of meetings, messages, etc., are collected and collated for future reference.	□
4.	Identify a deputy for when you are not present in the SRC.	□
5.	Organise security of the Centre.	□
6.	Produce contact directory for those working within the Centre	□
7.	If requested by MCA, book appropriate hotel accommodation.	□

ANGUS COUNCIL LIASON OFFICER		
Task	Action	Actioned
1.	Report to the MRC and make yourself known to the Senior MCA representative.	□
2.	Establish communications with the Angus Council SRC and confirm your attendance to the Oil Pollution Officer.	□
3.	Liaise with the Administrative Manager regarding the recording and distribution of information both to and from the MRC.	□
4.	Consult with the Oil Pollution Officer to arrange a replacement to cover for your absence from the MRC and delegate your normal duties to another officer.	□

ANGUS COUNCIL FINANCE OFFICER		
Task	Action	Actioned
1.	Liaise with Counter Pollution Branch Logistics Officer.	□
2.	Arrange for the installation of suitable financial control computer and software.	□
3.	Liaise with Functional Teams within the SRC regarding the use of appropriate documentation, systems and procedures for financial control and recording.	□
4.	Liaise with the Administrative Manager regarding the setting up of appropriate documentation, systems and procedures for identifying the authority for expenditure at various locations.	□
5.	Monitor the expenditure system to ensure it operates within existing standing orders.	□
6.	Liaise with Finance Officers from neighbouring local authorities, if appropriate, regarding financial records and control.	□

ANGUS COUNCIL COMMUNICATIONS & MEDIA OFFICER		
Task	Action	Actioned
1.	Arrange for staff to set up the Press Office,	□
2.	Attend the first SRC as advised by the Chief Executive/Oil Pollution Officer.	□
3.	Nominate a deputy to cover your absence from the SRC.	□
4.	Make contact with the MCA Media Team and collate all available information in relation to the response.	□
5.	Identify areas for discussion and advice at Management Team meetings and Prepare first press release.	□
6.	Arrange for briefing of SRC staff, Beachmasters, etc. on how to deal with media inquiries and the need to refer all requests through the Press Officer.	□
7.	Update Council staff on current situation and Arrange for consultation and information to the public.	□

ANGUS COUNCIL PROCUREMENT CHAIR		
Task	Action	Actioned
1.	Liase with Finance Officer re setting up appropriate documentation, systems and procedures for financial control and recording.	□
2.	Obtain details of available Council resources and details of Council approved vehicle and plant hire companies.	□
3.	Nominate a deputy to cover your absence from the SRC and delegate your normal duties to another officer.	□
4.	Arrange in consultation with the MCA a suitable location for the reception of Government Stockpile equipment and other specialist oil pollution clean-up equipment.	□
5.	Arrange and set up appropriate stores facility.	□
6.	Make arrangements for welfare and feeding of operatives at the various beaches.	□

1.15 INITIAL NOTIFICATION

Initial reporting of an incident from an offshore installation will be made by the Operator to various government agencies including DECC, MCA, HMCG etc. This information will be relayed to local authorities via HMCG by telephone and by a copy of the ePON1 form which contains specific information pertaining to the release.

Initial reporting of a vessel in difficulty will likely be relayed to Angus Council from HMCG. This will be facilitated by the duty Counter Pollution and Salvage Officer (CPSO) of the MCA. Notification will likely consist of a telephone call and or/ a faxed/emailed copy of the POLREP pollution report (CG77).
Initial reporting of on land spills are likely to made to Angus Council by the polluting party (road tanker etc.), by the police, by SEPA or by a member of the public.
Figure 7 outlines the communication routes of initial reporting procedures. Contact information is found in Table 6.

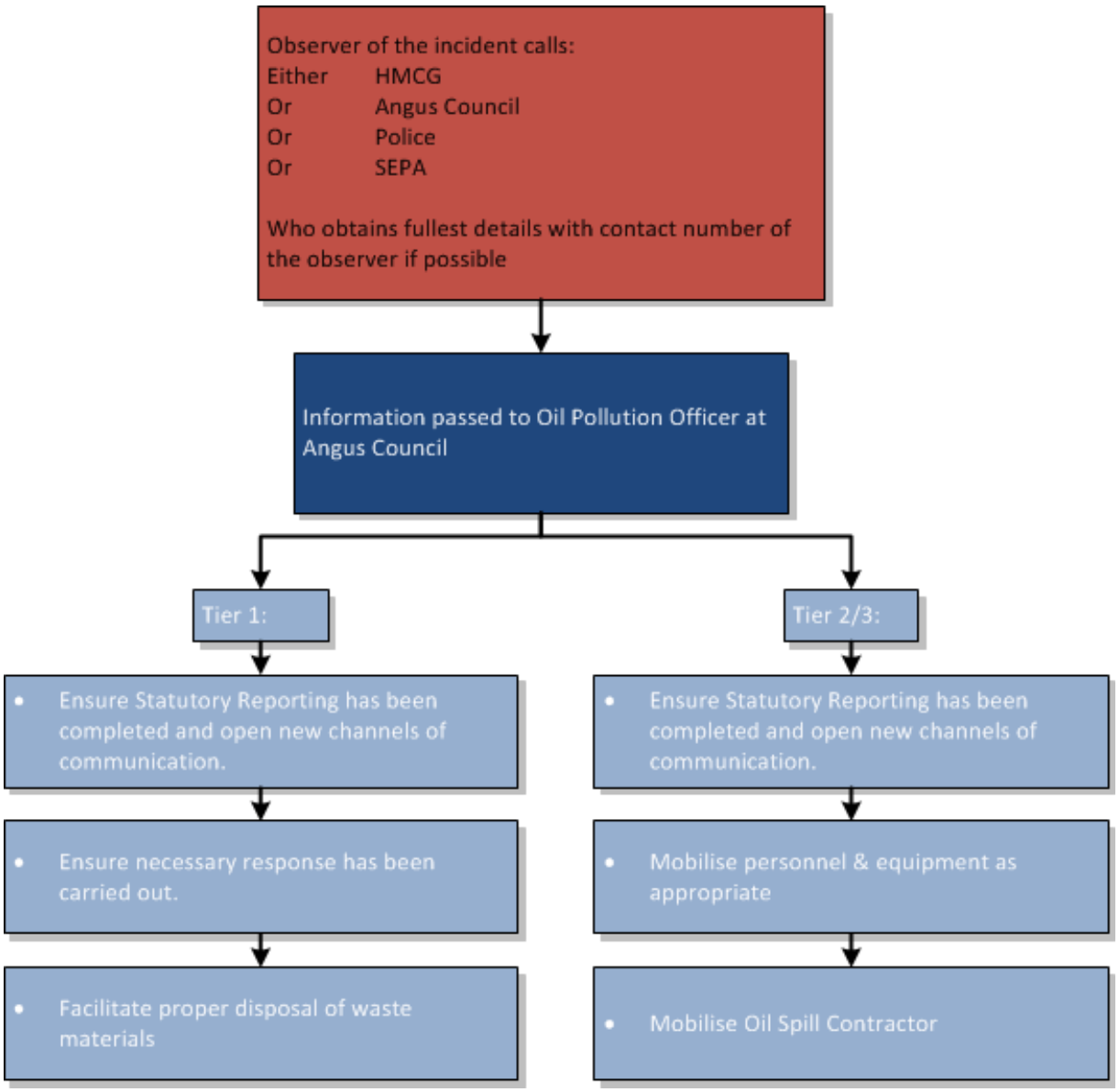


Figure 7: Reporting Procedure for Inland Spills

1.16 Contacts Directory

Table 6 below shows the notification requirements for an offshore spill approaching land. All spills must be reported via the CG77 POLREP form to MCA MRCC Aberdeen.

Significant inland spills that threaten water courses or drainage must be reported to SEPA immediately.

Organisation	Tier 1	Tier 2	Tier 3	Contact Details
MCA CGOC Aberdeen	Telephone & Email	Telephone & Email	Telephone & Email	Telephone: 01224 592334 Email: zone4@hmcg.gov.uk
NatureScot	Telephone & Email	Telephone & Email	Telephone & Email	Telephone: 01224 266500 Email: marinepollution@nature.scot
SEPA	Telephone	Telephone	Telephone	Telephone: 0800 80 70 60 Email: arbroath.admin@sepa.org.uk
Marine Scotland	Telephone	Telephone	Telephone	Telephone: 07770 733423 Email: ms.spillresponse@gov.scot
Aberdeenshire Council	N/A	Telephone	Telephone	Telephone: 0345 08 12 07
Dundee City Council	N/A	Telephone	Telephone	Telephone: 01382 434000
Oil Spill Contractor Briggs Environmental Services Ltd.	N/A	Telephone	Telephone	Telephone: 0800 374 348

Table 5: Notification Matrix

Company / Body Name	Contact	Office Hours	Out Of Hours	Fax
Aberdeenshire Council	Emergency Planning Manager	01261 813271	01261 813271	
Angus Council	Risk Resilience & Safety	07801317126	07623 377479 (Pager)	
Arbroath Harbour VHF Channel 11 & 16	Office	01241 872 166	07753397199	01307 878472
Briggs Environmental Services Ltd.	24 h Duty Manager	0800 374 348	0800 374 348	
Department of Energy and Climate Change (DECC), Aberdeen	Incident Response Desk	01224 254058	01224 254058	01224 254100
Dundee City Council	Risk and Business Continuity Manager	01382 433301	01382 433301	
HM Revenue & Customs Aberdeen	Main	0300 200 3300 (8am – 8pm)		
International Tanker Owners Pollution Federation (ITOPF), London	Main	0207 5666999	075666998 (24 h Emergency Number)	N/A
Joint Nature Conservation Committee, Aberdeen	Marine Pollution Officer	01224 266550	07623 976568 (Pager)	
MCA CGOC Aberdeen	Duty Officer	01224 592334	01224 592334	01224 575920
Marine Scotland Marine Laboratory, Aberdeen	Duty Officer	07770 733423 (Mobile)	07770 733423 (Mobile)	01224 295524
Montrose Port Authority	Harbour Office	01674 672 302	01674 672 302	01674 675 530
Oil Spill Analysis	ERT, Edinburgh	0131 331 5363	N/A	0131 331 5364
Scottish Environment Protection Agency,	Pollution Hotline	0800 807060	0800 807060	
NatureScot Tayside and Grampian Area Manager	Duty Officer	01224 266500	07774161001	01224 895958

Forvie National Nature Reserve Manager	Annabel Drysdale/Catriona Reid	01358 751330		
Royal Society for the Protection of Birds (RSPB).	Main	01224 624824	0131 311 4100 (Switchboard)	0131 311 6569
Scottish Society for the Prevention of Cruelty to Animals (SSPCA).	Chief Superintendent	0131 339 0111	0300 099 9999	0131 339 4777
Skip Hire Services	GRC	01307 462243	01307 432243	
	Binn Skips	01577 830833		
Waste Disposal Contractors	Taylors Industrial Services	01224 872972	01224 872972	01224 872697
	Northburn Industrial Services Ltd.	0870 850 1468	0870 850 1468	01236 441148

Table 6: Contacts Directory

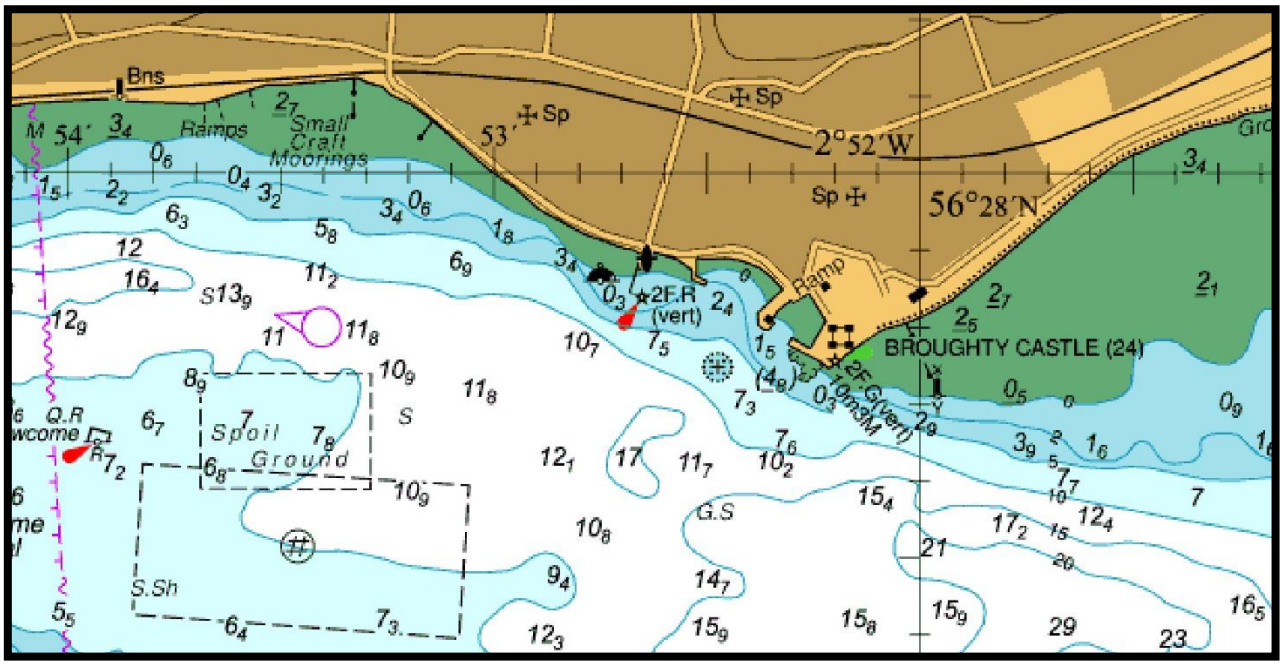
2 RESPONSE SITES

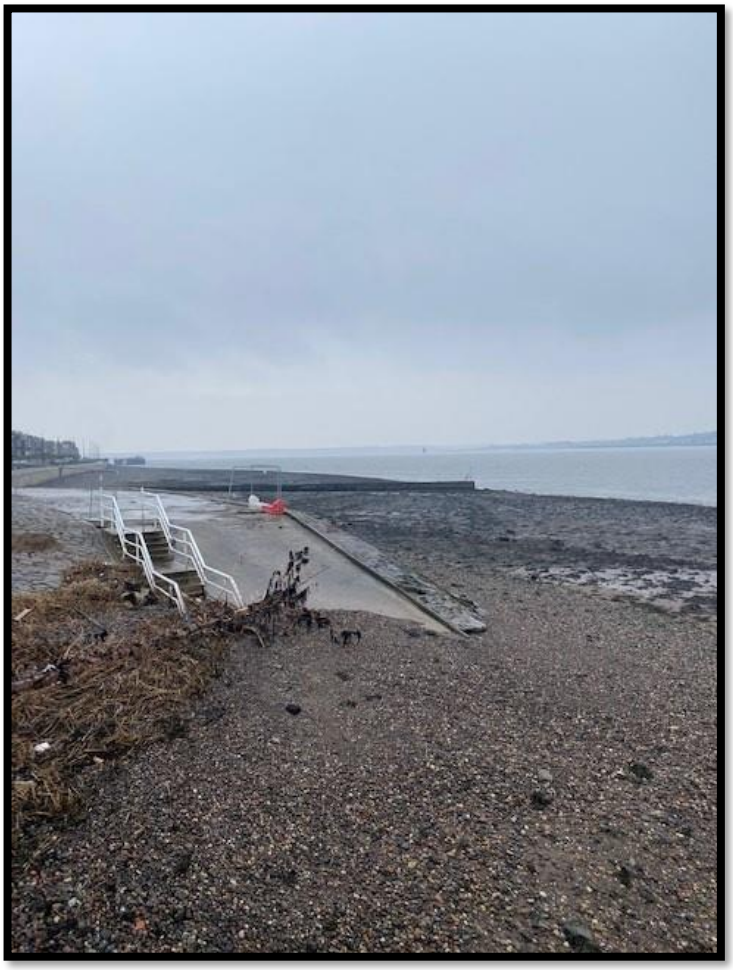
The following sites have been selected as key response sites in the event of on offshore or significant harbour spill. Actual response options will depend on safety concerns, weather and metocean conditions and available personnel & equipment. Defining exact booming points in a plan is very difficult as the response will be very much dependant on the conditions on the day. However local knowledge of where debris naturally collects will give a good indication of where the oil will go. These possible sites could be identified by using the SCAT system (shoreline clean-up assessment technique in Annex 1).

2.1 BROUGHTY FERRY (DUNDEE CITY COUNCIL)

SITE LOCATION	
SITE NUMBER: 1	**SITE NAME**: BROUGHTY FERRY
LATITUDE: 58°28'63"N **LONG:** 02°53'13" W	**ADMIRALTY CHART NUMBER**: 1481-0
ROUTE TO: Access for response personnel and equipment is preferable from the A92 Broughty Ferry Road/A930 Dundee Road W. This provides good access from the North and is the main route for traffic passing through Dundee. Access to the shoreline can be obtained at Douglas Terrace.	
ACCESS TO SHORELINE: The sea wall at Broughty Ferry is backed immediately by residential properties along Douglas Terrace, Fisher Street and Beach Crescent. There is considerable on street parking however access will be limited to vehicles no larger than long wheelbase van & trailer due to narrow roads and limited turning opportunities. There are numerous access points to launch small ribs from the beach to the River Tay including a slipway at Douglas Terrace (access during site visit was prevented by ongoing work and construction fences). Possible access also from Tay Yacht Club. Access may be gained from public path as bollard is removable, path would be narrow and limited to a 4x4 + possible trailer.	
NEAREST TOWN/ VILLAGE: Sufficient accommodation & supplies exist within Broughty Ferry for a sustained response.	**MOBILE/ OTHER COMMUNICATION:** Good coverage around the area for all mobile phone providers.
SITE DESCRIPTION:	
SITE NOTES: The shoreline at Broughty Ferry is predominantly formed by sea wall and sparely vegetated pebble beach. There is an additional fence between the sea wall and the road which further restricts/limits vehicle movements due to the narrow road left, especially when on street parking is considered. Load bearing of the substrate tends to be good and would provide a stable platform for machinery. However due to the tidal range use should be planned accordingly.	
KEY ENVIRONMENTAL DESIGNATIONS/ SOCIO ECONOMIC FEATURES: Firth of Tay and Eden Estuary SAC Firth of Tay and Eden Estuary SPA	
RESPONSE ACTION, RECOVERY & STORAGE	
AIM AND DETAILS OF RESPONSE: Protection of the beach shoreline area by the deployment of protection booms with deflection or shoreline sealing booms established to move any hydrocarbon away from key recreational beach or operational areas to an area where collection can take place such as the unused pier. Local temporary storage points can be established at the Quayside or on Douglas Terrace (space very limited here).	
OIL RECOVERY POINT: The slipway will provide access to the beach for clean-up operations if oil does beach. Recovery operations along the beach front will likely comprise of sorbent booms/pads contamination removal and natural wave driven dispersion. Jetty areas may be suitable for collection/deflection booming with removal by skimmer with adequate storage for fast tanks and equipment.	
TEMPORARY STORAGE AREA: Temporary storage areas can be set up on the beach as it appears to have good load bearing capacity. Douglas Terrace could be a good staging point close to the slipway. Further laydown areas exist on the Quayside with space for fast tanks and OSR equipment.	

ABILITY TO LAUNCH BOAT:
Slipway at Douglas Terrace which could be used at high tide.


Bns
Ramps
Small Craft Moorings
Sp
2°52′W
56°28′N
Ramp
2F.R (vert)
BROUGHTY CASTLE (24)
2F.G (vert)
Spoil Ground
S.Sh
G.S



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2.2 BROUGHTY FERRY CASTLE TO BARNHILL (DUNDEE CITY COUNCIL)

SITE LOCATION	
SITE NUMBER: 2	**SITE NAME**: BROUGHTY FERRY CASTLE TO BARNHILL
LATITUDE: 56°28'05"N **LONG:** 02°51'19" W	**ADMIRALTY CHART NUMBER**: 1481-0
ROUTE TO: Access to Barnhill esplanade is A930 then St Vincent Street & King Street. There are a few bottleneck areas for parked vehicles making HGV access problematic. There is sufficient parking for a variety of vehicles and maneuverers can be completed using either car park.	
ACCESS TO SHORELINE: Access to the shoreline is possible at Castle Approach where vehicles/ machinery of all sizes can reach the beach. There is limited storage potential here however the load bearing appears to be good and there is ample space to carry out recovery and OSR operations.	
NEAREST TOWN/ VILLAGE: Sufficient accommodation & supplies exist within Broughty Ferry & Dundee for a sustained response.	**MOBILE/ OTHER COMMUNICATION:** Good coverage around the area for Vodafone, EE and O2.
SITE DESCRIPTION:	
SITE NOTES: The shoreline at Broughty Ferry/Barnhill esplanade is predominately sandy lower beach with shingle/pebble upper beach and sand dune system. The area has high recreational value with Broughty Castle, dog walkers etc. The dune system has been colonised by Lyme Grass and stops ~200m from Broughty Castle.	
KEY ENVIRONMENTAL DESIGNATIONS/ SOCIO ECONOMIC FEATURES: Firth of Tay and Eden Estuary SAC Firth of Tay and Eden Estuary SPA Firth of Tay and Eden Estuary RAMSAR	
RESPONSE ACTION, RECOVERY & STORAGE	
AIM AND DETAILS OF RESPONSE: Some offshore may be possible with the deployment of shore sealing booms. The most likely response is to remove any significant sheen with sorbent pads and monitor the situation. The response situation will vary depending on the characteristics of the oil.	
OIL RECOVERY POINT: Oil recovery is likely to take place on the beach. Depending on the oil characteristics, this can range from removing sheen with sorbent pads to physically removing contaminated material with JCBs.	
TEMPORARY STORAGE AREA: Temporary storage areas can be set up in the two identified car parks. They provide sufficient space for equipment and vehicle storage and manoeuvres.	
ABILITY TO LAUNCH BOAT: Slipway at Douglas Terrace (please note this is tidal and at low tide boats could not be launched from here). Small RIB can be launched from the beach.	


Legend
Booming Points
Slipways
Beach Access
Laydown Areas
Broughty Ferry Castle to Barnhill
Angus Council
Shoreline Oil Pollution Emergency Plan
Briggs
Angus Council
Comhairle Aonghais
Datum: WGS 1984
Units: Meters
0
250
500 m
N

2.3 MONIFIETH BAY

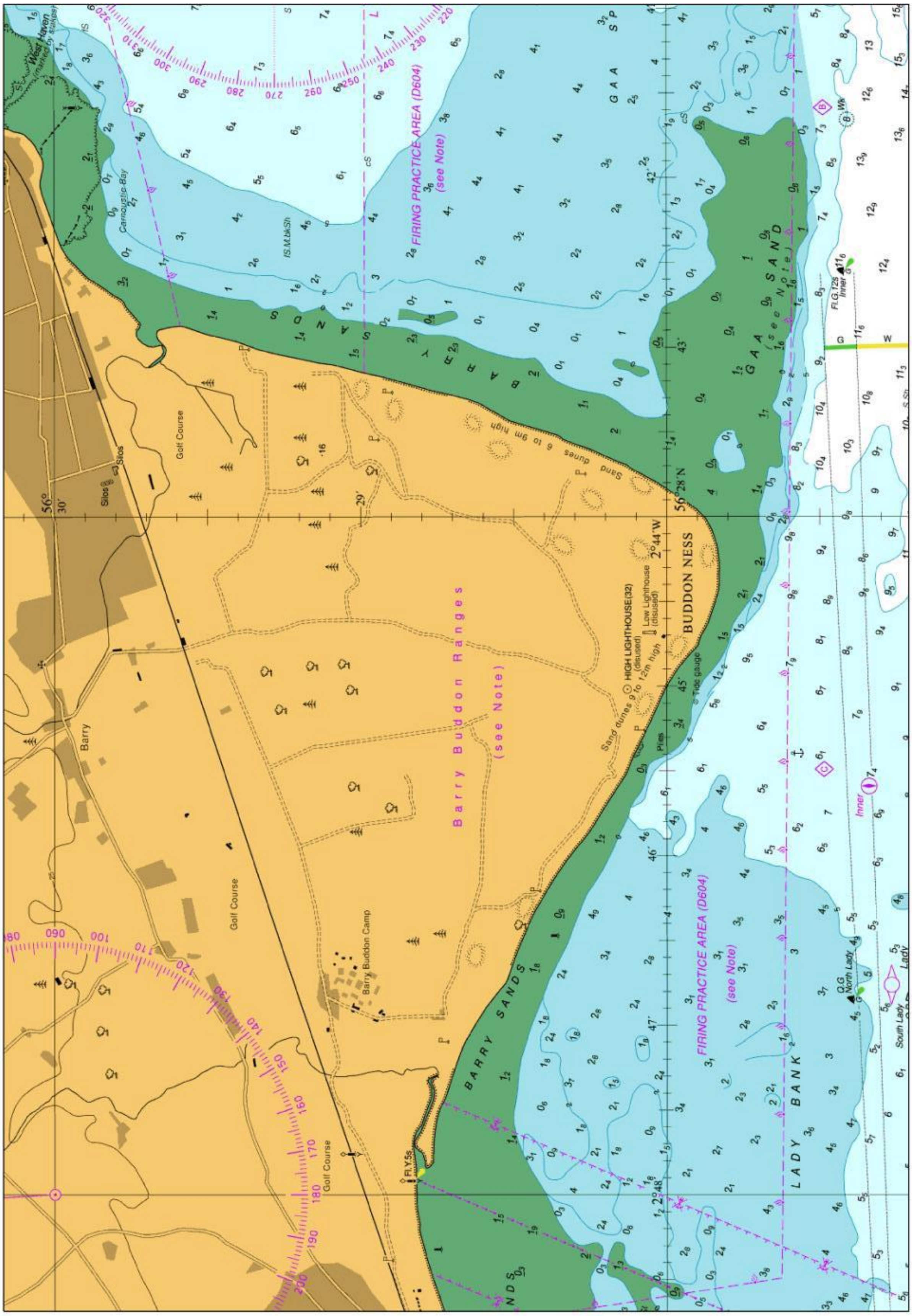
SITE LOCATION	
SITE NUMBER: 3	**SITE NAME**: MONIFIETH BAY
LATITUDE: 56°28'45" N **LONG:** 02°48'40 W	**ADMIRALTY CHART NUMBER**: 1481-0
ROUTE TO: Access to the shoreline is limited to the area around Tayview Caravan Park. This can be reached by the main A92 Arbroath Road, W Grange Road, A930 Tay Street & Marine Drive. Access is limited by 3.2 m low bridge crossing under the railway line.	
ACCESS TO SHORELINE: Access to the shoreline is possible on foot all along this area.	
NEAREST TOWN/ VILLAGE: Sufficient accommodation & supplies exist within Monifieth for a sustained response.	**MOBILE/ OTHER COMMUNICATION:** Good coverage around the area for all mobile phone carriers (3/4G).
SITE DESCRIPTION:	
SITE NOTES: Monifieth Bay has a large intertidal zone characterised by sand flats and low to medium sand dune systems. The largest dune system exists in the middle of the bay and has been encouraged by the planting of marram grass. Access to the beach is difficult and would require 4x4 capabilities depending on the prevailing weather conditions. The area supports winder waders and wild fowl that's food source would be severely affected by a spill beaching at this location. The location is a prominent recreation area for tourists, dog walkers, families etc. Sufficient parking and storage facilities exist in this location, however any response operations would need to be communicated to the local Caravan Park.	
KEY ENVIRONMENTAL DESIGNATIONS/ SOCIO ECONOMIC FEATURES: Monifieth Bay SSSI Firth of Tay and Eden Estuary RAMSAR Firth of Tay and Eden Estuary SAC Firth of Tay and Eden Estuary SPA Barry Links SSSI	
RESPONSE ACTION, RECOVERY & STORAGE	
AIM AND DETAILS OF RESPONSE: Depending on the type and quantity of oil there may be a case for deploying shoreline sealing and or protection booms. If oil is particularly thick and viscous then manual recovery with machinery and hand tools may be undertaken. If oil pollution is diesel then it will likely be left to degrade and evaporate naturally due to the high number of light ends.	
OIL RECOVERY POINT: Access to the shoreline can be provided through the dune system. Access for large machinery is more difficult, hence a manual recovery may have to take place. Access to the beach for large machinery can be taken through the MOD Camp at Barry Buddon with permission and specific arrangements. The use of sorbents cold water flushing is preferable at this location.	
TEMPORARY STORAGE AREA: Temporary storage areas can be set up on the green area adjacent to the caravan park. Storage areas	

on the beach are not recommended due to tidal conditions and soft sand.
ABILITY TO LAUNCH BOAT: Small RIB may be deployed on the beach.

2.4 : BARRY LINKS

SITE LOCATION	
SITE NUMBER: 4	**SITE NAME**: BARRY LINKS
LATITUDE: 56°27'54" N **LONG:** 02°44'46" W	**ADMIRALTY CHART NUMBER**: 1481-0
ROUTE TO: The entire Barry Links peninsula is owned and controlled by the Ministry of Defence as infrantry training base Barry Buddon. Any response within this area would need to be coordinated with the MOD as they have primacy access to this area.	
ACCESS TO SHORELINE: Shoreline access would have to be coordinated with the MOD. MOD Personnel could assist in clean-up operations if appropriate.	
NEAREST TOWN/ VILLAGE: Sufficient accommodation & supplies exist within Carnoustie for a sustained response. MOD facilities may be offered depending on the situation.	**MOBILE/ OTHER COMMUNICATION:** Good coverage around the area for Vodafone, EE and O2.
SITE DESCRIPTION:	
SITE NOTES: The Barry Links peninsula is classified by acidic dune systems and aggressive coastal erosion. In the early 90s rock armour revetment was placed in targeted locations to slow the loss of land threatening the base. Access for the River Tay could be completed by RIB/Landing Craft.	
KEY ENVIRONMENTAL DESIGNATIONS/ SOCIO ECONOMIC FEATURES: Barry Links SSSI Barry Links SAC Firth of Tay and Eden Estuary SAC Firth of Tay and Eden Estuary SPA Firth of Tay and Eden Estuary RAMSAR	
RESPONSE ACTION, RECOVERY & STORAGE	
AIM AND DETAILS OF RESPONSE: Depending on the type and quantity of oil there may be a case for deploying shoreline sealing and or protection booms. If oil is particularly thick and viscous then manual recovery with machinery and hand tools may be undertaken. If oil pollution is diesel then it will likely be left to degrade and evaporate naturally due to the high number of light ends.	
OIL RECOVERY POINT: Access to the shoreline can be provided through the dune system. Access for large machinery is more difficult, hence a manual recovery may have to take place. The use of sorbents cold water flushing is preferable at this location. Any entrance to Barry Links via Monifieth beach would need to be coordinated with the MOD as access is completely restricted to members of the public.	
TEMPORARY STORAGE AREA: Coordination with the MOD necessary.	

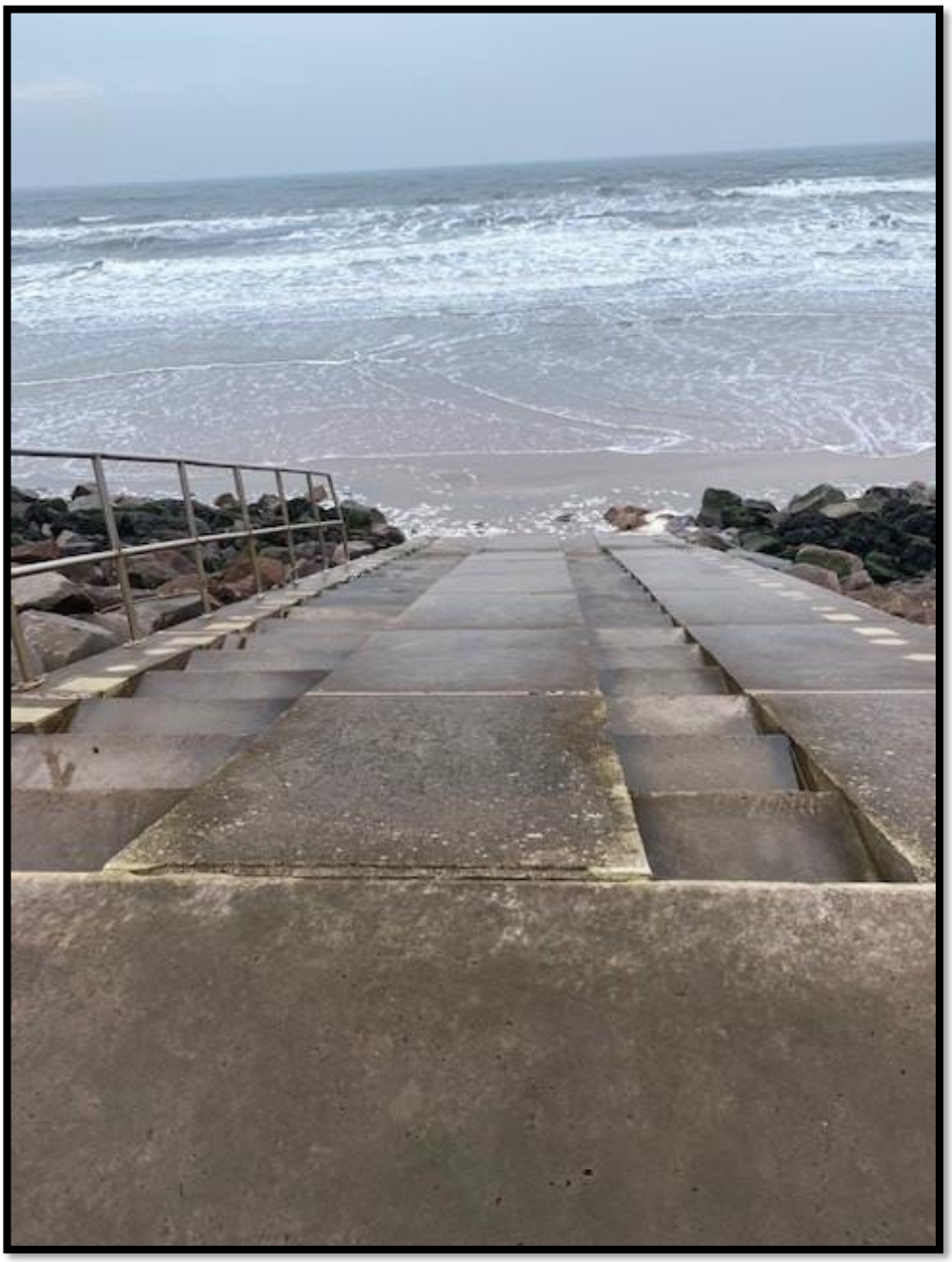
ABILITY TO LAUNCH BOAT:
Small RIB may be deployed on the beach.


FIRING PRACTICE AREA (D604)
(see Note)
GAA SAND
(see Note)
Golf Course
Barry Buddon Ranges
(see Note)
HIGH LIGHTHOUSE (32)
(disused)
Low Lighthouse
(disused)
BUDDON NESS
Barry
Barry Buddon Camp
BARRY SANDS
LADY BANK
FIRING PRACTICE AREA (D604)
(see Note)
Carnoustie Bay
West Haven
Silos
Sand dunes
Piles
Tide gauge
Inner
North Lady
South Lady
56°28'N
2°44'W

2.5: CARNOUSTIE BEACH AND COASTLINE

SITE LOCATION	
SITE NUMBER: 5	**SITE NAME**: CARNOUSTIE
LATITUDE: 56°29'59" N **LONG:** 02°42'25" W	**ADMIRALTY CHART NUMBER**: 1481-0
ROUTE TO: Access from the main A92 is provided by the A930 and Station Road to avoid the low bridge at Ferrier Street.	
ACCESS TO SHORELINE: Access to the shoreline is possible for heavy machinery to the west close to the Barry Burn. A slipway exists next to the sailing club and RIB/landing craft can easily land on the beach. Use of slipway for landing craft would be tide dependent.	
NEAREST TOWN/ VILLAGE: Sufficient accommodation & supplies exist within Carnoustie for a sustained response.	**MOBILE/ OTHER COMMUNICATION:** Good coverage around the area for mobile phone carriers, including 3/4G.
SITE DESCRIPTION:	
SITE NOTES: There are several laydown areas and ample storage facilities. The large green area and car park provide area for large vehicles of all sizes. The wide expansive beach should provide adequate load bearing capacity and there is access to the beach for all kinds of machinery and a slipway for launching vessels. Please note the slipway is steep an can be incredibly slippy.	
KEY ENVIRONMENTAL DESIGNATIONS/ SOCIO ECONOMIC FEATURES: Carnoustie Golf Club. Significant commercial enterprise and large tourist attraction. Recreational amenity that could be negatively affected by coastal marine pollution. Outer Firth of Forth and St Andrews Bay Complex SPA	
RESPONSE ACTION, RECOVERY & STORAGE	
AIM AND DETAILS OF RESPONSE: Depending on the type of oil spilled an appropriate response may be to prevent any hydrocarbons from reaching the shore by the use of shore sealing booms, this is only effective for thick oils (i.e. crude). Shoreline cleanup operations on rock armour revetment are very difficult and the most appropriate response is to monitor and allow for natural dispersion. For light oils (i.e. Diesel) sheen can be targeted with sorbent pads/booms but due to the high number of light ends marine diesel will largely evaporate.	
OIL RECOVERY POINT: Any oil recovery operations will likely take place on the beach. The beach was observed to have good load bearing capability for large JCBs and Dumper trucks. Manual recovery operations can also take place depending on the oil characteristics.	
TEMPORARY STORAGE AREA: Storage space within the Carnoustie Sailing club area is available at the large triangular car park, with sides of approximately 100m, 100m and 40m (1,959m²), adjacent to the golf club. Equipment stored in this area would not be secure; the car park is distant from any busy residential areas. There is 24 hour access to the car park, the area is however unlit. A container will need to be based at the back of the car park which could store all oil spill materials.	
ABILITY TO LAUNCH BOAT: Small RIBs can be launched from the beach at low tide. Slipway exists for larger vessels but must be coordinated with tides. Slipway here is very steep and usually slippy.	


Legend
Booming Points
Slipways
Beach Access
Laydown Areas
Carnoustie
Angus Council
Oil Pollution Emergency Plan
Briggs
Angus Council
Comhairle Aonghais
Datum: WGS 1984
Units: Meters
0
100
200 m
N

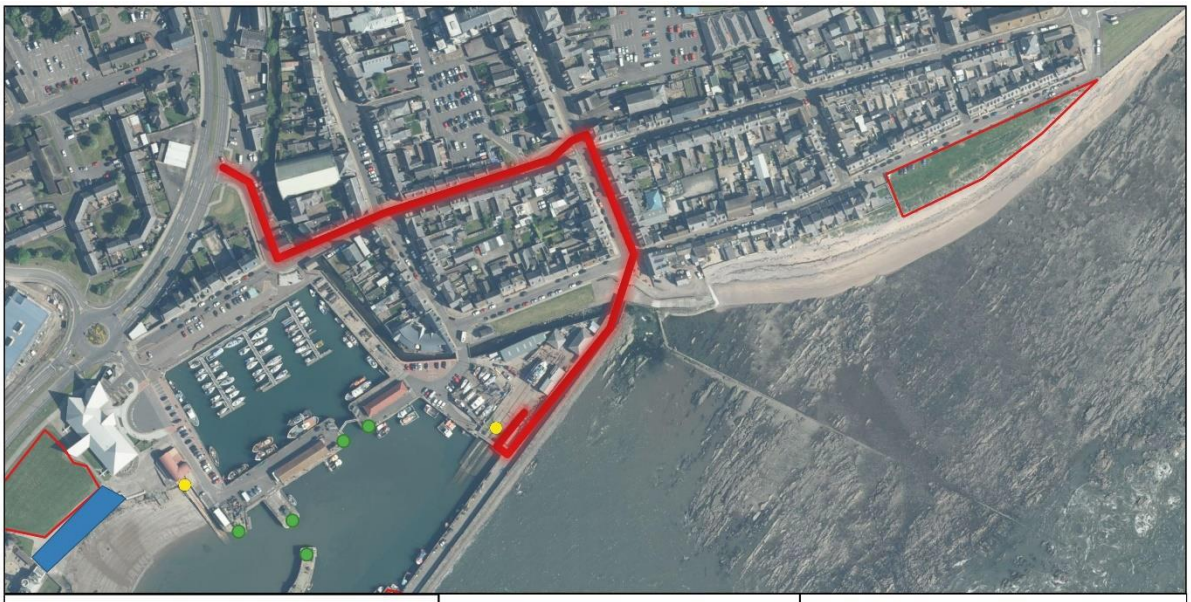


2.6. ARBROATH HARBOUR

SITE LOCATION	
SITE NUMBER: 6	**SITE NAME**: ARBROATH HARBOUR
LATITUDE: 56°33'22" N **LONG:** 02°35'04" W	**ADMIRALTY CHART NUMBER**: 1438-5
ROUTE TO: Arbroath Harbour is located just off the A92.	
ACCESS TO SHORELINE: N/A	
NEAREST TOWN/ VILLAGE: Sufficient accommodation & supplies exist within Arbroath for a sustained response.	**MOBILE/ OTHER COMMUNICATION:** Good coverage around the area for all mobile carriers, including 3/4G.
SITE DESCRIPTION:	
SITE NOTES: Port/harbour facilities. Fishing, sea angling and leisure sailing marina. Tourist information, visitor centre restaurant and retail. All operations will be coordinated with the Harbour Master. The shoreline around the harbour is mainly bedrock and boulders and small areas of shingle and sand, a small area to the left (southwards) is visible at low tides. The piers are narrow and can only accommodate cars mostly with limited room for manoeuvring. Long vehicles are unlikely to gain access to the narrow areas of the harbour. There are several areas of the harbour where stone steps and pier side ladders giving access to vessels of opportunity or local vessels at all states of the tides. The inner harbour is very protected with the inner area almost fully enclosed with a small opening approximately 15m wide, again pier side ladders are available at intervals allowing access to vessels at all states of tides and a slipway in the outer harbour work shipyard area.	
KEY ENVIRONMENTAL DESIGNATIONS/ SOCIO ECONOMIC FEATURES: The harbour area is an important economic and recreational centre. If oil pollution were to enter the harbour, damage resulting from oiling and loss of confidence and public perception would impact the harbour negatively. Outer Firth of Forth and St Andrews Bay Complex SPA	
AIM AND DETAILS OF RESPONSE: Deflection and collection booming to protect harbour entrance.	
RESPONSE ACTION, RECOVERY & STORAGE	
AIM AND DETAILS OF RESPONSE: Due to the protected nature of the Harbour, the chance of oil pollution entering the inner harbour from the sea is remote. 40-50 m of Ro Boom would seal the harbour entrance and a deflection boom could be used to coral any hydrocarbons for recovery.	
OIL RECOVERY POINT: The harbour piers are stone built and oil may permeate interstitial spaces in the stone surfaces. Protecting harbour surfaces with a barrier boom and retaining oil within a sorbent boom or floating rigid boom arrangement may be appropriate. Oil may be recovered using a vacuum tanker on the quayside if collected in a sufficient volume using floating booms or via corralling in a suitable corner of the harbour.	
TEMPORARY STORAGE AREA: Storage space within the harbour area is available at the car park, adjacent to the harbour. There is 24 hour access to the harbour. A container is based on site at the harbour which stores all oil spill materials and Arbroath harbour would activate its Oil Spill Contingency Plan (OSCP).	

ABILITY TO LAUNCH BOAT:

Multiple vessels available in the harbour. A small RIB could be lowered down at the quayside. In the event of an emergency, large slipway could be utilised with Harbour Masters permission and assistance (area would need to be cleared in boatyard) could be done in approx. 15-20 minutes. Access to this slipway will be highlighted in map below.



Legend

- Booming Points
- Slipways
- Beach Access
- Laydown Areas Seaton Cliffs
- Route to slipway

Route that should be taken to access Arbroath Harbour slipway in emergencies

Angus Council
Comhairle Aonghais

Briggs

Legend
- Booming Points
- Slipways
- Beach Access
- Laydown Areas

Arbroath Harbour
Angus Council
Oil Pollution Emergency Plan

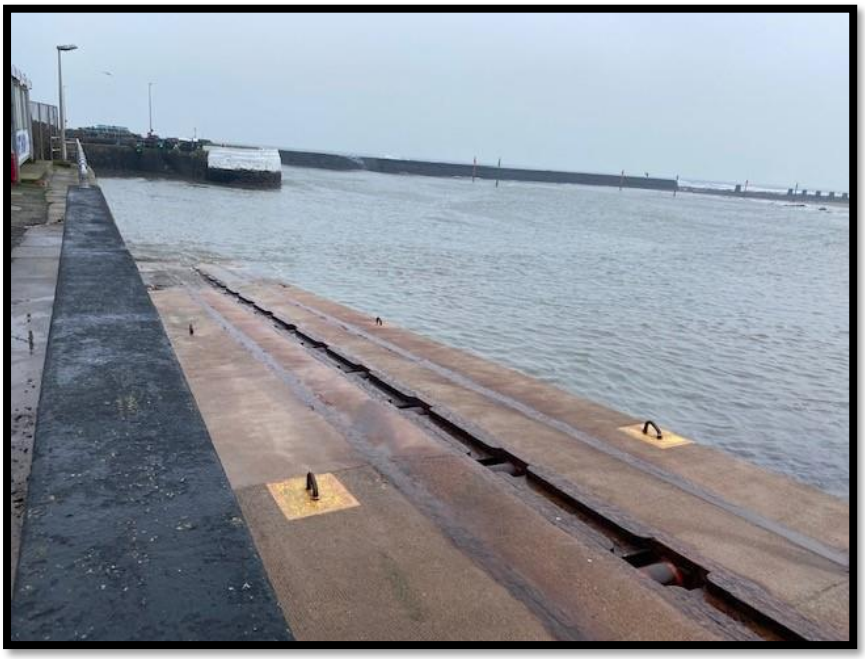
Angus Council
Comhairle Aonghais

Datum: WGS 1984
Units: Meters

0 100 200 m

N

Briggs



2.7. SEATON CLIFFS

SITE LOCATION	
SITE NUMBER: 7	**SITE NAME**: SEATON CLIFFS
LATITUDE: 56°33'40" N **LONG:** 02°33'27" W	**ADMIRALTY CHART NUMBER**: 1438-5
ROUTE TO: Access is available from the main A92, Ladybridge Street, John Street, Union Street E and onto Kings Drive. There are sufficient space and laydown areas for all vehicles at Victoria Park. Some streets in the area are very narrow and access with HGVs would be difficult.	
ACCESS TO SHORELINE: Access to the shoreline is possible at various points in Victoria Park, including 2 concrete slipways (one better for use at low tides). The rocky nature of much of this coastline makes it extremely slippery and caution should be taken if completing manual clean up works.	
NEAREST TOWN/ VILLAGE: Sufficient accommodation & supplies exist within Arbroath for a sustained response.	**MOBILE/ OTHER COMMUNICATION:** Good coverage around the area for all mobile carriers including 3/4G.
SITE DESCRIPTION:	
SITE NOTES: These cliffs are excellent areas for seabirds and wildflowers, consisting of striated layers of red sandstone. Care must be taken here due to high drop off, crumbling shoreline cliffs and lack of access. In most cases this area suits natural dispersal through wave or tidal action. Some response operations could be carried out on the beach at Arbroath golf club but this would likely be limited by access and as such natural dispersion would likely be the most prominent response method.	
KEY ENVIRONMENTAL DESIGNATIONS/ SOCIO ECONOMIC FEATURES: Seaton Cliffs are located within the Whiting Ness – Ethie Haven SSSI site. Cited for excellent examples of Stratigraphy and for aggregations of breeding birds. Outer Firth of Forth and St Andrews Bay Complex- SPA	
AIM AND DETAILS OF RESPONSE: Natural dispersion and manual clean up with sorbent pads and cold water flushing where possible.	
RESPONSE ACTION, RECOVERY & STORAGE	
AIM AND DETAILS OF RESPONSE: The high cliffs along Angus coast and lack of access to the shoreline do not allow for a shoreline response. In the event of an oil spill, given the high wave energy present at the site the best course of action is likely to involve leaving the oil to disperse naturally. A marine oil spill response involving offshore containment may prevent oil from reaching the gravel and boulder scree shorelines at the base of the cliffs.	
OIL RECOVERY POINT: Some manual recovery may be possible along the wave cut platform before the seawall. This area is extremely slippery so care must be taken during operations. Natural dispersion is preferred as a response strategy at this location.	
TEMPORARY STORAGE AREA: Significant parking and storage areas exist in Victoria Park for operations in the foreshore area. Significant clean-up operations along the cliffs are unlikely due to the conditions and tidal variance.	
ABILITY TO LAUNCH BOAT: 3 slipways present, small concrete jetty's for launching small RIBs, 2 are particularly tidal. The furthest	

slipway towards the right shown on the map below would be best for response purposes.

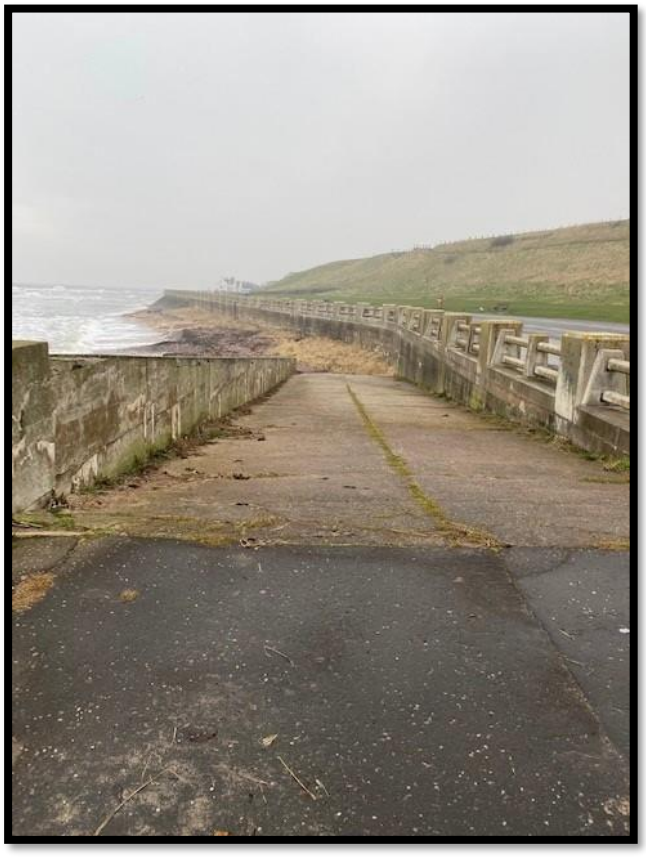
Legend
- Slipways
- Beach Access
- Laydown Areas

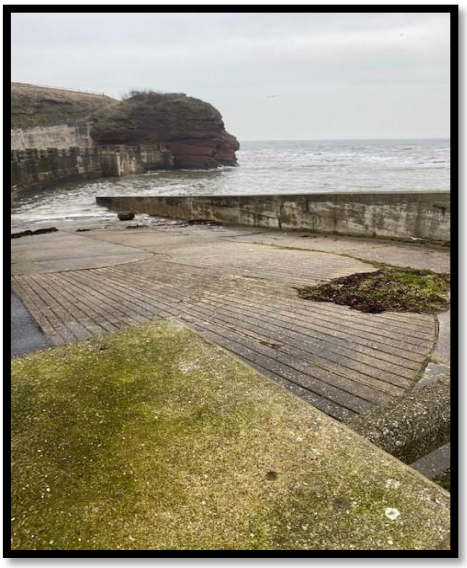
Seaton Cliffs
Angus Council
Shoreline Oil Pollution Emergency Plan

Datum: WGS 1984
Unit: Meters

0 100 200 m

N





2.8. AUCHMITHIE

SITE LOCATION	
SITE NUMBER: 8	**SITE NAME**: AUCHMITHIE
LATITUDE: 56°35'22 N **LONG:** 02°31'11" W	**ADMIRALTY CHART NUMBER**: 190-0
ROUTE TO: Access is available from the main A92, thereafter the roads are secondary and single track. There is a single-track road down to the coastal area but it is hazardous with signs of land subsidence. The single track is blocked by boulders which would need moved.	
ACCESS TO SHORELINE: There is a steep access road to the former harbour where a response could be initiated. A 4x4 is recommended due to the condition of the road surface and access will be weather dependent. No trailers or HGV's would be able to access the shoreline or use the road to this area.	
NEAREST TOWN/ VILLAGE: Sufficient accommodation & supplies exist within Arbroath/Montrose for a sustained response.	**MOBILE/ OTHER COMMUNICATION:** No to poor coverage around the area for mobile carriers.
SITE DESCRIPTION:	
SITE NOTES: Auchmithie sits on top a cliff of red sandstone conglomerate of Devonian date; a characteristic that can be seen along the Angus coast. Approximately 120 feet below is a shingle beach. The pebbles are derived from the weathered cliffs.	
KEY ENVIRONMENTAL DESIGNATIONS/ SOCIO ECONOMIC FEATURES: A former fishing community, still used by locals with small boats (launched from the beach). Potential impact on tourism and recreation.	
RESPONSE ACTION, RECOVERY & STORAGE	
AIM AND DETAILS OF RESPONSE: Natural dispersion and manual clean up with sorbent pads and cold water flushing where possible.	
OIL RECOVERY POINT: OSR operations at this location will be focussed on the beach area and beach clean-up processes. Difficult access will likely result in a low-key response of sorbent booms and pads.	
TEMPORARY STORAGE AREA: Areas for fast tanks and storage but access for large machinery and vehicular access is an issue.	
ABILITY TO LAUNCH BOAT: A rib could be launched from this location from the beach.	


Legend
Booming Points
Slipways
Beach Access
Laydown Areas
Auchmithie
Angus Council
Oil Pollution Emergency Plan
Angus Council
Comhairle Aonghais
Datum: WGS 1984
Unit: Meters
0
75
150 m
N
Briggs


THIS ROADWAY IS UNSAFE IN PLACES
THE ASSOCIATION WILL NOT BE LIABLE FOR VEHICLES OR THEIR OCCUPANTS DAMAGED AS A RESULT OF USE OF THE ROADWAY

2.9. LUNAN BAY

SITE LOCATION	
SITE NUMBER: 9	**SITE NAME**: LUNAN BAY
LATITUDE: 56°39'19" N **LONG:** 02°30'20" W	**ADMIRALTY CHART NUMBER**: 190-0
ROUTE TO: Access is available from the main A92, and an unmarked narrow single tracked road. A car park exists behind the main dune system at Lunan Bay.	
ACCESS TO SHORELINE: No Clear vehicular access exists through the dune system. Any response would need to be carried out on foot.	
NEAREST TOWN/ VILLAGE: Sufficient accommodation & supplies exist within Arbroath/ Montrose for a sustained response.	**MOBILE/ OTHER COMMUNICATION:** No to poor coverage around the area for mobile carriers.
SITE DESCRIPTION:	
SITE NOTES: Lunan beach bay area is an extensive open exposed sandy beach with limited access points to the main beach area. It has extensive sand dune formations. This broad east-facing beach is backed by sand dunes and framed by low cliffs to the north and south. From its northern end, Boddin Point, located about three miles south of Montrose, it extends two miles south to Ethie Haven. The crumbling ruin of Red Castle stands on elevated ground overlooking Lunan Bay and dates from the 12th century. Access to the coastline at Scurdie Ness is not considered possible.	
KEY ENVIRONMENTAL DESIGNATIONS/ SOCIO ECONOMIC FEATURES: Voted Scotland's most beautiful beach in 2010. The sand dune system to the north and south of the Lunan water consists of mobile dunes backed by an established links area. In the northern section there is a thick mantle of Marram Grass. Inland of the mobile dunes the habitat changes into a shorter dune pasture area. The dune habitat also supports a number of invertebrate species, including grasshoppers, earwigs, many species of beetle, butterflies and moths. Cliff headlands bound Lunan Bay and fossil cliffs run along the back of the raised beach ranging from 250m-50 m landward of the High Water Mark. The southern upper raised beach (15 m OD) sits on the fossil cliffs and consists of rough pasture. An extensive area of inter-tidal sand flats runs virtually uninterrupted for 3.5 km of Lunan Bay. There are also areas of estuarine Mud/ Sand Flats, Saltmarsh and Wet Grassland.	
RESPONSE ACTION, RECOVERY & STORAGE	
AIM AND DETAILS OF RESPONSE: Some offshore protection of the beach may be possible through the use of shoreline sealant booms. However the most likely response in this location will be to remove any significant areas of sheen with sorbent pads/ booms. Oils of a ticker viscosity are likely to be collected by manual recovery methods. Any operation to do so must not negatively impact the environment to a worse degree than leaving oil to degrade naturally.	
OIL RECOVERY POINT: OSR operations at this location will be focussed on the beach area. Difficult access will likely result in a low-key response of sorbent booms and pads.	
TEMPORARY STORAGE AREA: There is a car park behind the main dune system which can be used for storage of vehicles and equipment.	
ABILITY TO LAUNCH BOAT: Not recommended at this location. Small rib could be launched from	

beach if required, weather dependent.

Legend
- Booming Points
- Slipways
- Beach Access
- Laydown Areas

Lunan Bay
Angus Council
Shoreline Oil pollution Emergency Plan

Datum: WGS 1984
Unit: Meters

0 75 150 m

N

Angus Council
Comhairle Aonghais

Briggs

2.10. SCURDIE NESS

SITE LOCATION	
SITE NUMBER: 10	**SITE NAME**: SCURDIE NESS
LATITUDE: 56°42'05" N **LONG:** 02°26'13" W	**ADMIRALTY CHART NUMBER**: 1438-5
ROUTE TO: Access is available from the main A92, roads within the immediate area are narrow, suited for one vehicle.	
ACCESS TO SHORELINE: No clear vehicular access exists as it is a private road and very narrow (8 foot wide). No passing places. From point of possible vehicular access there would be a 1 mile walk to access site and carry equipment to.	
NEAREST TOWN/ VILLAGE: Sufficient accommodation & supplies exist within Montrose for a sustained response.	**MOBILE/ OTHER COMMUNICATION:** No to poor coverage around the area for Vodafone, EE and O2.
SITE DESCRIPTION:	
SITE NOTES: The coastline from Scurdie Ness to Rickle Craig has been designated a Site of Special Scientific Interest. There is a small access road down to the coastal area but the beach is fenced off so access is a major issue. This rocky stretch of coastline is of particular importance for the range of saltmarsh communities present and for the examples of unimproved and species-rich maritime cliff grassland vegetation which support a wide range of uncommon plants. These areas of rich vegetation also support a diverse mollusc fauna. The site also contains important examples of exposures of igneous rocks of Devonian age which includes an area where the mineralogy of agates can be studied.	
KEY ENVIRONMENTAL DESIGNATIONS/ SOCIO ECONOMIC FEATURES: Scurdie Ness is a Geological Conservation Review (GCR) site. The Old Red Sandstone, lavas and associated sedimentary rocks found there are part of the Montrose Volcanic Formation. Tourism and recreation would be affected by a spill. Rickle Criag- Scurdie Ness SSSI	
RESPONSE ACTION, RECOVERY & STORAGE	
AIM AND DETAILS OF RESPONSE: Some offshore protection of the beach may be possible using shoreline sealing booms. This would use vessels deployed from Montrose Port Authority. A beach response could also occur here to remove any significant areas of sheen with sorbent pads/booms. Access to the beach would likely be best from a landing craft as the beach is a 1 mile walk from the nearest vehicle access. Oils of a thicker viscosity are likely to be collected by manual recovery methods. Any operation to do so must not negatively impact the environment to a worse degree than leaving oil to degrade naturally.	
OIL RECOVERY POINT: OSR operations at this location will be focussed shoreline sealing booms/booms to protect Montrose Port Authority entrance. Difficult access will likely result in a low key	

response of sorbent booms and pads.
TEMPORARY STORAGE AREA: Areas for fast tanks and storage but access is an issue.
ABILITY TO LAUNCH BOAT: If the use of a boat is required at this site a vessel of opportunity or a Briggs vessel should be launched from Montrose Port Authority.

2.11. MONTROSE BASIN

SITE LOCATION	
SITE NUMBER: 11	**SITE NAME**: MONTROSE BASIN
LATITUDE: 56°42'25" N **LONG:** 02°28'36" W	**ADMIRALTY CHART NUMBER**: 190-0
ROUTE TO: Access is available from the main A92, A934 and the A935 to the northern shore of the basin.	
ACCESS TO SHORELINE: Access is possible at both landfalls of the railway bridge. Access is also possible at the nature reserve on the southern edge of the basin. Access is more difficult on the northern edge of the basin, landowner cooperation would need to be negotiated.	
NEAREST TOWN/ VILLAGE: Sufficient accommodation & supplies exist within Montrose for a sustained response.	**MOBILE/ OTHER COMMUNICATION:** Good to excellent coverage around the area for Vodafone, EE and O2.
SITE DESCRIPTION:	
SITE NOTES: Montrose basin is an internationally important site cited for its mudflats and aggregations of wild fowl. The extremely strong tidal flow would make booming across the river extremely difficult and likely ineffective. Shoreline clean-up operations can be mustered from several sites and there is sufficient supplies and equipment available within Montrose to initiate a response.	
KEY ENVIRONMENTAL DESIGNATIONS/ SOCIO ECONOMIC FEATURES: Montrose Basin, as well as being an LNR, is also a Special Protection Area under the European Birds Directive. Partnership is key to managing the site, as many individuals and organisations have an interest in the LNR. Around 300 Mute Swans overwinter on the Basin. The Montrose Basin is part of the estuary of the South Esk forming a tidal basin near to the town of Montrose, Angus, on the east coast of Scotland. The nature reserve in this embayment is internationally important for Pink-footed Geese, Red Knot and Common Redshank and is nationally important for Common Shelduck, Wigeon and Common Eider Ducks. It is also popular with Mute Swans, Oystercatchers and Northern Lapwings as well as smaller birds. Breeding birds are preyed on by Peregrine Falcons and Sparrow hawks. Montrose Basin: SSSI Montrose Basin: RAMSAR Montrose Basin: SPA Montrose Basin: Scottish Wildlife Trust Reserve	
RESPONSE ACTION, RECOVERY & STORAGE	
AIM AND DETAILS OF RESPONSE: The Montrose Basin is a unique and extremely sensitive site. Oil spill response operations within the basin are not recommended. The tidal flow makes booming almost impossible and manual recovery and OSR is likely to cause significant disruption to breeding birds. The mudflats are likely to sink underfoot making manual clean-up hazardous. A spill in this location would likely activate the Montrose Port Authority OSCP and they should be alerted to all spills within the basin. Any operations in this area should be coordinated with the basin rangers who have an extensive knowledge of the area.	

OIL RECOVERY POINT: Oil recovery at this location is very unlikely due to the sensitive nature of the site.
TEMPORARY STORAGE AREA: If OSR operations prove to be appropriate then temporary storage areas exist along the southern edge of the basin at the nature reserve and at the rail bridge.
ABILITY TO LAUNCH BOAT: A slipway does exist as marked on the map below although this would only be able to use at high tide**.** Alternatively**,** vessels can be launched from Montrose Port Authority which would be able to access the area.


40

2.12. MONTROSE BEACH

SITE LOCATION	
SITE NUMBER: 12	**SITE NAME**: MONTROSE BEACH
LATITUDE: 56°42'44" N **LONG:** 02°56'52" W	**ADMIRALTY CHART NUMBER**: 190-0
ROUTE TO: Access to Montrose Bay is possible at several locations. The preferable site to launch OSR operations is the promenade at Trail Drive.	
ACCESS TO SHORELINE: No Clear vehicular access exists through the dune system. Any response would need to be carried out on foot.	
NEAREST TOWN/ VILLAGE: Sufficient accommodation & supplies exist within Montrose for a sustained response.	**MOBILE/ OTHER COMMUNICATION:** Good phone coverage around the area for mobile carriers, including 3/4G.
SITE DESCRIPTION:	
SITE NOTES: The esplanade at Trail Drive has sufficient open space and access points to mount OSR operations. This location has been heavily influenced by aggressive coastal erosion and hard engineering coastal defences. Some success has been achieved in protecting the GlaxoSmithKline plant to the south, however large-scale erosion is occurring to the north. The local amenity value of the location is high and the presence of oil pollution would be detrimental to the amenity value of the land and may disrupt tourism. The aggressive wave action would give rise to natural dispersion as a response strategy. Clean up through the use of sorbents and manual recovery could compliment flushing as a response strategy.	
KEY ENVIRONMENTAL DESIGNATIONS/ SOCIO ECONOMIC FEATURES: High recreational value with various sporting and leisure activities.	
AIM AND DETAILS OF RESPONSE: Natural dispersion and manual clean up with sorbent pads and cold water flushing where possible.	
RESPONSE ACTION, RECOVERY & STORAGE	
AIM AND DETAILS OF RESPONSE: Depending on the type of oil spilled an appropriate response may be to prevent any hydrocarbons from reaching the shore by the use of shore sealing booms, this is only effective for thick oils (i.e. crude). Shoreline cleanup operations on rock armour revetment are very difficult and the most appropriate response is to monitor and allow for natural dispersion. For light oils (i.e. Diesel) sheen can be targeted with sorbent pads/booms but due to the high number of light ends marine diesel will largely evaporate.	
OIL RECOVERY POINT: The beach area will be the focal point for OSR operations with manual clean-up or recovery of light sheens light absorbent pads. Responding to spills within the rock armour revetment is extremely difficult and will likely be left to degrade naturally. This area experiences very powerful wave action will would accelerate the weathering process of hydrocarbons.	
TEMPORARY STORAGE AREA: The promenade area has sufficient parking and storage locations for sustained OSR operations.	
ABILITY TO LAUNCH BOAT: Vessels can be sourced from Montrose Port Authority and small RIBs can be launched from the Beach.	

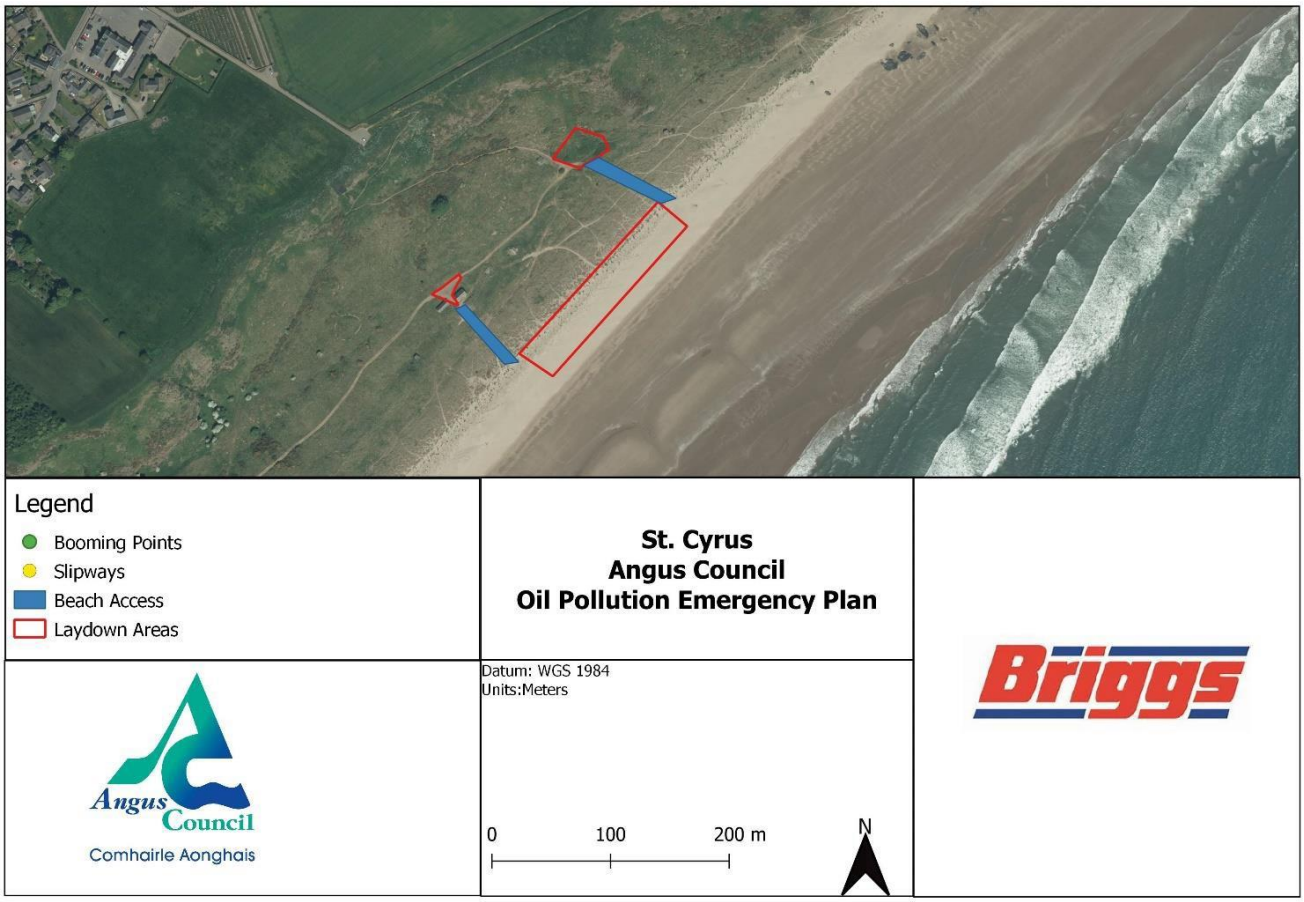

Legend
Booming Points
Slipways
Beach Access
Laydown Areas
Montrose Beach
Angus Council
Oil Pollution Emergency Plan
Datum: WGS 1984
Units: Meters
0
100
200 m
N
Angus Council
Comhairle Aonghais
Briggs


ROAD
AHEAD
CLOSED

2.13. ST CYRUS BEACH RESERVE (ABERDEENSHIRE COUNCIL)

SITE LOCATION	
SITE NUMBER: 13	**SITE NAME**: ST. CYRUS RESERVE
LATITUDE: 56°46'22" N **LONG:** 02°24'27" W	**ADMIRALTY CHART NUMBER**: 190-0
ROUTE TO: Access to St Cyrus Nature Reserve is by the main A92 and a very narrow local road. Vehicles would have to be no larger than Van/4x4 + Trailer.	
ACCESS TO SHORELINE: Is limited to a rough track which is unsuitable for most vehicles (4x4 only) and only reaches to dunes where equipment will then need manually handled to beach. Launching of craft via sandy beach or via difficult periods of incremental weather with strong south and south westerly winds will be difficult.	
NEAREST TOWN/ VILLAGE: Sufficient accommodation & supplies exist within Montrose for a sustained response. Local accommodation & supplies are limited.	**MOBILE/ OTHER COMMUNICATION:** Fair coverage around the area for most mobile phone carriers.
SITE DESCRIPTION:	
SITE NOTES: St Cyrus NNR (National Nature Reserve) lies between the village and the North Sea. The cliffs and dunes provide a nationally important habitat for flowering plants and insects. Traditional salmon fishing with nets is still conducted from St Cyrus beach.	
KEY ENVIRONMENTAL DESIGNATIONS/ SOCIO ECONOMIC FEATURES: St Cyrus National Nature Reserve (NNR) is on the Aberdeenshire coast approximately 7 km north of Montrose. The Reserve is a 2.5 km sweep of golden sands, backed by extensive dunes and species rich grassland, sandwiched between the North Sea and towering inland cliffs. Within its narrow confines nature has combined one of the most beautiful coastlines of North Eastern Scotland with an extraordinary wealth of wildlife. On a clear day, the view from the top of the cliffs looking over the Reserve is stunning. The ridge of sand dunes and the cliffs provide shelter creating an unusually warm climate for this part of Scotland. These warm conditions mean St Cyrus is one of the richest botanical sites on the northeast coast of Scotland. A rich insect fauna parallels the diversity of plants. The Reserve is home to several rare plant and insect species, some of which are at their northern limit in Britain. The Reserve also supports a variety of breeding birds. St Cyrus and Kinnaber Links: SSSI St Cyrus: National Nature Reserve	
RESPONSE ACTION, RECOVERY & STORAGE	
AIM AND DETAILS OF RESPONSE: Responding at this location is difficult due to the narrow access roads and rough tracks make passage unsuitable for larger vehicles. The area is an extremely sensitive habitat and OSR operations may cause more damage to this habitat while reaching the beach than would be caused by an oil spill. If sheen can be cleared without causing disruption to the reserve then this is the preferable response option. Large scale, mechanical recovery is not preferred.	
OIL RECOVERY POINT: Small scale beach recovery is possible.	

TEMPORARY STORAGE AREA: Storage is limited to car parks for visitor centre. Storing OSR vehicles and equipment within the reserve is not recommended.
ABILITY TO LAUNCH BOAT: Small RIBs can be launched from the Beach



2.14 RESPONSE TO INLAND OIL SPILLS

Inland spills can be very much more difficult to clean up than marine spills. This depends upon various factors e.g. local geology, soil structure, angle of the surface, depth to ground water and access to the impacted areas. Presented below are a few causes of oil spills inland:

From Left to Right Illegal dumping, insufficient bunding, and bad storage oil changes in the street.

As with most emergency situations, the initial hours after the incident are typified by a certain amount of confusion due to the lack of reliable information. This situation influences the decisions of the clean-up team leader which ultimately reflects on the performance of the team during the event. The following items should help ensure those in charge of the operation initiate the most appropriate actions quickly and efficiently at the beginning.

- The team and its leader have a detailed working knowledge of the area for which they are responsible.
- They are fully conversant with the alternative methods of control available to them.
- An adequate communication system is in place.
- The priority of specific emergency measures is established.
- The basis of an integral clean up system has been established.
- Alternative strategies for a number of situations have been prepared.

CLEAN UP OPERATIONS

One area that has a direct bearing on the performance of the team is the planned deployment of personnel and equipment to ensure there most effective use and the continued operation of a clean-up team.
In any incident where oil is being recovered there are a number of physical tasks that must be carried out to assure success.

- Booming or oil containment.
- Recovery of oil or oil/ debris.
- Temporary storage.
- Transport of recovered material to permanent storage or treatment centre.
- Treatment of oiled material.

EMERGENCY MEASURES

Whilst the whole process of cleaning up an oil spill may take a long time, there are a number of actions that need to be taken immediately which ensure that future actions can be carried out with the minimum risk to both the team and other life in the vicinity.

ISOLATE SOURCE

It is essential that the source of the oil is identified and, where possible, further leakage prevented. In some cases a tank may have lost all its contents, but in many cases the leak is identified before the total loss occurs. Every attempt should be made to stop the release of oil, either by plugging the hole, closing the valves, or deflecting the oil into an alternative containment area. Depending on where the spill is coming from, it may be possible to close valves in the pipe work to stop, or minimise, the amount of material being spilt.

FIRE AND EXPLOSION

In any event where oil is spilled safety must be of prime consideration and all appropriate measures taken.

- Liaison with the authorities at the spill site must be maintained particularly with the fire service and police.
- Where there is any possibility of the presence of a flammable mixture the atmosphere should be checked with an explosimeter.
- Until the area is known to be safe only certified flame proof or intrinsically safe equipment must be used in the danger area (cameras, tape recorders and radios may not be safe).
- Until it is certain that there is no risk of an explosion or fire, sources of ignition should not be allowed in the area and all engines should be turned off.
- Traffic should be stopped or diverted.
- Warning notices and No Smoking signs should be displayed, and public access limited.

ECOLOGICAL CONSIDERATIONS

A few useful points to consider:

- Where wildlife is affected, any action should be in full consultation with the appropriate expert or organisation.
- In general, oil will be collected among the vegetation along the river banks and lakes and on the trunks of trees close to the water's edge.
- Where oil is spilt in or near agricultural land, there may be adverse effects on crops and remediation will be required.
- Where pasture land is adjacent to the contamination, the banks should be fenced off to prevent livestock eating oiled vegetation or drinking contaminated water.

COMMUNICATIONS

In the event of a large spill, the team will have to coordinate remedial measures and clean-up activities. Investigations have to be made into oil movement, including how far it has gone and whether it has reached

or is likely to reach, one or more water courses. It is important that the decision makers know all the geographical and physical features of the area and the leader must know at all times what personnel and equipment is available to counter the spill. Because rapid and coordinated actions give the best results and lowest costs, effective communications are essential. The leader of operations should have a communications centre at his base. All reports from the field are received and analysed there, this enables the leader to ensure that up to the minute directives are given to the operators in every location where remedial action is taking place.

POINTS TO REMEMBER

- The oil spill leader must have good communications.
- The Emergency Services will operate on the same system and frequency.
- When positioning mobile communications take into account the possibility of radio shadows cause by buildings, large trees, valleys etc., and the associated aerial must be erected in an unshielded position.
- Spare batteries and chargers should be issued.
- In an emergency all messages should be relayed quickly and briefly so communication lines are not blocked.

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3 DATA DIRECTORY

3.1 SHORELINE TYPES

The following ratings have been applied to the various shoreline types around NE Scotland and in particular the Angus Council coastline Area of Jurisdiction following field surveys in October 2013. Where several shoreline types exist on the same beach or localised area *i.e.* rock and bedrock areas flanking compacted sand this will receive a rating of "*2 and 3*". This rating table has been adapted to include man-made structures and sea cliffs which were not considered in the original table. Some shorelines, owing to their position and composition, act as natural catchments for litter and dislodged seaweeds and any oil pollution will be carried there in the same way. Natural gullies and open spaces in the beach strata, such as between or under rocks, will also act as natural collection points and the oil can potentially penetrate deep into the beach substrate.

The Angus coastline extends from Milton Ness in the North to the Dighty Burn, Balmossie in the South. The Council boundaries extend slightly beyond the Angus coast because they have been set to ensure that it is coastal processes that influence management recommendations rather than local authority boundaries. The Council includes part of Broughty Ferry castle, which is within Dundee City Council's jurisdiction and extends to the northern extent of which is at Milton Ness within Aberdeenshire Council's jurisdiction. The coastline changes significantly to the north of Milton Ness, where it becomes rocky with very few beaches, contrasting with the wide beaches at St Cyrus, Montrose and Lunan Bay. The southern boundary is characterised by a rocky coastline. Moving south again between Arbroath and Broughty Ferry extensive links areas run along most of the backshore.

The Angus coastline has several features that contribute to making it a particularly important coastal resource locally, nationally and internationally, which must be taken into account when developing such as:

- A large proportion of the Angus coastline is designated so as to protect the natural heritage interests found along it. Areas such as Sites of Special Scientific Interest (SSSI), Ramsar sites and Local Nature Reserves like Montrose Basin. The Firth of Tay as well as the Eden Estuary are now Special Protection Areas (SPA). The international importance of this part of the Angus Coast is further outlined with Barry Links becoming a confirmed SAC.
- It is a popular settlement area, with four out of seven of the major Angus towns located on the coast.
- There are four Golf Links in Angus, including Carnoustie and Montrose links, which are important recreational and economic resources for the area.
- There are a large collection of archaeological sites and sites of historic value that are located along the Angus coastline.
- The coast is an important informal recreation resource for the people of Angus, particularly the large sandy beaches, e.g. Montrose and Lunan Bay, which are particularly popular during the summer months

TABLE 1: SHORELINE TYPES AND VULNERABILITY

Vulnerability Index	Shoreline Type	Comments
1	Sea cliffs/ exposed rocky headlands	Wave reflection keeps most of the oil offshore. No clean-up is necessary.
2	Eroding wave-cut platforms	Wave swept. Most oil removed by natural processes within weeks
3	Fine-grained sand beaches	Oil does not penetrate into the sediment, facilitating mechanical removal if necessary. Otherwise, oil may persist for several months.
4	Coarse-grained sand beaches	Oil may sink and/ or be buried rapidly making clean-up difficult. Under moderate to high energy conditions, oil will be removed naturally within months from most of the beach.
5	Urban or human built environment	Oil may adhere to the man-made structures. Clean-up is usually necessary.
6	Exposed, compact tidal flats	Most oil will not adhere to, nor penetrate into the compacted tidal flat. Clean-up is usually necessary.
7	Mixed sand and gravel beaches	Oil may undergo rapid penetration and burial. Under moderate to low energy condition, oil may persist for years.
8	Gravel beaches	Same as above. Clean-up should concentrate on the high tide swash area. A solid asphalt pavement may form under heavy oil accumulations
9	Boulder and scree shoreline	Areas of reduced wave action. Oil may persist for years. Clean-up is not recommended unless oil concentration is very heavy.
10	Sheltered tidal flats	Areas of great biological activity and low wave energy. Oil may persist for many years. Clean-up is not recommended unless oil accumulation is very heavy. These areas should receive priority protection using booms or oil sorbent materials.
11	Salt marshes and seagrass beds	Most productive of aquatic environments. Oil may persist for years. Cleaning of salt marshes by burning or cutting should only be undertaken only if heavily oiled. Protection of these environments by booms or sorbent material should receive first priority.

SOURCE: ADAPTED FROM: GUNDLACH & HAYES (1978).

TABLE 2: DISTRIBUTION OF MARINE SEDIMENTS

Location	Coastal processes
Milton Ness to Montrose Harbour	Open coastline characterised by a beach dune system along virtually the entire length. Littoral processes dominated by North Sea wave conditions although tidal currents are an important process at the southern end at the outlet of Montrose Basin and Annat Bank. Net longshore transport tends to be to the north but is very sensitive to small changes in the wave climate that affect the rate and pattern of erosion at the southern end of Montrose Bay. Little sediment is lost to the north around Milton Ness. The extent of the interchange of sediment between Montrose Bay and Montrose Basin is not known but is unlikely to be significant.
Montrose Basin	Tidal basin with littoral processes dominated by tidal currents, flows from the River South Esk and locally generated wind wave conditions. Montrose Basin tends to be a "sink" for fine sediments. Unlikely to be any significant interchange of sediment between the beaches in Montrose Bay and Montrose Basin.
Scurdie Ness to Rickle Craig	Cliff coastline dominated by wave processes. Cliffs do not supply any appreciable amount of sediment to the beaches in Montrose Bay or Lunan Bay and effectively block any interchange of beach sediment
Rickle Craig to Lang Craig	Self-contained beach unit with little interchange of beach sediments between adjacent units due to the cliff nature of the coastline to the north and south. Lunan Bay is relatively stable with little loss or gain of beach sediments and a near neutral net longshore transport.
Lang Craig to Whiting Ness	Cliff coastline dominated by wave processes. Cliffs do not supply any appreciable amount of sediment to the beaches in Lunan Bay or to the coastline south of Arbroath and effectively block any interchange of beach sediment.
Whiting Ness to West Haven	Open coastline characterised by sand/ shingle beach with a rock platform along part of the frontage. Net longshore transport tends to be towards the south-west, with sediment processes generally dominated by wave conditions. It is possible that tidal flows have some influence in sediment transport processes towards the southern boundary. At West Haven there is likely to be a small interchange of beach sediments
West Haven to Buddon Ness	Open coastline characterised by a wide sand beach with much of the hinterland protected by coastal defences. Littoral processes dominated by a complex interaction of wave conditions and tidal currents. Wave induced net longshore transport tends to be to the south along the outer part of Barry Links but can be to the north along the Carnoustie frontage. An anti-clockwise tidal gyre due to strong ebb flows from the Tay Estuary results in a near continuous southward tidal current, and transport of sediment within Carnoustie Bay. At Buddon Ness the influence of wave conditions from the north-east quadrant of the North Sea diminishes with the change in orientation of the coastline. At Buddon Ness, beach sediment tends to move or is moved on to Gaa Sands by ebb tidal currents. However, actual sediment transport processes around Buddon Ness are extremely complex and poorly understood.
Buddon Ness to Broughty Castle	Estuarial coastline with longshore transport processes dominate by tidal flows, and wave conditions from the south-east quadrant in the North Sea. Net longshore transport is predominantly to the north and west but patterns of erosion and accretion depend on position of the sand banks at the mouth of the Tay Estuary. Broughty Castle acts as a groyne trapping beach sediment being moved to the west by wave action but beach sediment over the lower parts of the beach will either be recycled back to the east by ebb currents or transported onto the sand banks in the middle reaches of the Tay Estuary by flood currents.

3.2 INTRODUCTION TO ROCKY SHORES

a) STRUCTURE OF THE BEACH

Rocky and bedrock shores are common along the Angus coastline and can be very variable in form. Where rocky shores occur, they tend to be immediately adjacent to the shore, fringing islands, headlands and open coastlines, high energy areas that are exposed to the North Sea. Depending on geological processes and oceanographic processes, a rocky shore can vary from bedrock to intertidal boulder shores with extensive kelp beds. In general, the wave action against rocky shores keeps the rock surface clear of sediment. Some rocky shores have a firm sediment layer beneath the rocks while others have large interstitial spaces which penetrate deep below the surface making the substrate more porous (IPIECA Report Series Volume 7)[1].

In all rocky shores there is a degree of zonation of species down the shore which principally reflects the degree of immersion by the tide. Environmental exposure will also play a large role in determining which organisms can survive in a particular area. Rocky shores are colonised by a wide variety of marine flora and fauna which are adapted to survive in a stressful environment. Depending on its location on the beach, an organism may be subjected to high levels of desiccation, salt, predation and changes in temperature and submersion. In response to these environmental stresses, rocky shore organisms tend to live in distinct horizontal bands or 'zones' along the shore. The rocky shoreline is often characterised by rock pools, cracks in bedrock and crevices between boulders a little of which can be found on the Angus coastline (as you move towards the coast). These micro-environments tend to support a rich community of shrimps, sea squirts, benthic species and small mobile crustaceans along with algae that also act as natural traps for any oil pollution. Highly exposed rocky shores and cliffs will have a small number of species present and will generally include algae species particularly kelp and seaweeds.

b) CONSERVATION IMPORTANCE

Rocky shores are important as they provide valuable feeding grounds for resident and over-wintering bird species. The coastal area and lagoon margins are particularly important for large congregations of migratory species. These include summer visitors such as: Sedge Warbler and Golden Plover occur regularly. Wood Sandpiper, Wheatear and several other visitors have been recorded, often associated with the resident Greenshank and both species of Oystercatcher. Rocky shores are also important to the local grey and common seal populations as haul out areas, pupping areas and as platforms during the moulting season. These areas or habitats are present on this particular stretch of Angus coastline. In general across the coastline kelp and other seaweeds are a vital natural resource they are a key component of coastal ecosystems, where they make a major contribution to primary production and provide the habitat and/ or food source for a wide variety of marine life, including young fish, and crustaceans. The health and overall biodiversity of the Angus coastal ecosystems depend on seaweeds and seaweed habitats This affects the environment - and the possible future economy of the Angus community members and council finances - through the complex interactions and interdependence between seaweeds and marine fauna such as birds, finfish and mammals.

1 BIOLOGICAL IMPACTS OF OIL POLLUTION: ROCKY SHORES. IPIECA VOLUME 7

c) VULNERABILITY OF ROCKY SHORES TO OIL POLLUTION

A rocky shore's vulnerability to oil pollution will vary depending on the topography and composition of the shoreline itself and the degree of exposure to wave action especially in the North Sea. The daily changeable and variable physical conditions, including light availability, degree of exposure, changes in temperature and salinity, aspect, substrate type and biotic features lead to the development of a characteristic zonation of species and habitats. The following zones can be distinguished on rocky shores: the splash zone, the upper (eulittoral), middle and lower (sublittoral) zones. The middle shore generally has the greatest species diversity, whilst the lower shore is most prolific. Conditions on rocky shores are harsh; organisms must be able to survive rapidly to changing environmental conditions and to be capable of rapid recolonisation. The presence of rock pools provides an opportunity to view many species of intertidal plants and animals in their natural habitat. For example, an exposed rocky shore of Seaton cliffs with cliff edge facings will not sustain as severe and long-lasting pollution as a sheltered, gradually sloping boulder shore.

Likewise wave and weather action on a rocky shore following soiling by oil will influence the persistence and longevity of the pollution. In the majority of cases, it is more likely that the oil will be concentrated along the high-water mark of the beach rather than adhere to the lower portion of the beach where tide action is strongest. Likewise, oil will adhere strongest to dry rocks and kelp/ algae rather than wet areas where the presence of water will prevent the oil settling onto the substrate.

3.3 INTRODUCTION TO SANDY SHORES

a) STRUCTURE OF THE SHORE

Sandy shore structure will depend on the steepness of the shore and the grade of sediment but Conner *et al.* (2004) state that finer sediments tend to be more stable than larger particles and retain more water at low tide and therefore will support a greater number of species. Medium and fine sand shores will have a population of polychaetes (segmented worms) and burrowing crustaceans and bivalves. Sandy beaches generally form in moderately exposed or sheltered areas and are made up of fine sediments with little organic matter. The sand surface may be rippled from wave action and have scattered shell fragments or small gravelly stones in places. Littoral sediment environments will vary markedly with the seasons. Sediment is generally deposited during the calmer summer months and eroded during the winter storms. Sediment size can also vary with season as finer sediments are put into suspension during the heavy weather. This variation will have an effect on the species which are present though the year with some species only being present during the summer months when the sediments are more stable (Conner *et al,.* 2004).

In general, for sandy beaches density and diversity of species increases as exposure to wave action decreases. The species density of benthic macrofauna generally increases in a down-shore direction, albeit with a short interruption where the waves break. Interstitial fauna (meiofauna and microfauna) present below the sediment surface are buffered against physical extremes of the seashore with little change in their densities encountered until the steep slope of the sandy beach (Armonies & Reise, 2000). Sand habitats found in the mid to upper regions of estuaries, exposed to variable salinity or in areas exposed to strong currents are often low in diversity and are dominated by robust species such as small polychaetes and rapidly burrowing bivalves and amphipods. Highly mobile sands found in upper estuarine areas are often species poor due to very low fluctuating salinity (UKBAP, 2007).

FIGURE 1: SANDY SHORE AT ST. CYRUS

b) CONSERVATION IMPORTANCE

Many inshore areas adjacent to sandy beaches (usually within 6 nautical miles of the shore) are important nursery areas for juvenile commercial fish species, such as species of finfish. Rich invertebrate fauna may be found along sandy shorelines, particularly where intertidal sandy, gravel and mud mixes occur, supporting wading birds in the area. Many beach areas along the Angus coastline (such as Lunan Bay) are amenity sites of recreational importance to local communities, providing popular sites for walking, running and watching wildlife and photography.

c) VULNERABILITY OF SANDY SHORES TO OIL POLLUTION

Depending on the size of the sand grains, oil can penetrate the sediment or lie on top of the sand. Oil spill response becomes difficult when the oil penetrates deep into the sediments and fills the interstitial spaces between sand grains. Burrowing organisms such as amphipods may be smothered by the oil on the surface or succumb to the toxicity of the oil and in the long-term, this will lead to less degradation of beach material causing a build-up of rotting materials along the strandlines.

3.4 INTRODUCTION TO SHINGLE SHORES

a) STRUCTURE OF THE SHORE

Shingle is the term applied to sediments larger than grains of sand but smaller than boulders. In general (and in this survey) shingle is considered to be between 4 mm – 200 mm (UK Biodiversity Action Plan 1999). Shingle beaches are often highly mobile foreshores, subject to wave action and salt spray. Stormy conditions can have a strong influence on the stability of beach above normal tidal levels while shingle shores will form on relatively exposed shores where the wave action prevents finer sediments from settling (Conner *et al,.* 2004). The shingle shores are important as nesting sites for ringed plovers, and for the establishment of Juniper scrub. Shingle shores provide a habitat for diverse invertebrate communities and some species are restricted to shingle habitats (Coastal Sand Dunes and Shingle Local Biodiversity Action Plan 2003).

FIGURE 2: SHINGLE SHORELINE

The most common (and simplest) shingle habitat is the fringing beach which form as the shingle is pushed up the foreshore towards land by wave action. These beaches frequently occur at the foot of sedimentary cliffs, sand dune systems or saltmarshes. A second form of shingle habitat is a shingle spit which forms outwards from the land, most often where there is an abrupt change in direction of the coastline. Shingle spits are generally subject to wave action from two (or more) directions and there tend to be curves and hooks along the spit, most often at the end point. Shingle bars or barriers will form across the mouth of an estuary or coastal indentation resulting in the formation of a lagoon behind the barrier.

b) CONSERVATION IMPORTANCE

Shingle shores are globally restricted in distribution with few occurrences outside north-west Europe, Japan and New Zealand. Due to the dynamic nature of exposed shingle, examples of shingle shorelines stable enough to support perennial vegetation are relatively rare in the UK. Coastal vegetated shingle is a UK BAP Priority Habitat (UKBAP, 2009). Many of the shingle landforms along the Angus Council coastline are of geomorphological interest and support a rich invertebrate fauna.

c) VULNERABILITY OF SHINGLE SHORES TO OIL POLLUTION

The vulnerability of shingle shores will depend on their exposure to wave and tidal action. Very exposed shingle beaches are highly mobile and are generally inhospitable to plant and animal life due to the continually shifting substrate. Landed oil on an exposed shore is likely to be removed swiftly by wave action. Sheltered shingle beaches however, are considered to be highly vulnerable to oil pollution. As there are large interstitial spaces between individual stones shingle beaches are porous and oil will penetrate relatively easily and heavy oils in particular can persist there for a considerable length of time.

3.5 INTRODUCTION TO DUNE SYSTEMS

a) STRUCTURE OF THE BEACH

Dune systems are often formed in association with Machair or similar species, a distinctive type of coastal grassland. These dunes systems and wide areas of coastal greens interspersed with permanent and seasonal pools provide habitat for wading birds and waterfowl. Strong winds prevailing shoreward will blow coarse grains of sand inland which form beaches and mobile dunes. Sand dunes will form in relatively exposed locations the common type being bay dunes. The structure of the dune is related to the length of deposition time and the degree of stability it has attained. Mobile dunes are unsettled and support very few species while fixed dune systems are no longer accreting significant amounts of sand and the structure is very stable. Such dune systems will support a large number of plant and animal species.

FIGURE 3: DUNE SYSTEM AT ST. CYRUS

b) CONSERVATION IMPORTANCE

Sand dune systems have a key role in natural coastal protection and also support a range of habitats and species not found in other ecosystems such as eider duck and terns, rare mosses, lichens, fungi, and invertebrates such as the small blue butterfly. Nationally, within the UK, coastal dune systems are the target of a Habitat Biodiversity Action Plan, and the dune systems on the coastline being part of designated protected sites.

c) VULNERABILITY OF DUNE SYSTEMS TO OIL POLLUTION

Under normal conditions the seaward movement of sand dunes can be significant and they are a highly mobile ecosystem. Few dunes are considered to be in equilibrium with more sand being lost through erosion than gained through deposition. Any oil pollution and associated substrate removal will further impact on the loss of the dune system as a whole. In addition to the impacts of pollution, sand dunes can be physically damaged by the transit of vehicles, machinery and response personnel across the dunes to the beach system below.

3.6 INTRODUCTION TO COASTAL MUD FLATS

a) STRUCTURE OF THE BEACH

Coastal mud flats are sedimentary intertidal habitats which are generally formed from very fine particles of less than 0.063 mm (Conner *et al.,* 2004). There is an anoxic layer, generally in the first few millimetres of the surface, where little oxygen penetrates due to the compact nature of the sediment. Mudflat communities are characterised by worms and bivalves. Mudflats are only found in sheltered areas where the fine sediments are able to settle without wave action causing them to remain in suspension. They commonly appear in the natural sequence of habitats between subtidal channels and vegetated saltmarshes. In large estuaries they may be several kilometres wide and commonly form the largest part of the intertidal area of estuaries.

FIGURE 4: MONTROSE COASTAL MUD FLATS ARE SEDIMENTARY INTERTIDAL HABITATS WHICH ARE GENERALLY FORMED FROM VERY FINE PARTICLES OF LESS THAN 0.063MM (CONNER ET AL. 2004).

b) CONSERVATION IMPORTANCE

Mudflats, like other intertidal areas, dissipate wave energy, thus reducing the risk of eroding saltmarshes, damaging coastal defences and flooding low-lying land. The mud surface also plays an important role in nutrient chemistry. In areas receiving pollution, organic sediments sequester contaminants and may contain high concentrations of heavy metals. Protection for mudflats is provided by various international and EU agreements and is implemented by the relevant UK enabling legislation. In addition the UK has its own domestic measures which can protect mudflats. Some of this legislation provides direct protection for the habitat whilst other measures provide indirect protection by controlling water quality. International legislation of major significance to mudflats are the Ramsar Convention which protect wetlands of international importance, the Bonn Convention which protects migratory species of wild animals, and the Bern Convention which conserves European wildlife and habitats.

c) VULNERABILITY OF COASTAL MUDFLATS TO OIL POLLUTION

The tightly packed nature of the mud particles tends to make the substrate relatively impermeable to oil and may wash off with subsequent tidal immersions. However, on highly productive mudflats with a high population of burrowing organisms and plants the burrows and roots may provide the oil pathways deep into the structure of the beach. This influx of oil may result in the burrow being abandoned and filling with sediment from the top thus trapping the oil in anaerobic sediments where the degradation rate will be very slow and any future decolonisation will be reduced by the presence of toxic compounds.

3.7 INTRODUCTION TO COASTAL SALT MARSHES

a) STRUCTURE OF THE BEACH

Coastal saltmarsh are defined by the JNCC as “intertidal areas of fine sediment transported by water and stabilised by sediment” (Boorman, 2003). They lie between mean high water neap tides and mean high water spring tides and will periodically be submerged by the incoming tide. Saltmarsh will only develop in sheltered areas where sand or muddy sediments build up creating a stable environment which will support a distinctive community of plant species able to withstand frequent inundation by salt water. At the lowest level of the saltmarsh the species are much more salt tolerant that those on the higher (and drier) zones of the saltmarsh. Saltmarsh is an uncommon feature of the North East, with the largest saltmarsh areas at Findhorn and Culbin Sands comprising about 70% of the region’s saltmarsh. Saltmarshes can act as transition habitats between marine and terrestrial habitats. They are important to waders and wildfowl acting as breeding and feeding sites especially in areas where unimproved meadowland has been lost to intensive agriculture. Brent geese and widgeon will over winter in large numbers on saltmarshes relying on the presence of grazing material (Boorman, 2003).

b) CONSERVATION IMPORTANCE

Saltmarsh hold a wide range of plant communities and are important areas for wading birds and wildfowl. They can act as refuges for birds feeding on adjacent mud flats, as breeding sites and as feeding sites. They are especially vital in during the winter months as they provide valuable feeding grounds for migrating birds.

c) VULNERABILITY OF COASTAL SALT MARSHES SHORES TO OIL POLLUTION

Saltmarshes tend to be priority areas for spill response as they can trap large volumes of oil and are difficult to clean and may cause more damage in the long term (IPIECA Report Volume 6, 1994). Oil deposits on coastal saltmarsh are highly visible and unsightly which may bring pressure from the public to commence a clean-up operation which may cause further damage to vulnerable communities. Seasonality will affect the vulnerability of a salt marsh. Oiling of a salt marsh over winter can have an effect on over-wintering seeds and reduce the germination in the spring. A marked reduction in flowering will be observed if the plants are oiled when in bud.

3.8 ENVIRONMENTAL VULNERABILITIES

TABLE 3: EASTERN SCOTTISH COASTAL ENVIRONMENTAL SENSITIVITIES

Area	Designations	Species/ Habitat
St Cyrus & Kinnaber Links	**SSSI**	St Cyrus and Kinnaber Links SSSI is located on the east coast of Scotland, on either side of the mouth and estuary of the River North Esk, about 5 km north of Montrose. There is varied site consists of sand dunes, shingle, foreshore, river estuary, saltmarsh and cliffs composed of basalts and andesites of Old Red Sandstone age. The cliffs have weathered to produce a moderately base-rich soil, and for the north-east of Scotland the site enjoys relatively long hours of sunshine.
Montrose Basin	**SSSI**	Montrose Basin is a large, almost circular, estuarine basin on the River South Esk immediately west of Montrose in which there are extensive mudflats at low tide. Montrose Basin consists of a mosaic of saltmarsh, mudflat and transition fen habitat together with arable and pasture land, which is used annually by thousands of migrating and over-wintering birds for feeding and roosting. A section of Montrose Basin at Maryton is a key site for the illustration of post-glacial sea level fluctuations. The mudflats support an abundant invertebrate fauna and flora which provide a rich feeding ground for the birds. The fauna is dominated by worms (annelids), and the molluscs *Hydrobia* and *Corophium*, and includes several areas of mussel beds. There is a marked zonation resulting from differences in salinity and substrate. The flora is dominated by eel grass Zostera, the algae *Cladophora, Enteromorpha* and bladder-wrack seaweed *Fucus* and is similarly affected by salinity and the character of the substrate. Three eel grasses species occur in the Basin, two of which are nationally scarce species: *Zostera angustifolia* and *Zostera noltei*.
Montrose Basin	**SPA**	Montrose Basin Special Protection Area supports a diverse assemblage of wintering waterfowl of outstanding nature conservation and scientific importance. The site qualifies under Article 4.2 by supporting in excess of 20,000 waterfowl and qualifying as a Wetland of International Importance. In the five-year period 1987/88 to 1991/92, a winter peak mean of 47,640 waterfowl was recorded, comprising 14,190 waders and 33,450 wildfowl.
Montrose Basin	**RAMSAR**	Aggregations of non-breeding birds: Greylag goose (*Anser anser*), Waterfowl assemblage, Pink-footed goose (*Anser brachyrhynchus*), Redshank (*Tringa totanus*). Littoral desiment: Intertidal mudflats and sandflats.
Montrose Basin	**Local Nature Reserve**	The basin covers 750 hectares and is the esturay of the South Esk. This site is designated as such for local and migratory bird species. It's status as a nature reserve ensures larger levels of protection of the wildlife that inhabit it.
Whiting Ness to Ethie Haven	**SSSI**	Whiting Ness to Ethie Haven SSSI is situated on the Angus coastline, stretching about 11 km in length from Victoria Park, on the edge of Arbroath, to almost as far as north as Lunan Bay. The site is geologically important for its exposures of Upper Old Red Sandstone and *Ethie Lavas.* It is also the longest continuous stretch of sea cliffs and rocky shore in Angus and supports nationally important numbers of nesting seabirds and over-wintering waders, a wide range of coastal grassland and coastal cliff communities and the small blue butterfly *Cupido minimus, a* Scottish rarity.
Elliot Links	**SSSI**	Elliot Links is an area of sand dunes on the Angus coast 2km south-west of Arbroath and to the west of the Elliot Water. The site consists of a stable dune system in association with abandoned river meanders. The sand dunes and the fen vegetation in the old meanders support species rich plant and invertebrate communities which are very local in Angus. Uncommon plants occur such as small scabious *Scabiosa columbaria,* as well as butterflies such as the ringlet and small blue.
Easthaven	**SSSI**	Easthaven SSSI is located approximately 2 miles northeast of Carnoustie, on the Angus coastline, by the village of East Haven. The site is the only recorded location in Scotland of the greater yellow-rattle *Rhinanthus angustifolius* (formerly known as *Rhinanthus serotinus).* It is recorded at only 10 other sites in Great Britain. The population of greater yellow-rattle at Easthaven is important in a geographical context, as it is the most northerly station in Britain for the species by about *150 miles.* The greater yellow-rattle plants are found growing here in tall, herb-rich neutral grassland on the foredunes.

TABLE 3 CONT: EASTERN SCOTTISH COASTAL ENVIRONMENTAL SENSITIVITIES

Area	Designations	Species/ Habitat
Barry Links	**SSSI**	Barry Links lies on the northern side of the mouth of the Firth of Tay to the east of Monifieth. The sand dune system is one of the largest on the east coast of Scotland and forms a peninsula jutting out into the estuary. It is a complex site which provides a valuable example of an active dune system and a full range of dune habitats which support a wide range of plants, mosses, liverworts, and invertebrates.
Barry Links	**SAC**	Qualifying Interests for which the site is designated: • Atlantic decalcified fixed dunes (*Calluno-* • *Ulicetea*)* • Coastal dune heathland • Embryonic shifting dunes • Fixed dunes with herbaceous vegetation • ("grey dunes")* • Dune grassland • Humid dune slacks • Shifting dunes along the shoreline with • *Ammophila arenaria* ("white dunes") • Shifting dunes with marram
Firth of Tay and Eden Estuary	**SAC**	Qualifying Interests for which the site is designated: • Estuaries • Mudflats and sandflats not covered by • seawater at low tide • Intertidal mudflats and sandflats • Common seal *(Phoca vitulina)* • Sandbanks which are slightly covered by sea water all the time • Subtidal sandbanks
Firth of Tay and Eden Estuary	**SPA**	The Firth of Tay & Eden Estuary SPA is a complex of estuarine and coastal habitats in eastern Scotland stretching from the mouth of the River Earn in the inner Firth of Tay east to Barry Sands on the Angus coast and St Andrews on the Fife Coast. The site includes extensive invertebrate-rich intertidal flats and areas of reed bed, saltmarsh and sand dune. The SPA is contained within the following SSSIs: Inner Tay Estuary, Monifieth Bay, Barry Links, Tayport-Tentsmuir Coast and Eden Estuary.
Monifieth Bay	**SSSI**	Monifieth Bay is situated on the north shore of the outer Firth of Tay 5 km east of Dundee. It consists primarily of intertidal sand and mud, extending for 4 km along the coast and up to 1 km seawards. The site is important as the extensive mud flats with its rich invertebrate population provide a feeding ground for wintering waders specifically important numbers of sanderling. Sanderling utilise Monifieth Bay at low tide to feed on the exposed mud and sand. They roost elsewhere, mainly on Buddon Ness to the east and on Lucky Scalp on the south side of the estuary.

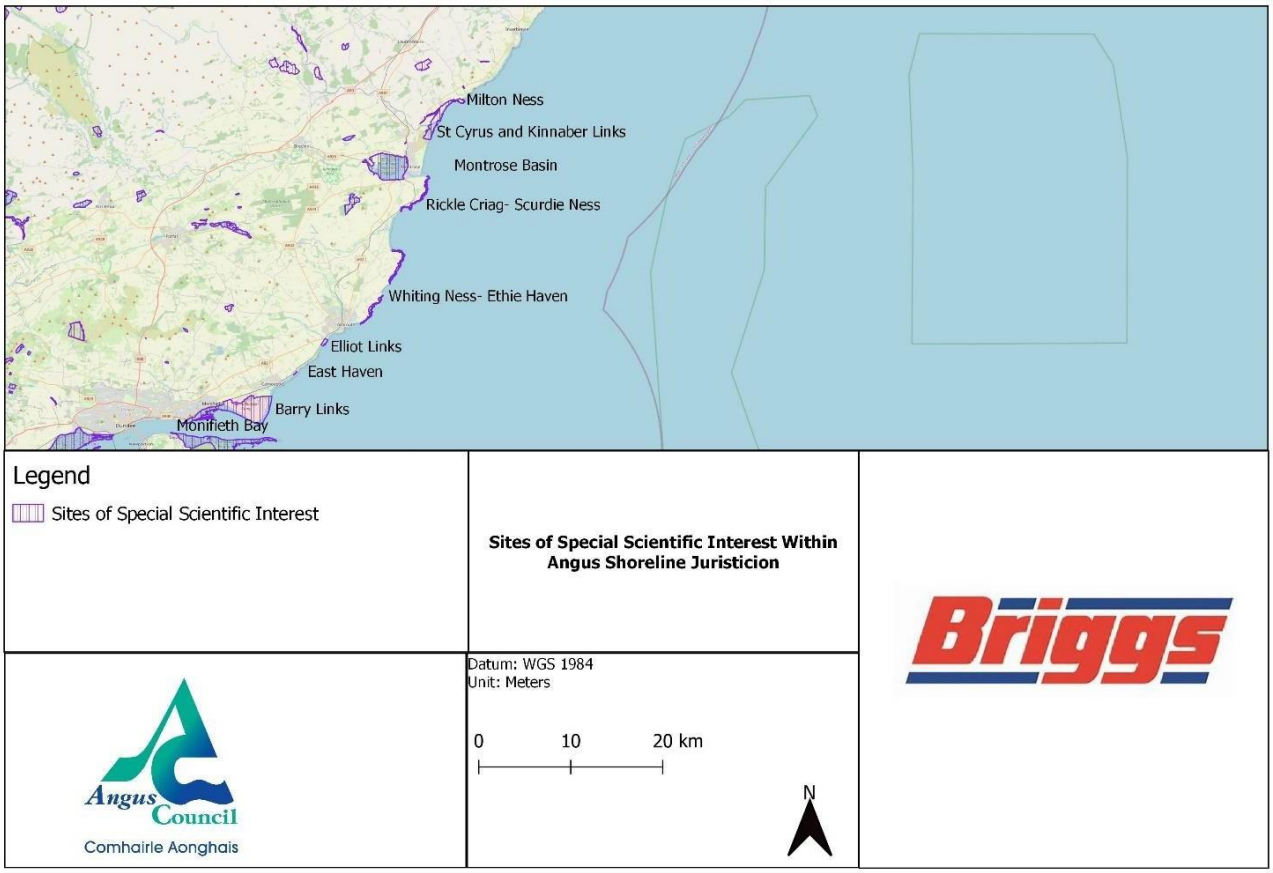


Figure 5: A map to illustrate sites of special scientific interest within Angus Shoreline jurisdiction

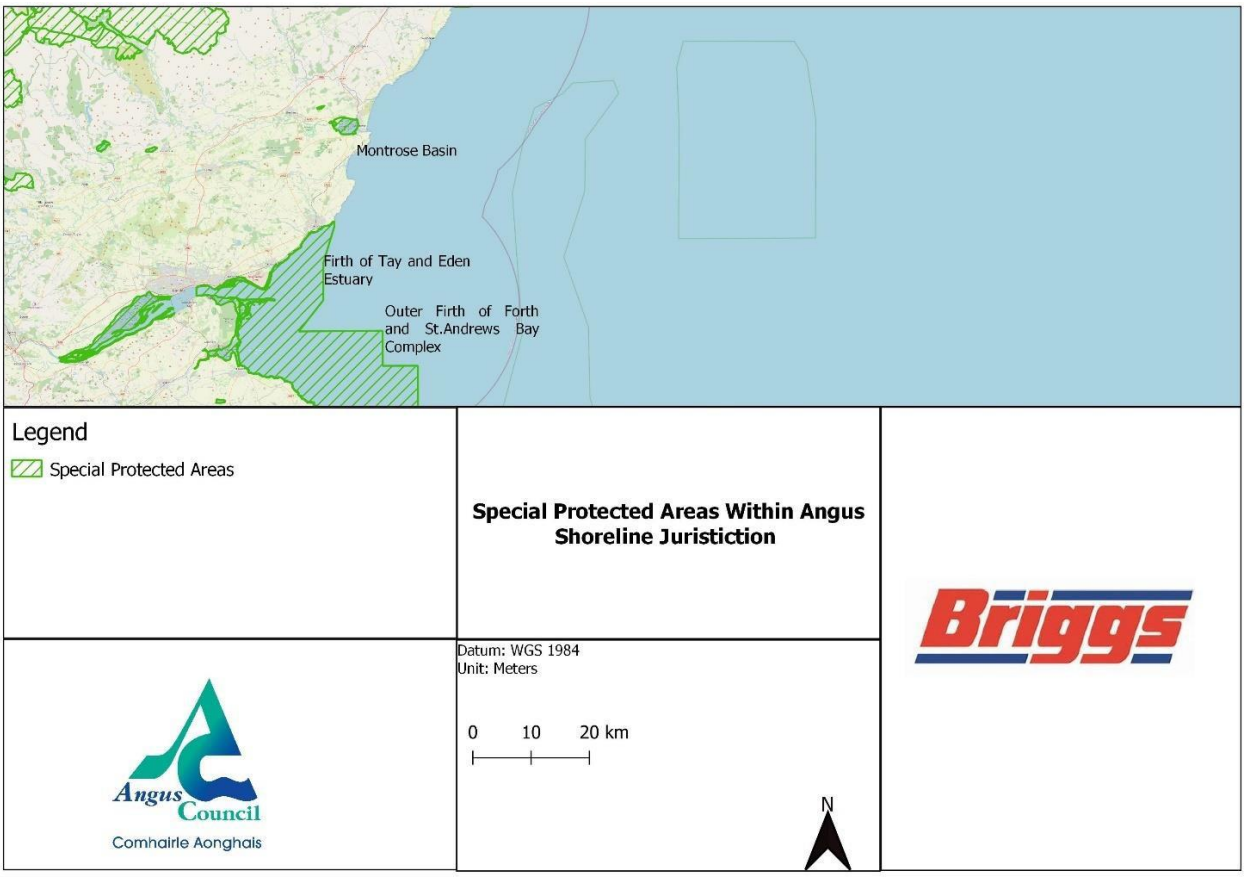


Figure 6: A map to illustrate special protected areas within Angus shoreline jurisdiction

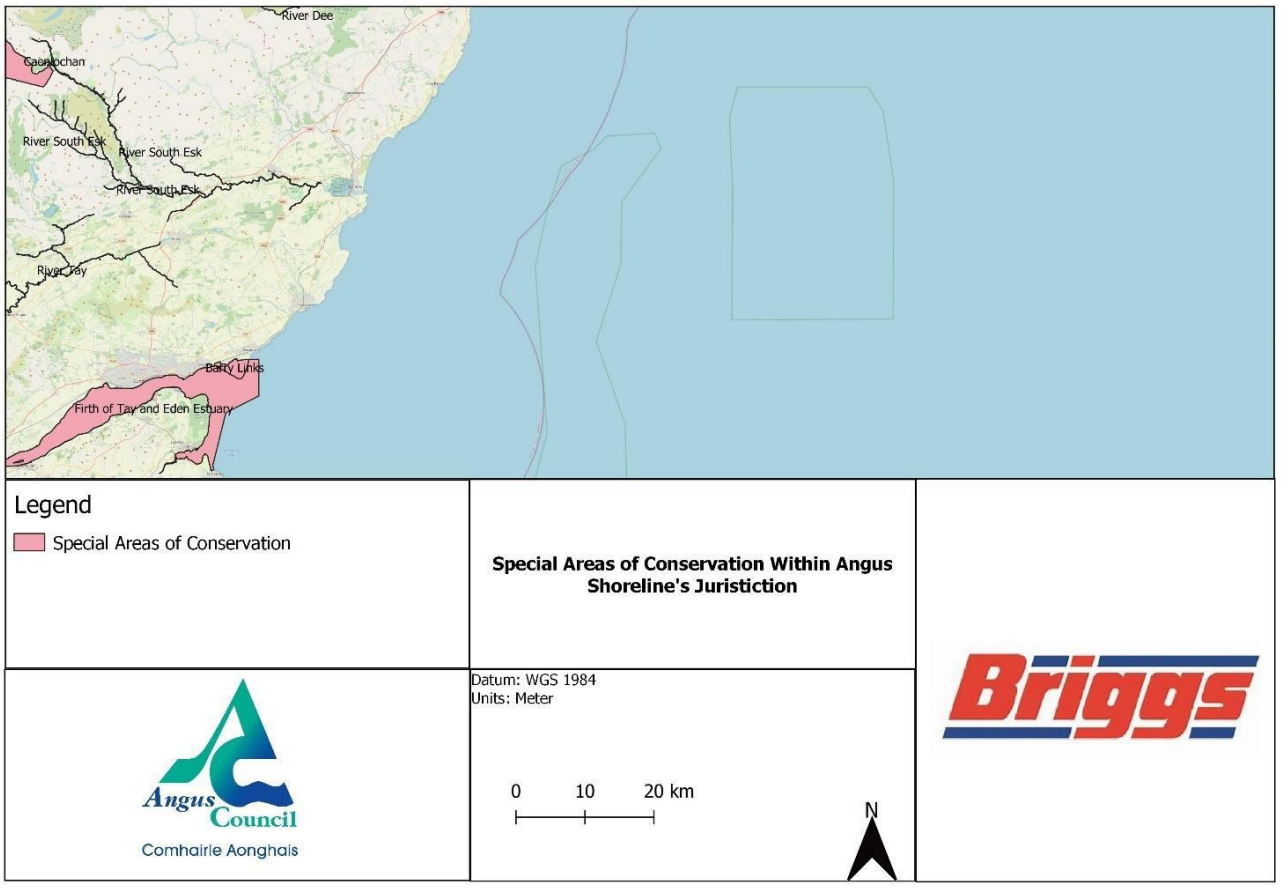


Figure 7: A map to illustrate special areas of conservation within Angus shorelines jurisdiction

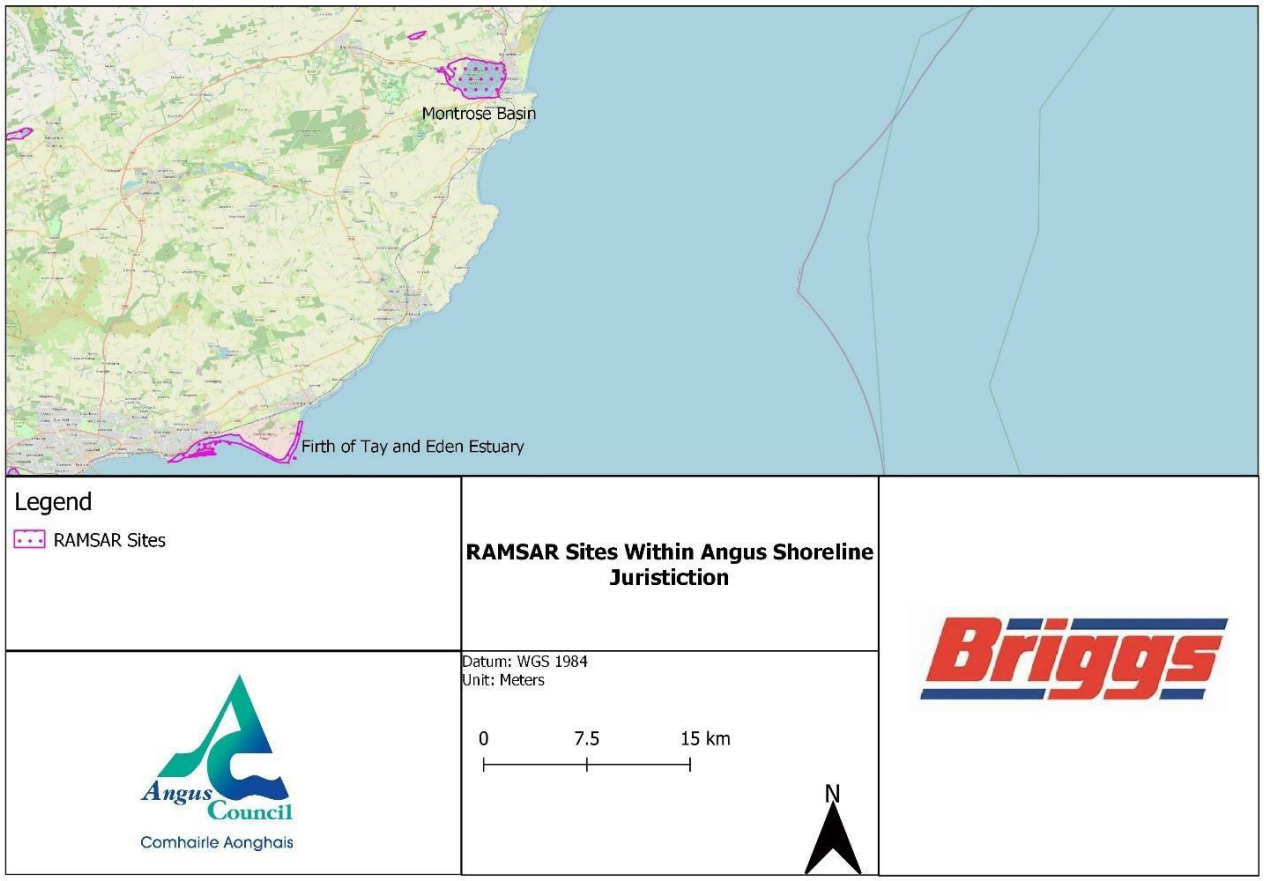


Figure 8: A map to show RAMSAR sites within Angus shoreline jurisdiction

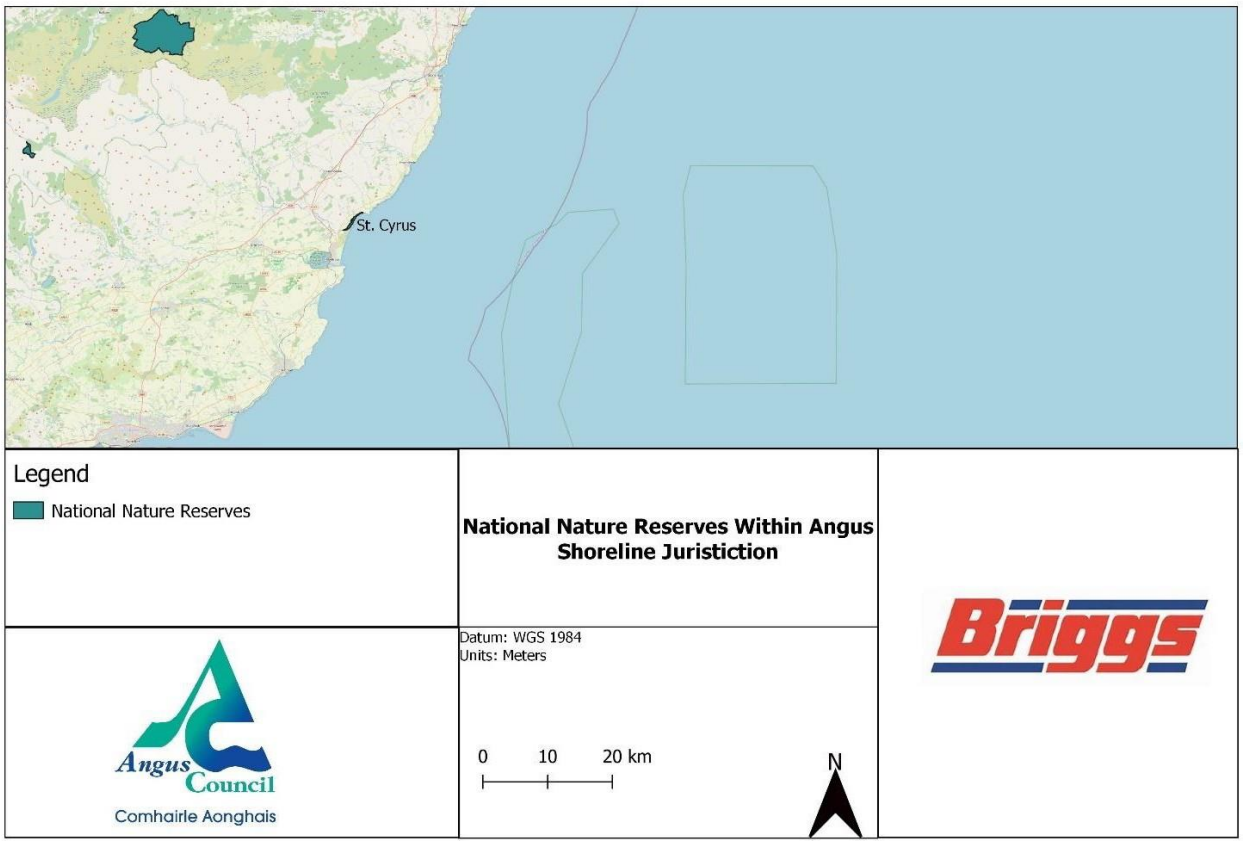


Figure 9: A map to show national nature reserves within Angus Shoreline Jurisdiction

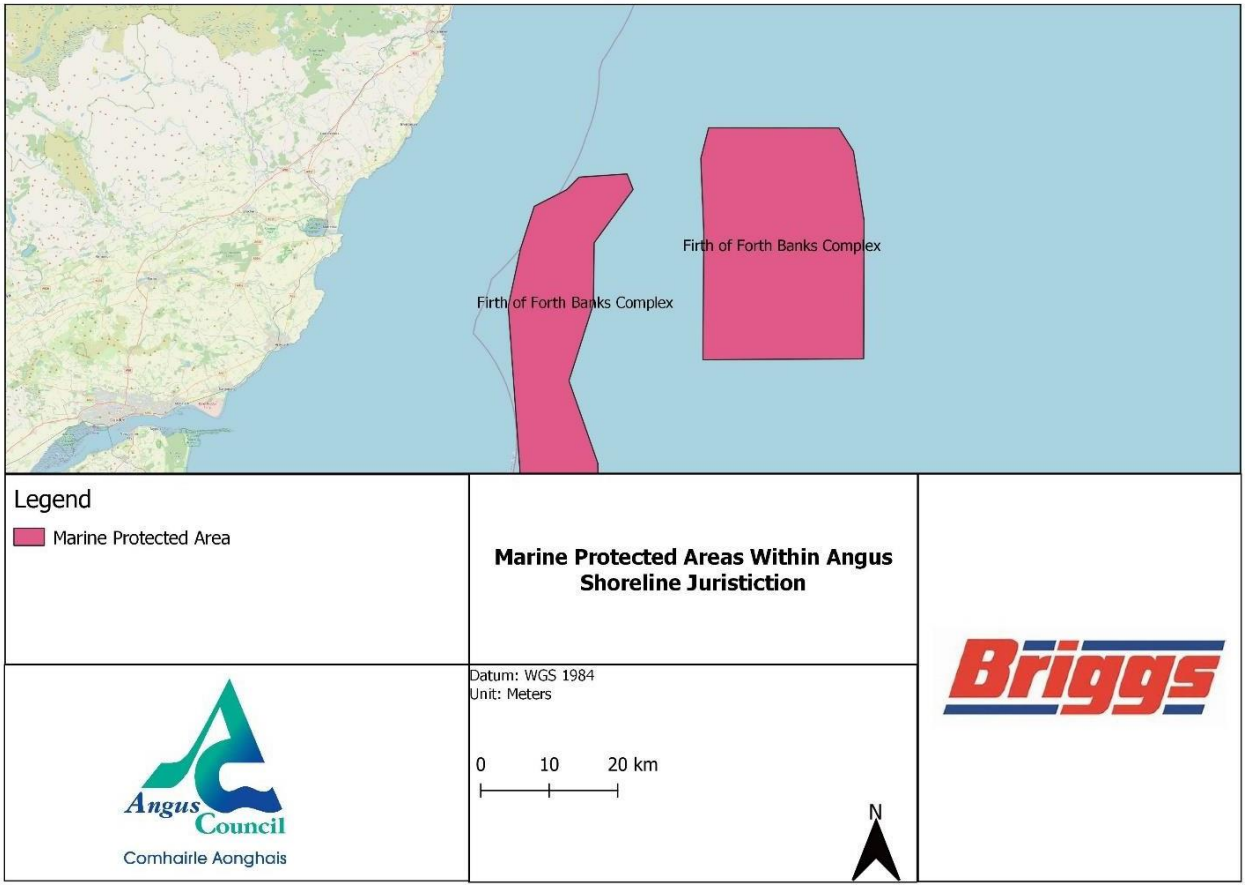


Figure 10: A map to show marine protected areas within Angus shoreline jurisdiction

Figure 11: A map to show local nature reserves within Angus Shoreline Jurisdiction

3.9 OIL SPILL RESPONSE OPTIONS

a) NATURAL CLEAN UP

In some situations 'natural clean-up' i.e. leaving the oiled environment to recover naturally though degradation and weathering of the oil may be the most efficient and effective method of response. An evaluation of the potential benefits of oil removal against any impact to the environment caused by the response strategy will be required. The relevant environmental agencies and local Angus stakeholders should be consulted and their views taken into account prior to any decision being taken on an approach. In moderate to exposed sites action by waves and weather will go some way towards natural clean-up. As the tide comes in, the residual lying oil will be taken back into suspension and can potentially be floated off the beach with the receding tide. Heavy wave action and grazing by shoreline creatures will also remove significant amounts of oil on rocky shores over time. Where possible, the removal of floating oil from the water surface before it adheres to the beach substrate is likely to be an effective response and will reduce the volume of free oil in the environment.

b) THE EFFECTS OF THE ENVIRONMENTAL CONDITIONS ON RESPONSE

Dynamic coastal process and the physical conditions encountered during any pollution response willhave an impact on the efficiency and effectiveness of any response strategy. In general, surface oil will move with the tide, with wind direction and strength having a much lesser influence. Forward planning and predictive deployment of equipment to beaches or vulnerable economic areas such as harbours which may be impacted in the future may be a more efficient use of resources than immediate deployment to already impacted beaches i.e. direct a greater response to those beaches which are likely to be affected at the turn of the tide may act to minimise secondary pollution. The environmental effects of the weather conditions will influence the equipment which can be deployed safely and effectively. High winds and swell may disrupt or inhibit the containment capacity of offshore booms and severe weather may delay responders gaining access to vulnerable coastal areas. Conversely, high winds and temperatures will act to speed up evaporation reducing the volatile compounds and therefore the toxicity of the oil.

c) TIERED RESPONSE LEVELS & CATEGORIES OF INCIDENT

A three tiered oil spill classification system is recognised internationally. Each level can be dealt with increasing levels of man power and resources. Realistically Angus Council could deal with a Tier One oil spill without outside assistance. A Tier Two spill would require all local resources and external agencies. A Tier three spill is beyond all local resources and will require enactment of the National Contingency Plan.

3.10 THE AIM OF RESPONSE

The ultimate aim of any oil spill response is to minimise damage to environmental and socioeconomic resources and to reduce the recovery time of affected areas. The nature and the relative inaccessibility of much of the coastline around Angus will add an additional complication to any oil spill response strategy. In all cases it will be preferable to contain any oil spill at source. This can involve the use of sorbent booms or sorbent pads for a land spill such as loss of containment from land based oil storage tanks, road tankers or smaller scale vehicle collisions. At source containment of offshore oil spills resulting from small scale vessel collisions to large scale tanker groundings, will require offshore containment booms being deployed strategically either directly around the stricken vessel or in formation to contain drifting oil down current of the spill location. To achieve an effective at source containment the response contractor or local council response team will require rapid notification of the initial incident and mobilisation of the oil spill contractor. It is likely even with rapid notification and mobilisation the oil will have spread some distance from the originating location when contractors and responders arrive on site. Local, immediate action by those on site at the time of the loss of containment will, in the majority of cases, have a major impact on the course of any oil spill.

3.11 OIL RESPONSE TECHNIQUES

It is generally accepted that aggressive methods of beach clean-up may cause more harm to an already stressed ecosystem. Historically, the use of high pressure hoses to remove oil from rocks and using chemical dispersants to break up oil on surface waters were common pollution response methods. These techniques all resulted in the removal of long-lived keystone species from beaches which then took much longer to recover. Oil response techniques which remove the bulk of the oil without damaging the underlying substrate are preferable. Visually, there may be residual oil remaining on the shore but this careful removal preserves organisms *in situ* which may have survived the initial effects of the oil pollution. In some cases the recommendations made by environmental groups may be to leave the oil completely *in situ* or attempt clean up only from the water. This would be employed only when the contaminated shoreline was too fragile to support vehicles or response personnel. Any oil spill response approach must be considered to be a dynamic and evolving strategy which can be altered depending on the changing conditions rather than a static stepped approach which must be adhered to for the duration of the response.

a) MONITOR AND EVALUATE

Oil is a natural product and given sufficient time will be dispersed naturally by environmental processes. In some cases it will be best to observe the spill and refrain from engaging in any response or clean-up activities particularly in areas where there is either high wave action such as the base of cliffs or environmental sensitivities where any attempt to remove any deposited oil may cause more damage. However, a 'no action' response may prove to be a difficult action particularly in areas of high visibility and public scrutiny may require action to be taken. If a 'no action' response is taken, clean up teams must still be placed on alert and be ready to respond should computer simulations or real time observations suggest the oil has altered course or there is any change in the situation.

b) SHORELINE CLEAN UP

Many oil spills result in pollution of shorelines despite all efforts to prevent it. Oil may sometimes however, be allowed or encouraged to beach on an easily cleaned shoreline. Shoreline booms can prevent oil migrating down the coastline and impacting a more sensitive area. It is important to note that the use of inappropriate techniques and inadequate organisation can increase rather than mitigate the extent of the damage caused by the pollution. Regardless of the type of shoreline the oil impacts, the method of clean-up is usually labour intensive and often demoralising. Once oil is beached a response to an oil spill normally changes from an emergency response situation to a clean-up project and will need to be managed as such.

In fragile ecosystems such as salt marshes and mudflats the wrong oil spill response can increase the overall damage caused. For example, physical removal of surface sediments either by hand or machine can result in compaction of and other damage by the transit of heavy vehicles, machinery and personnel across the marsh land. In such cases the advice from the relevant environment agencies may be remove only surface oil using small boats or gentle flushing with high volumes of fresh water from the land. Depending on the oil type it may be a more effective response to allow natural recovery rather than physical removal or treatment.

There are three stages in the clean-up of shoreline contamination:

- ***Stage 1 -*** *Removal of floating oil at the water's edge and thick concentrations on the shore.*
- ***Stage 2 -*** *Clean-up of moderate contamination, stranded oil and oiled beach materials.*
- ***Stage 3*** *- Clean-up of lightly contaminated shorelines and final polishing such as the removal of oil stains.*

In all cases a reliable estimate of oil quantity will be a valuable source of information to any response. Annex 2 details a method to evaluate the volume of spilled oil.

c) MANUAL REMOVAL

Oil response techniques which remove the bulk of the oil without damaging the underlying substrate are preferable. Visually, there may be residual oil remaining on the shore but this careful removal preserves organisms *in situ* which may have survived the initial effects of the oil pollution. In some cases the recommendations made by environmental groups may be to leave the oil completely *in situ* or attempt clean up only from the water. This would be employed only when the contaminated shoreline was too fragile to support vehicles or response personnel. Burial of oiled material by newly deposited sediments can be rapid and the response should focus on not mixing previously oiled material deeper into the substrate by compaction through vehicle or foot traffic. Clean up techniques may include physical removal of oiled sediments taking care to minimise the amount of substrate removed as this may hinder natural recovery.

d) OFFSHORE CLEAN UP

Offshore response will always be limited by the weather, the distance from land, the availability of suitable vessels and the oil type. Any response will have to be evaluated on a case by case basis and the following should be viewed as a guide only.

e) REMOVAL OF SURFACE OIL

Large volumes of oil may be removed by skimming, pumping or suction devices. Heavy equipment can clean oiled beaches quickly and can be used to contain contaminated beach material such as seaweed and sand. However, the use of heavy equipment and associated vehicles may not always be an acceptable method of beach clean-up as some habitats will be vulnerable to physical damage and access with machinery may not be advisable or permitted. Manual removal of oil from shoreline sediments can be an effective strategy as selective and strategic removal can be employed minimising disturbance to oil free or lightly oiled areas.

f) CHEMICAL DISPERSANTS

Dispersants can only be used with the full permission of the relevant environmental agencies along with a Marine License. When used effectively, dispersants are useful to protect the shoreline and associated wildlife. However, dispersants are effective only within a small window before the weathering process begins to break up the oil; once an oil and water emulsification has formed dispersants will no longer be effective. Also, dispersants are generally oil type specific and so for dispersant spraying to have an effect, the correct type must be used. This may not always be possible, particularly when dealing with an oil spill from an unknown source. Dispersants also do not cause the oil spill to disappear. The effect of the dispersant is to remove the oil from the water surface and place it in the water column thereby affecting fish and the wider marine environment. For this reason, dispersants should not be used in areas where there is aquaculture, water intakes, saltmarshes and populated areas.

3.12 BOOMING STRATEGIES

The use of booms is considered to be the most effective method of protection and containment. Booms are used for oil collection, deflection, containment and concentration and protection. Properly deployed and positioned booms are an effective and efficient way to protect vulnerable shorelines and priority areas such as marinas and fish farms if the oil is predicted to impact on the area. Booms are only effective in certain sea conditions; rough weather reduces the containment ability of the boom. Likewise, rough conditions reduce the effectiveness of mechanical recovery devices; relatively low waves will flood recovery devices and result in more oil than water being recovered. Sorbent booms can be effective if deployed in a logical manner along the incoming or outgoing tide acting to remove oil before it adheres to beach sediments. However, any deployed pollution equipment should be securely anchored and monitored to ensure complete retrieval following any response action. A sorbent boom deployed higher than the current tide level and not being continually adjusted to follow the outgoing tide will allow much of the oil to sink into the sediments particularly on an outgoing tide. Booms should also be overlapped to ensure there are no areas where oil could pass (Figure *5).*

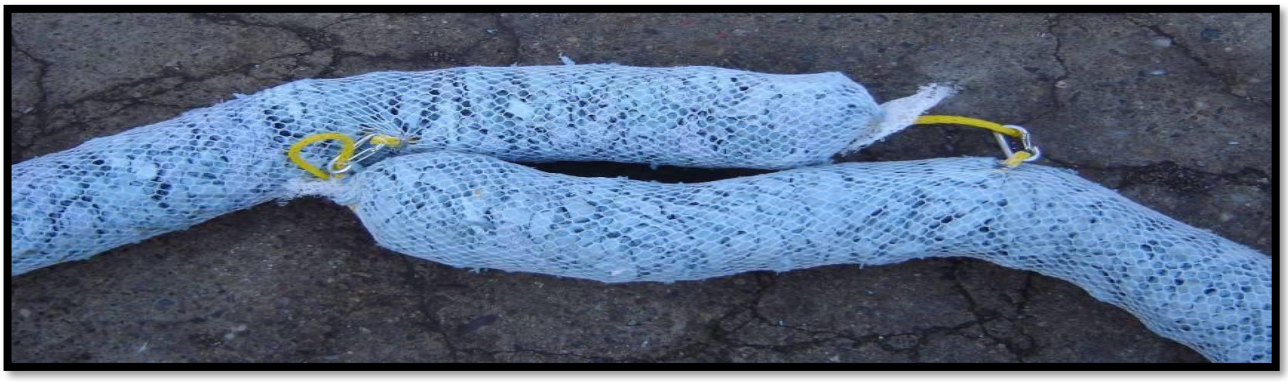


FIGURE 5: OVERLAPPING SORBENT BOOMS

In some instances it may be acceptable to deliberately direct oil into less sensitive environments (e.g. deflect incoming oil from amenity beaches or saltmarshes onto exposed rocky shores) either for subsequent collection or to weather and degrade naturally. These shorelines are chosen for their lack of environmental sensitivities and socio-economic usage and also for the ease of access which will aid in clean up. Public perception of such a response however, should be judged prior to any decisions.

On all coastlines there are natural collection points to which oil will naturally migrate. These areas can be identified by a large volume of flotsam and jetsam. Piers, harbours and jetty walls will also act as physical containment areas. In general, oil should be removed from a shoreline (where possible and with the agreement of the relevant environmental agencies) to prevent it from moving on to more sensitive areas.

Environmentally sensitive areas such as sand flats and mudflats and economically vulnerable areas such as award beaches and aquaculture zones should be protected wherever feasible. In such cases, the use of natural collection areas may be justifiable.

Boom selection for a given situation must take account of the following considerations:

- the circumstances under which the boom will operate;
- weather conditions;
- wave heights;
- open or enclosed water; and
- current speeds.

The logistics of any situation will also influence the selection for example the deployment site, the accessibility of the site and the available manpower.

a) COLLECTION BOOMING

In this mode the boom is towed in a particular configuration e.g. J. U or V to a position where oil is known to be floating, and by the operation of a boat at either end is used to collect the oil. Such a system is usually only possible where there is an adequate stretch of clear, navigable water.

An essential part of this system is a means to remove the oil from the area enclosed by the boom. This may take the form of a skimmer, or in some cases may mean towing the oil to a shelving shoreline and depositing the oil there for mechanical pick-up. In several commercial systems, skimmers are incorporated in the boom system itself, e.g. Weir Boom and Ro-Skim.

b) DEFLECTION BOOMING

Deflection booming is used where the water current in an area is greater than 1 knot or if the area to be protected is so large that the available boom would not be sufficient to contain oil or protect the shoreline. In addition, deflection booming is useful for diverting oil from sensitive areas to other shoreline locations that are less sensitive and/ or more easily cleaned up.

Deflection booms are deployed at an angle from the shoreline closest to the leading edge of the approaching oil stick to deflect oil toward shore, where pickup of pooled oil is more effective. When the boom is at right angles to the current, surface flow of water and oil is stopped. At current speeds greater than about 1 knot, vortices (whirlpools) and entrainment (oil droplets shearing off from the underside of the oil layer) will drag the oil down beneath the skirt, rendering the boom Ineffective. If the boom is placed at an angle to the current, surface flow is reduced and diverted permitting the oil and water to move downstream along the boom into the collection area and/ or against the shore. The reduction in current speed perpendicular to the boom is related to the decrease in the angle of the boom relative to the direction of current flow.

The first of two possible methods of deflection booming involves six or more lengths of boom ranging from 10 m to 25 m placed in a cascading formation in the water. The lead boom intercepts the oncoming oil slick and diverts it toward the shore. Subsequent booms placed downstream of the lead boom continue the diversion process until the slick is directed to the recovery area. See Figure 6.

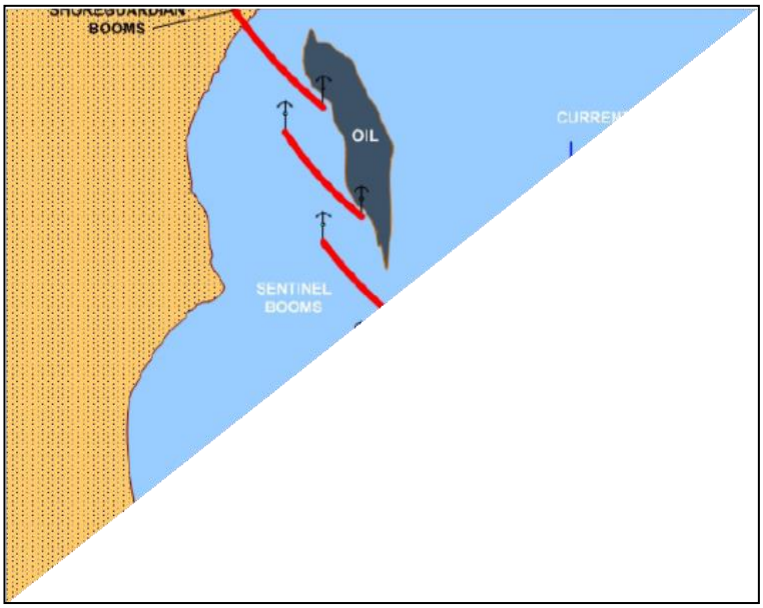


FIGURE 6: DEFLECTION/ DIVERSION BOOMS

The second method of deflection booming is similar to the first except that the diverting boom is used to direct the oil onto the shoreline or away from shore. One of the diverting booms is anchored to the shoreline and the free end is angled by the vessel. The advantage of this method is that it can be set up in less time and with less equipment than the cascading booms method (see figure 7). Both are most effective on shorelines with limited wave action. The primary disadvantage is that the shoreline around the recovery area must be cleaned.

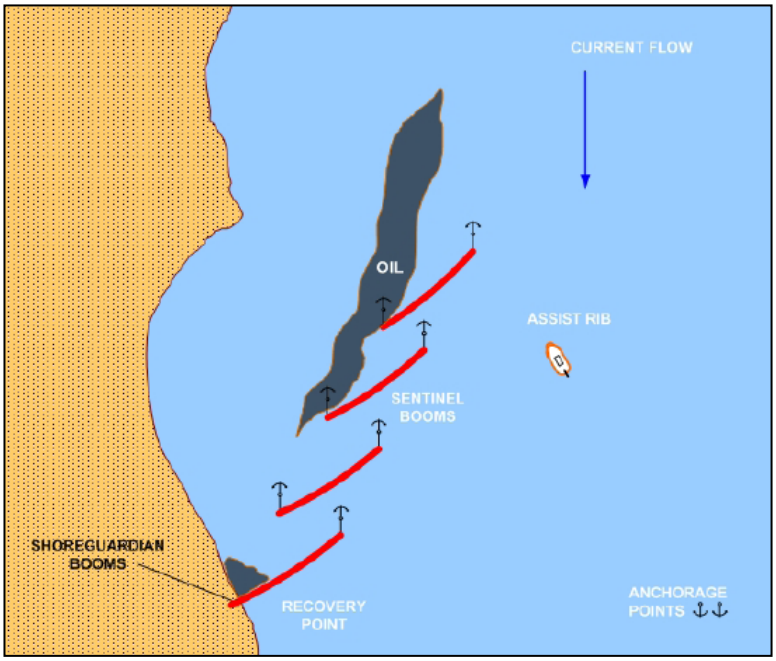


FIGURE 7: CASCADE BOOMING TO SHORE

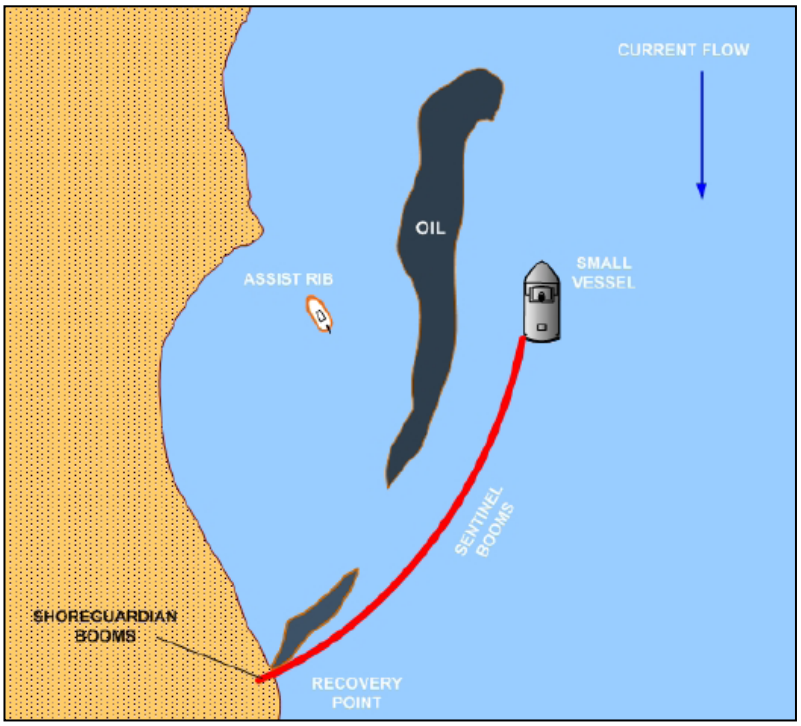


FIGURE 8: BOOMING STRATEGY USING OFFSHORE SUPPORT VESSEL

c) CONTAINMENT BOOMING

Booms are used to prevent the spread of oil over the water surface prior to pick-up. There is a wide variety of situations where this is desirable, for instance at the spill source; to localise the effect of the oil spill; where oil has collected in small bays or coves or on beaches; In quiet eddy pools at river banks; or where oil is trapped against quays.

It is important to have retaining anchors on the booms to keep them in position and prevent them from being washed ashore, against rocks or barnacle covered quays.

d) PROTECTION BOOMING

Protection booming involves deploying the boom in a static mode, i.e., placing or anchoring the boom between two or more stationary points. This method is used primarily to prevent or exclude oil from entering harbours, marinas, breakwater entrances, lagoons, and inlets.

Many of these entrances or channels have tidal currents exceeding 1 knot or surf breaking in the opening. Under these conditions, booms are placed landward from the entrance in quiescent areas of the channel, harbour or inlet. Exclusion booms are also deployed at an angle to a shoreline when possible (preferably in the direction of the wind) to guide oil to an area where pumps or skimming equipment can recover the oil. In many cases, the deployment of a secondary boom behind the primary boom is desirable in order to contain oil that may spill under the primary boom. Protection booming of harbours or inlets will require that a RIB or other small vessel be stationed at the upstream end of the boom to open the boom for boat traffic entering or leaving the harbour (see Figure 9).

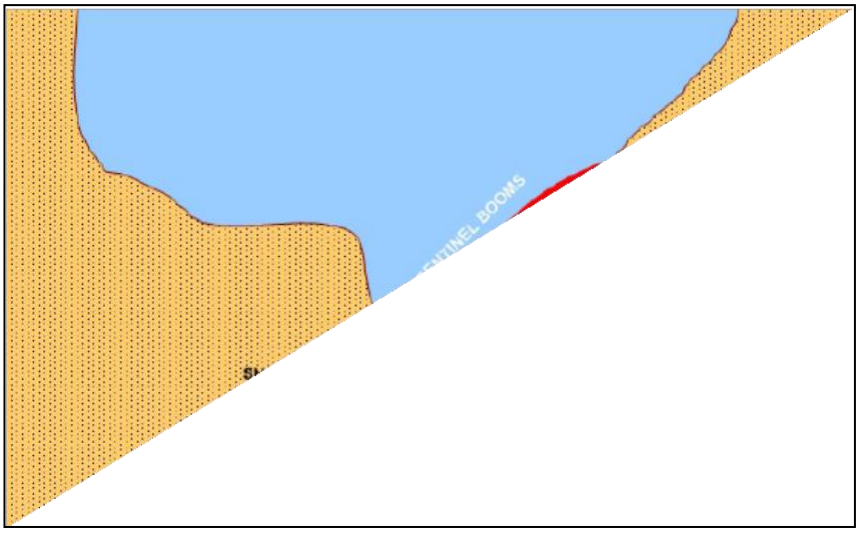


FIGURE 9: PROTECTION BOOMING OF A BAY OR HARBOUR ENTRANCE

Protection booming is most effective where the boom is relatively short; booms are more likely to fail when deployed across greater distances.

3.13 BOOMING CONSIDERATIONS

The optimum angle of boom deployment is dependent on the current speed and the length and type of boom used. To avoid boom failure in strong currents, the angle must be smaller than in weak currents. The same relation is true with regard to boom length. The optimum deployment, angle decreases as boom length increases.

The various types of booms available have varying degrees of stability under increasing current conditions. The more stable the boom, the larger the optimum deployment angle for a given current speed. In general, booms with a high ratio of buoyancy to weight, with tension members located at the top and bottom edges

and booms with horizontally oriented floatation collars resist pivoting and have good stability under most conditions.

a) EQUIPMENT REQUIREMENTS

Specific manpower and equipment requirements depend primarily on the width of the approaching slick and the current speed. The type of boom and angle to which it is deployed also affect the requirements. Booms deployed at small angles in high current areas require greater boom lengths to cover the same width as those deployed at greater angles.

b) ANGLE OF BOOM

In order to effectively perform protective booming of shoreline areas, boom must be placed at a particular angle (Figure 10). This angle will allow the boom to hold position without boom failure.

The following table will provide guidance when setting boom in current. The speed of the current will affect the boom's ability to redirect oil because of entrainment. By changing the boom angle, response personnel can collect the maximum amount of oil possible.

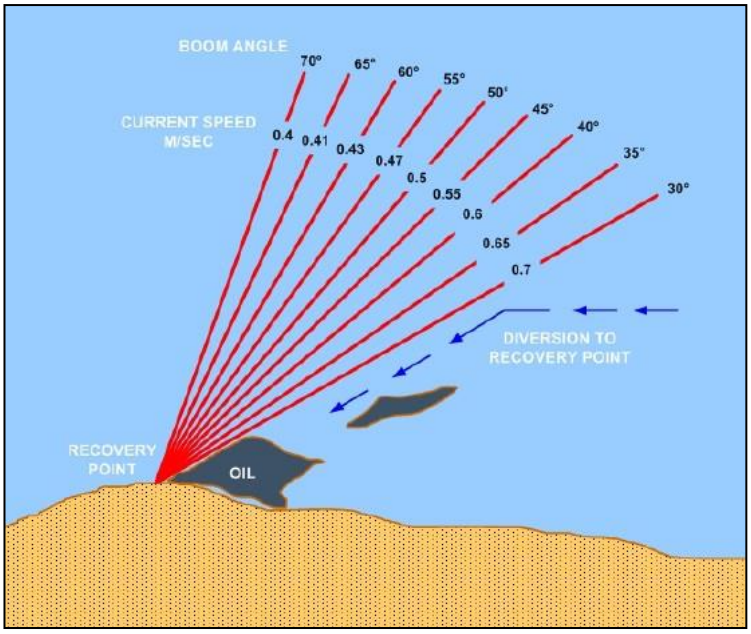


FIGURE 10: BOOM POSITION RELATIVE TO CURRENT SPEED

TABLE 4: CURRENT SPEED RELATIVE TO EFFECTIVE BOOM ANGLE

Maximum Current Speed (knots)	Maximum Current Speed (m/s)	Maximum Effective Boom Angle
< 0.5	< 0.4	90°
0.8	0.4	70°
0.83	0.43	60°
0.93	0.5	50°
1.12	0.6	40°

1.6	0.7	30°
2.1	1.1	20°

c) ANCHORING TECHNIQUES

In order to effectively handle booming operations, anchor systems will be necessary to effectively hold boom in a determined configuration. The Figure 11 shows the necessary equipment for anchoring boom for containment, exclusionary booming, diversionary booming, deflection booming, or cascade booming.

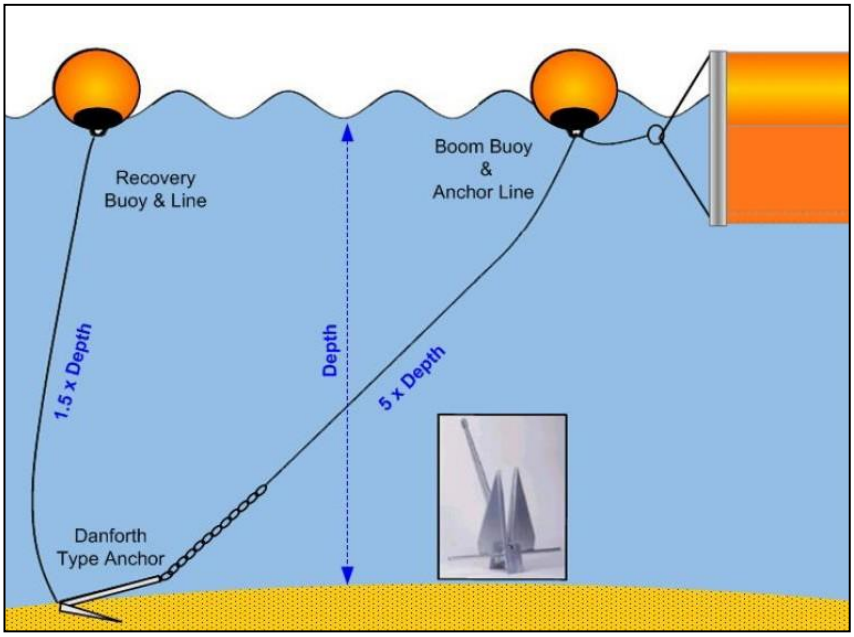


FIGURE 11: ANCHOR TECHNIQUES

d) MOORING THE BOOM WITH BOOM ANCHORING SYSTEMS

Danforth anchors are used to moor the boom as follows:

- assemble the anchors, chain, anchor line, trip line, and buoys as shown in figure above;
- set the anchor, and then attach the anchor line to the anchor point on the bottom of the boom;
- the length of the anchor line should be five times the water depth, (If possible); and
- the buoy line must be connected to the heel of the anchor to allow the anchor to be easily pulled from water.

ANNEX 1: SHORELINE CLEAN-UP ASSESSMENT TECHNIQUE SURVEY FORM

Shoreline Clean-up Assessment Technique Survey Form - RAPID

Page 1 of 2

[SCAT Manual: Terms & definitions: pages 34 to 44]

1 General Incident:_____ Local authority:_____ Date:_____

Survey from: Boat / Viewpoint / Foot Weather & tide:_____ Time:_____ to _____

2 Surveyors _____ Org./Tel./Radio No:_____

_____ Org./Tel./Radio No:_____

_____ Org./Tel./Radio No:_____

3 Segment ID / Shore name & location (Where in county? What part of shore surveyed? Mark on map/sketch overleaf)

4 Shore type(s) ✓✓ = primary ✓ = secondary Bedrock: cliff ☐ / slope ☐ / platform ☐ / ridges ☐

Stable boulders/cobbles ☐ Mobile boulders/cobbles/pebbles ☐ Solid seawalls ☐ Revetment ☐

Coarse sediment ☐ Mobile sand ☐ Stable sand ☐ Clay/Peat ☐ Stable mixed substrata ☐

Firm muddy sand ☐ Soft mud ☐ Saltmarsh ☐ Reed swamp ☐ Other:_____

Prominent features: Pools ☐ Deep cracks/crevices ☐ Pockets of sediment between rocks ☐

Strandline debris & litter: _____

5 Operational features Ongoing clean-up activity ☐:_____

Access to shore: _____

Access on shore:_____ Comms:_____

Suitable laydown / storage area ☐_____ Oiled debris ☐ _____bags / trucks

6 Surface Oil (mark location and extent on map/sketch overleaf)

Describe surface oiling using the following terms if possible: **Location**: above / below strandline **Distribution**: Continuous, Broken, Patchy, Sporadic **Oil Thickness**: Thick oil, Cover, Coat, Stain, Film **Oil character**: Fresh, Mousse, Tar Balls, Tar Patties, Tar, Surface Oil Residue, Asphalt Pavement **Area:** Describe area of oil coverage with dimensions (pace out shore lengths and band widths)

Risk that shoreline oil could remobilise? ☐ Floating oil (close to shore)? ☐

7 Subsurface Oil Observed / Likely / Unlikely / Don't Know (mark location on map/sketch overleaf)

Explain reasons for above categorisation. Describe observed subsurface oiling using the following terms where possible: **Location**: above / below strandline. **Distribution**: Extensive, Frequent, Uncommon **Oil descriptors**: depth & band thickness (cm), Heavy deposits (Mobile?), Residue, Film or Stain, Asphalt Pavement

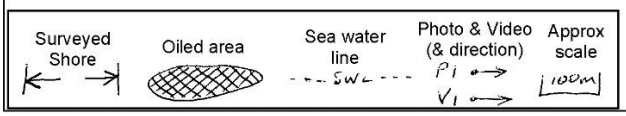
Other materials: Map ☐ Sketch ☐ Photos ☐ (No._____) Video ☐ (No._____)

Rapid SCAT survey of Segment:..... Date:..... Page 2 of 2

8A Resource sensitivities and other constraints on clean-up (ecological / recreational / cultural / economic; incl. wildlife casualties)

8B Clean-up recommendations (Oil, debris, litter)

9 Sketch maps / profiles



Administration: Form checked? ☐ Associated materials labelled and stored? ☐ Form processed? ☐ JM 31 December 2011

ANNEX 2: POLREP (POLLUTION REPORT) FORM

To zone4@hmcg.gov.uk
Copy to Agencies as required
From ……..

Part 1 – Information which should be provided in an initial pollution report	
A.	**Classification of Report:** **(i) doubtful (ii) probable (iii) confirmed** **(Delete as necessary)**
B.	**Date:_____Time:_____pollution observed** **Identity of Observer/Reporter: _____**
C.	**Position of Pollution _____** **(by latitude and longitude if possible, state range and bearing from some prominent landmark)** **Extent of Pollution_____litres/barrels/tonnes** **Size of polluted area_____from _____** **(from where sighted)** **(estimated amount of pollution, e.g. size of polluted area, number of tonnes of oil spilled; or number of containers, drums, etc. lost. When appropriate give position of observer relative to pollution)**
D.	**Wind Speed:_____knots; Direction from: _____** **Tidal status at time pollution observed:_____after/before HW/LW**
E.	**Weather Conditions and sea state:** **_____sea state/ wave height_____metres**
F.	**Characteristics of Pollution:** **Type: _____** **(e.g. oil, crude, diesel: packaged or bulk chemicals UN Number if known, garbage)** **Appearance:_____** **(e.g.: liquids, floating solid, liquid oil, semi-liquid sludge: tarry lumps; weathered oil, discoloration of sea; visible vapour; etc.)**
G.	**Source of Pollution: _____** **(from vessel or other undertaking)**

Cause of Pollution: _____

_____

_____

(apparent deliberate discharge or casuality. If the latter give a brief description. Where possible name, type, size, nationality and Port of Registry of polluting vessel. If vessel underway give course speed and destination if known)

H. **Details of other vessels in the area:** _____

_____

(to be given if the polluter cannot be identified and the spill is considered to be of recent origin)

J. **Photographs taken** **Yes / No**

Sample taken for analysis **Yes / No**

K. **Remedial action taken, or intended, to deal with spillage:** _____

_____

_____

L. **Forecast of likely effect of pollution:** _____

_____

(e.g. arrival on coastline, with estimated timing)

M. **Names of those informed other than addressees:**

_____

_____

N. **Any Other relevant information:** _____

_____

_____

(e.g. names of other witnesses, references to other instances of pollution pointing to source)

Part 2 – Supplementary information to be provided later
(this part may be disregarded when POLREPS are for UK internal distribution only)

O. **Results of sample analysis** _____

_____

P. **Results of photographic analysis**

_____

_____

Q. **Results of supplementary Inquiries:** _____

_____

(e.g. inspection by Surveyors, statements from ship's personnel, etc. if applicable)

R. **Results of mathematical models**_____

_____

ANNEX 3: BONN AGREEMENT COLOUR CODES

Code 1 – Sheen (< 0.3 µm)
The very thin films of oil reflect the incoming light slightly better than the surrounding water and can therefore be observed as a silvery or grey sheen. All oils in these thin layers can be observed due to this effect and not the oil colour itself.
Oil films below approximately 0.04 µm thickness are invisible. In poor viewing conditions even thicker films may not be observed.
Above a certain height or angle of view the observed film may disappear.

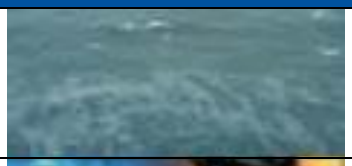
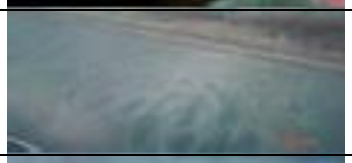
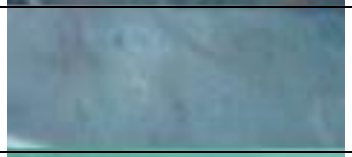
Code 2 – Rainbow (0.3 µm – 5.0 µm)
Rainbow oil appearance represents a range of colours, yellow, pink, purple, green, blue, and red, copper, orange; this is caused by an optical effect and independent of oil type.
Depending on angle of view and layer thickness, the distinctive colours will be diffuse or very bright.
Oil films with thicknesses near the wavelength of different coloured light, 0.2 µm – 1.5 µm (blue, 400nm or 0.4 µm, through to red, 700nm or 0.7 µm) exhibit the most distinct rainbow effect. This effect will occur up to a layer thickness of 5.0 µm. Bad light conditions may cause the colours to appear duller.
A level layer of oil in the rainbow region will show different colours through the slick because of the change in angle of view. Therefore if rainbow is present, a range of colours will be visible.

Code 3 – Metallic (5.0µm – 50 µm)
The appearance of the oil in this region cannot be described as a general colour and is oil type dependent. Although a range of colours can be observed, blue, purple, red and greenish the apparent colour is not caused by interference of light or by the true colour of the oil. The colours will not be similar to 'rainbow'. Where a range of colours can be observed within a rainbow area, metallic will appear as a quite homogeneous colour that can be either blue, brown, purple or another colour. The 'metallic' appearance is the common factor and has been identified as a mirror effect, dependent on light and sky conditions. For example blue can be observed in blue-sky conditions.

Code 4 – Discontinuous True Colours (50 µm – 200 µm)
For oil slicks thicker than 50 µm the true colour will gradually dominate the colour that is observed. Brown oils will appear brown, black oils will appear black. The broken nature of the colour, due to thinner areas within the slick, is described as discontinuous. This is caused by the spreading behaviour under the effects of wind and current.
'Discontinuous' should not be mistaken for 'coverage'. Discontinuous implies true colour variations and not non-polluted areas.

Code 5 – True Colours (>200 µm)
The true colour of the specific oil is the dominant effect in this category.
A more homogenous colour can be observed with no discontinuity as described in Code 4.
This category is strongly oil type dependent and colours may be more diffuse in overcast conditions.

Table 5: Oil Characteristics

Code	Oil Appearance / Colour	Pictorial	Quantity (Tonnes / km²)	Litres per km²
1	Sheen (Silvery / Grey)		0.04 to 0.30	40 – 300
2	Rainbow		0.30 to 5.0	300 – 5000
3	Metallic		5.0 to 50	5000 – 50,000
4	Discontinuous true oil colour		50 to 200	50,000 – 200,000
5	Continuous true oil colour		More than 200	More than 200,000

ANNEX 4: ESTIMATING THE SIZE OF A SPILL

It is important to determine the size of the spill and to classify it. **Where possible, calculate the volume of oil spilled from methods other than the evaluation of a spill on the sea for example from:**

- volume of diesel in hose;
- lost or unaccounted volume of diesel or oil.

If an estimate of the spill size cannot be determined from operational information, a visual inspection may be made by observing the slick on the sea surface. Although this can be performed from a pier or vessel, best estimates are made during aerial surveillance flights. When using this technique, bear in mind that the entire area of the slick may not be visible and that this can only provide an order of magnitude estimate of the amount of oil spilled. The following tables and graphs should be used to assist you to make a best estimate of spill size.

Calculation of the volume of oil spilled from the appearance of oil film on water

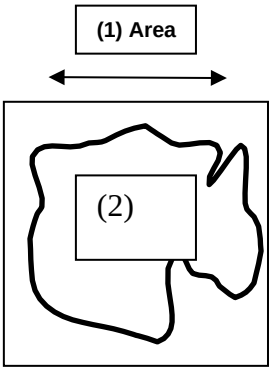
Estimate total size of the area as a square or rectangle (in km) ie maximum extremities of the slick.

1 Assess the area affected by the slick in km^2 calculated as a % of the total area in (1).

2 Estimate the area covered by each colour of oil, calculated as a % of the total area affected.

3 Multiply the area covered by each colour by the appropriate figure in the oil quantity table below.

4 Adding all of the colour figures will give the total quantity of oil in m^3 within the slick.



Example: if the total area of a rectangle is $30km^2$ and the area within that covered by oil is estimated to be about 75% then total area affected is $22.5km^2$. If the area covered by "blue" oil is 40% then that will equal $9m^3$, area covered by "rainbow" oil is 60% then that will be $4m^3$; total amount of oil spilled will then be about $13m^3$.

Table 2: Oil Quantity estimation by colour

Code	Appearance/colour	Quantity (m^3/km^2)
1	Silvery	0.02
2	Grey	0.1
3	Rainbow	0.3
4	Blue	1
5	Blue/brown	5
6	Brown/black	15-25
7	Dark brown/black	>100

Mass Balance Calculations

With the variable compositions of oils the initial volume spilt can often be significantly different to the amount which remains on the water over time or is stranded on the shoreline. This is because of the processes of evaporation, dissolution and emulsification. Whilst some idea of the magnitude of these processes can be ascertained from an examination of the physical properties of the fresh oil this can be only a guide.

On the NOAA website: http://response.restoration.noaa.gov there are a number of tools available to oil spill responders, one of these is a software package called ADIOS 2 which is available for free download.

This application has a database of oil characteristics and by entering a number of simple parameters (volume spilt, wind speed, time since spill) it will calculate and graph changes in the mass balance ie: amount evaporated, amount emulsified, etc. This gives a much better overview of the changes through time of the amounts of material likely to be encountered.

ANNEX 5: SLICK TRACKING AND SURVEILLANCE

After the initial spill assessment has been completed, the slick should be tracked and monitored throughout the incident to evaluate the extent of the slick, monitor the movement of the slick and decide on the appropriate action. This will occur as follows:

1 In the early stages of the incident, the slick may be monitored from the pier side or harbour vessel. Figure 1, which predicts the movement of oil on water as a function of wind and current, should be used to assist this.

2 For large spills, the Oil Pollution Officer should mobilise aircraft to undertake aerial surveillance. Surveillance should be undertaken at least twice per day until such time as no oil is visible on the sea surface. Angus Council will notify the HM Coastguard of its intentions to use aerial surveillance. Aerial surveillance will be undertaken as soon as possible after an incident has occurred.

Table 6: Slick Surveillance/Tracking Checklist

Checklist	Notes
Determine extent and co-ordinates of slick	
Chart slick size, growth patterns and affected area(s); estimate quantities if possible.	Estimate by direct observation and use Annex 34.
Carry out slick trajectory predictions	Use vectors (⇒ Figure 1 over page)
Follow direction of movement of slick	
Identify heaviest concentrations of oil	Likely to be at downwind leading edge of spill
Identify onset and progress of water in oil emulsion formation	Heavy oil (eg intermediate fuel oil) will change in appearance soon after spill; in initial stages, the thicker parts will appear as dense, black areas, but as emulsification takes place, the colour will change to brown, orange or yellow.
Watch for any flocks of birds	Refer to Environmental Maps
Watch for any oil floating subsurface	
Watch for break up of slick and determine direction of movement of any oil patches	
Report on progress of natural dispersion	This is likely to be good for diesel or base oil hydrocarbon spills
Report on effectiveness of response	If dispersants are employed watch particularly for signs of dispersant not working.

In addition to gravity spreading which will cause the oil to cover a progressively larger area, the oil moves on water as a function of wind and current – the current has a 100% influence and the wind a 3% influence. A slick will continue to spread until a thickness of about 1 mm is reached. Once this stage is reached, the slick may break up into windrows, which will further increase the spread of the slick. To plot the movement of a slick, the following steps should be taken in association with Figure 1:

1 Plot 100% of the current speed on an appropriate chart in the direction that it flows (ie if the current is 1 knot, then plot 1 nautical miles on an appropriate chart).

2 From this end point then plot the wind direction as 3% of its value in the direction it is blowing (ie if the wind is 30 knots, then plot 0.9 nautical miles in the direction it is blowing).

3 Point B will be the centroid of the oil spill 1 hour later and vector AB its predicted trajectory.

For best results, the plot should be updated hourly and verified with overflights.

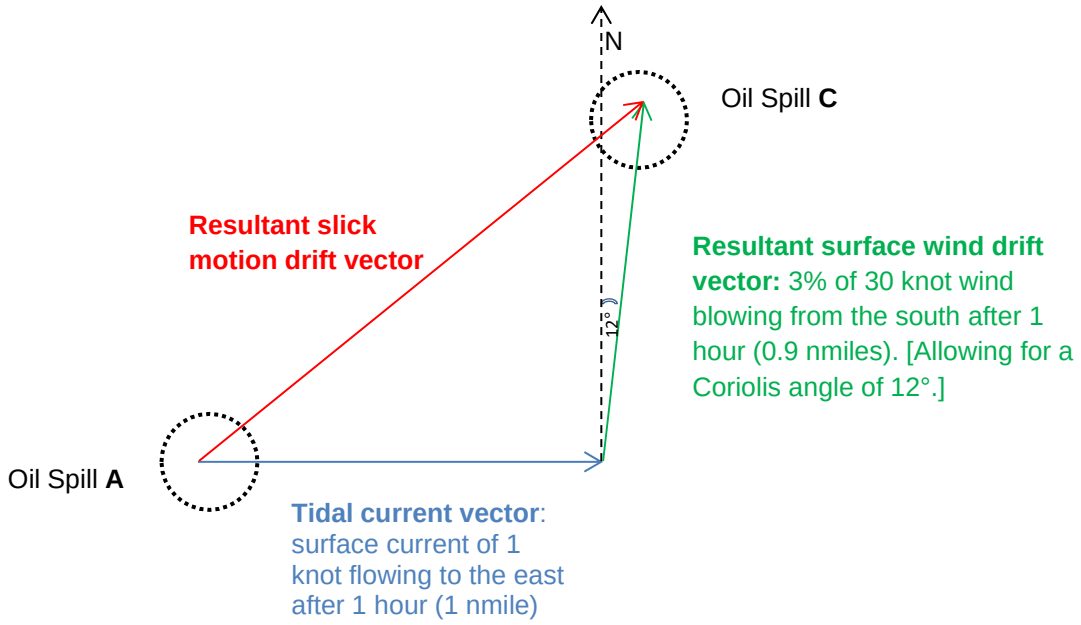


Figure 13: Manual prediction of oil slick trajectory prediction

Given the direction and speed of both the water currents and the wind it is possible to determine the movement of the oil by manual plotting. This can be performed by following the method for oil spill tracking detailed below.

- Mark the most accurate central position of the slick **A**.
- Plot the current vector at 100% of the flow and in the direction of flow from **A**.

  Note that a current flows to a given direction. (1 nautical mile = 1 minute of latitude) Example: If the current is flowing towards a direction of 090° at a speed of 1 knots (1 nautical mile per hour)
  - draw a line equivalent to 1 nmile (representing 1 hour of travel) in the direction of 090° to give the point **B**.
- Plot the wind vector at 3% of the speed from the end of the current vector at **B** in the direction that the wind is blowing.

  Note that wind blows from the given direction.
  Example: if the wind direction is 225° and the speed is 30 knots
  - draw a line equivalent to 0.9 nmiles (3% of 10 knots for 1 hour of travel) in the direction of 225° - 180° = 045° to give point **C**.
  - Rotate the vector 12° in a clockwise direction to allow for the Coriolis force.

  Complete the vector diagram joining **A** to **C**, which is the centre of the slick an hour after **A**.

ANNEX 6: HEALTH AND SAFETY STATUTORY DUTIES

A6.1 APPLICABLE STATUTORY LAW AND ITS IMPLICATIONS

The Health and Safety at Work Act 1974 places a clear duty on all employers and persons responsible for premises to ensure that the workplace is safe and in the case of the employer, to have a safe system of work. This duty is placed regardless of whether the workers are employees, sub-contract workers, temporary workers or self-employed persons. Implementation of the Health and Safety at Work Regulations 1999 requires that, all employers carry out suitable and sufficient Risk Assessments of all tasks to be undertaken in the workplace. Where five or more employees are employed then the Assessment is to be recorded and those at particular risk must be informed accordingly. These same regulations require that the employer executes a Safety Management System and that measurement of performance against standards is made. All employees must receive adequate training, information and supervision. Additionally, there is a requirement for all employees to receive suitable and sufficient health surveillance to ensure that they are fit to carry out the work and that the work and conditions do not cause them adverse effect. The Provision and Use of Work Equipment Regulations 1998 requires that all equipment provided for use at work is safe and fit for purpose. The persons using the equipment must be adequately trained in its use and the operation must be properly supervised. The Personal Protective Equipment (PPE) Regulations 1992 requires that all equipment provided is fit for purpose and does not cause adverse effect. That all personnel are trained in its use and that all associated risks are recorded controlled and pointed out to those affected. The Manual Handling Regulations 1992 requires that all work where lifting, pulling and pushing is involved, is assessed and all risks to the health and safety of those involved are reduced to a level as low as reasonably practicable. The Control of Substances Hazardous to Health Regulations 2002 requires that all substances to which a worker may be exposed, including dusts and gasses are properly assessed and the risks to health reduced to a safe and acceptable level. In addition to the above legislation, MCA's STOp 4/2001 entitled Health, Safety and Welfare during

A6.2 SITE SAFETY ASSESSMENT

To achieve a safe operation, those in charge of the response must follow those generalised parts of the contingency plan, which apply in all circumstances. Additionally they must have available the means to prepare those elements of the plan which are Site and response specific.

The Site Safety Assessment is intended to prevent uncontrolled incidents occurring which may cause further damage to the environment or loss due to damage, injury or illness. Each section should be addressed jointly and separately before work commences and the appropriate steps taken to ensure that requirements are adequately met. The Site Safety Assessment should comprise the following sections:

- *Site Survey*
- *Operations Analysis*
- *Site Control*
- *Logistics and Supplies*
- *Personnel.*

A6.3 SITE SURVEY

A Site Survey Form (see Annex 6) should be available, which when followed correctly will add all of those site unique details which assist in the decision making process and remind staff of essentials which might otherwise be omitted. The Site Survey should address the safety of those personnel taking part in the clean-up as well as those members of the public who may also be involved. The following list indicates a few of those subjects which, should be addressed, assessed and reported in the survey.

The list is by no means exhaustive.

- *Communications requirements*
- *Exposure to temperature*
- *Feasibility of handrails or ropes*
- *Lack of or shelter from weather*
- *Lighting conditions*
- *Machinery usage*
- *Visibility*
- *Water hazards*
- *Manoeuvrability*
- *Manual handling*
- *Pedestrian traffic*
- *Requirement to access confined spaces*
- *Sample collection*
- *Terrain surface and incline*
- *Vehicle traffic*

A6.4 OPERATIONS ANALYSIS

Having surveyed the site and assessed the aspects which are influenced by the terrain, water conditions, and other pertinent factors. The On Scene Commander will assess the way in which the operation is to be conducted. The intention to use the following facilities can be stated and the reasons for and priorities of each facility established

- *Cranes*
- *Boats*
- *Breathing apparatus*
- *Dispersants*
- *Fork lifts*
- *Raking and sweeping gear*
- *Winches*
- *Hoses and pumps*
- *Low loaders*
- *Motor vehicles*

A6.5 SITE CONTROL

It is essential that those in charge of the Spill Clean-up have control of the site as soon as possible and before any significant part of the clean-up operation begins. Access to the site must be restricted to those personnel who are essential to the clean-up operation. Arrangements must be made for the area to be barriered, closed and policed such that no one can enter the work area without reporting to the site supervisor. No workers should be allowed on site until they have received the full vetting and briefing with respect to the Safety Assessment.

A6.6 LOGISTICS AND SUPPLIES

Specifically with respect to safety, it should be ensured that the appropriate equipment, materials and substances are available at the required times. Particular attention should be paid to the availability of the various sizes of protective clothing required. This sometimes cannot be established until the members of the workforce have been detailed and their individual roles and tasks decided. Consideration must be given for a prolonged clean-up operation possibly stretching to 24 hrs operations. In which case, shelter, accommodation, refreshments, rest areas, sanitation and first aid must be available. Where training has to be delivered prior to work commencing, the necessary instructors and equipment must be available before work commences. It is an error to allow experienced workers to commence work whilst others are waiting for training.

A6.7 PERSONAL PROTECTIVE EQUIPMENT (PPE)

If the weather is at all inclement, the protective clothing issued to workers must be warm, water and chemical-proof. It should include coveralls, gloves, boots, eye protection and headgear. If the weather is warm, the use of the same protective clothing may be necessary, but the requirements for ventilation and cooling will be greater.

PPE includes:

- *Breathing apparatus including respirators*
- *Flotation suits and vests*
- *Gloves/ gauntlets*
- *Protective clothing*
- *Goggles, visors and safety glasses*
- *Hard hats*
- *Insulated clothing*
- *Reinforced boots, shoes and gloves*

A6.8 FIRST AID.

The Health and Safety (First Aid) Regulations 1981, together with the New Code of Practice on First Aid, outline the requirements for trained first aiders and the equipment that must be provided. A foreshore clean-up is considered as a special circumstance and the appropriate extra provisions should be taken into account.

A6.9 PERSONNEL

Selection of Personnel to carry out the clean-up must be dominated by safety considerations.

A6.10 SAFETY ON THE FORESHORE

During the execution of a foreshore Site Survey, access to the area to be cleaned must to be carefully assessed and documented. Account needs to be taken of low and high tides and the need for workers to access inlets, cliffs and terrain difficult to navigate. Tide tables should be consulted as well as the taking of advice from those with local knowledge. Where necessary and appropriate, the use of equipment such as handrails, ropes and ladders should be considered. Where workers are, by necessity, required to work out of sight of one another, communication between them and the supervisor is essential. The provision and use of Personal Emergency Beacons and Distress Flares by appropriate personnel should be considered.

A6.11 SAFETY ON THE WATER

Agreements with the Coastguard should be reviewed and complied with. At the very least, they should be informed of the vessels operating in their area together with all necessary detail of vessel capability and persons on board. Protective Clothing. Workers operating from sea-going vessels should be equipped with harnesses built to BS 1397. They should, at all times, wear a self or automatic inflating lifejacket and should be protected by a Survival Suit.

A6.12 RISK ASSESSMENT

The identification of all hazards at a worksite or spill location is a singular task that should be done by involvement of the people who are expected to carry out the work. The supervisor responsible for co-ordinating the risk assessment should ensure that all hazards are identified before the next step in the process is attempted. A hazard is an object, place, process or circumstance with the potential to do harm in the form of injury, damage, delay or pollution.

A6.13 CONDITIONS REQUIRING DECONTAMINATION:

Where workers have been wearing waterproof and protective clothing, it is likely that the clothing will become contaminated by crude oil or chemicals that might have been used during the clean-up operation. The clothing needs to be cleaned to prevent further contamination. Facilities for such cleansing should be made available either near to Rest or Feeding areas or close by, but clear of the work site.

A6.14 PERSONAL HYGIENE PRACTICES ON THE JOB:

Workers should be instructed on the dangers of ingesting hydrocarbons and chemicals through contact of contaminated equipment or clothing, such as gloves via the mouth and nose. Facilities for removing protective clothing and washing before consuming food or smoking should be made available.

A6.15 DECONTAMINATION AREA DRAINAGE:

The decontamination area where clothing and personal equipment is cleansed should be arranged so that cleansing water and contaminants are drained into tanks. Care should be taken to ensure that contaminated waste does not drain into either the normal drainage system or into the soil under the decontamination area.

A6.16 DISPOSAL OF CONTAMINATED CLOTHING:

Clothing, which is not fully washable or capable of having all traces of contaminant removed, may need to be disposed of safely. Such clothing may comprise Special or Hazardous Waste. If incineration facilities do not exist at the site, the clothing may need to be delivered to the Local Authority or to a Special Waste Contractor.

ANNEX 7: LOAD BEARING CHARACTERISTICS

LOAD BEARING/ SITE RESTRICTIONS as a general note as load spreads out, the pressure on the soil is greatest right beneath the footing or vehicle tyres or contact point. Very fine compacted soils (clays and silts) typically have lower capacities than coarse granular soils (sands and gravels).

Table 6: Soil Bearing Capacities

Class of Materials	Load-Bearing Pressure (pounds per square foot)
Crystalline bedrock	12,000
Sedimentary rock	6,000
Sandy gravel or gravel	5,000
Sand, silty sand, clayey sand, silty gravel and clayey gravel	3,000
Clay, sandy clay, silty clay, and clayey silt	2,000

Source: Table 401.4.1; CABO One- and Two- Family Dwelling Code; 1995.

However, some clays or silts have higher bearing capacity than the values in the code table above. During an emergency a soil test can be carried out to discover if denser clay with a much higher bearing strength is present along the chosen routes towards and around the Tay estuary. Mechanical compaction of the surrounding soil can also raise its bearing capacity and this could be tested in certain areas nearer the coastline/ harbour area where sand and silty sand/ gravel resides to support any emergency clean up equipment or vehicles. Tests on surrounding sandy soil and its bearing capacity can be done using a hand held penetrometer. This pocket-sized device is a spring-loaded probe that estimates the pressure on the soil and its resistance and is calibrated to give readings in tons per square foot this helping emergency vehicles or equipment to avoid trouble.

ANNEX 8: Waste Disposal Operations

NB: Within this Plan waste oil refers to the disposal of oil which has been contained and recovered as the result of a spill or a pollution incident.

The safe handling and disposal of recovered oil is governed by relevant sections in the following legislation:

- *The Environmental Protection Act 1995.*
- *The Controlled Waste (Registration of Carriers and Seizure of Vehicles) Regulations 1991.*
- *Control of Pollution (Amendment) Act 1989.*
- *The Waste Management Licensing Regulations 1994.*
- *Special Waste Regulations 1996 (as amended).*
- *Water Environment (Controlled Activities) (Scotland) Regulations 2005.*
- *Landfill (Scotland) Regulations 2003.*
- *The Environmental Protection (Duty of Care) Regulations 1991.*
- *Special Waste Amended Regulations (Scotland) 2004.*

If oily waste material is produced as a result of a pollution incident then the polluting party has a duty of care to ensure that the waste is contained, handled, transported and ultimately disposed of in an appropriate manner. If the material is to be handled by contractors then Angus Council (to reduce liabilities to a minimum) has to ensure that each contractor has the relevant transportation registration and waste management licences, where applicable. NatureScot and SEPA (as the Waste Regulatory Authority) should be consulted on any proposal to dispose or store waste material to ensure that sensitive wildlife areas such as SSSIs are not affected. SEPA should also be consulted to ensure compliance with the relevant legislation relating to controlled waste and the protection of controlled waters. In addition HM Revenue and Customs must be notified if recovered oil is brought ashore by dedicated oil recovery vessels. Landing should not be hindered by the absence of an official from HM Revenue and Customs; however, Angus Council should maintain a careful log on quantity and nature of the recovered oil.

Waste should not be moved without obtaining the appropriate paperwork and authorisation from SEPA in the form of a Consignment Note. Waste should only be transported by a licensed carrier. The options for waste disposal or treatment of material, be it oily liquids or oiled solids are:

- *Temporary store, clean, stabilise and then recover or re-use.*
- *Temporary store and then take to appropriate disposal site for burial.*
- *Take to a refinery/ incinerator (mainly for oily liquids only).*
- *Take to appropriate disposal site.*
- *Each disposal option is examined below with various points for consideration highlighted.*

A8.1 TEMPORARY STORAGE THEN CLEAN, TREAT, STABILISE, RECOVER, REUSE

This option aims to store temporarily the material and then, slowly over the ensuing period, to clean it or stabilise it and then to recover or reuse it. In most cases this is the best practical environmental option (BPEO). It avoids the risk of changing what was a marine oil pollution problem into an inland surface pollution problem or groundwater pollution problem. From temporary storage the contaminated material can be stabilised with cement, lime, clay, organic binders and asphalt. The characteristic of each product needs to be considered when determining the ultimate disposal route or any perceived end use. It is important to note that the treatment of wastes also comes under the waste management licensing system. Therefore, any strategy to deal with the waste in this manner can only be developed through close liaison with the Local Authority concerned and SEPA. SEPA would have to be consulted on any intention to temporarily store oil collected on shores and beaches under paragraph 41 Exemption under Schedule 3 of the Waste Management Licensing Regulations 1994. Furthermore, waste oil is likely to be classified as Special Waste and should be treated as such until otherwise determined. It would therefore be subject to the Special Waste Regulations (as amended) 1996. Mixes of crude oil/ sand and oil/ seawater etc. would probably be considered as Special Waste if the percentage of carcinogenic compounds is above 0.1% or where the waste would be considered as an absolute entry in the European Waste Catalogue (EWC, 1994). It is therefore likely that oily beach materials and oil/ water liquids would have to be handled as Special Waste.

A8.2 TEMPORARY STORAGE

The reasons for constructing a temporary storage site are as follows:

- There is no immediate disposal outlet for large quantities of oil/ sand mixture or for oil/ water mixtures and clean-up cannot be slowed or stopped.
- The equipment used to clean beaches is usually labour intensive and therefore requires an immediate transfer area adjacent to the site to be provided.
- The nature of the roads precludes high traffic densities.
- The in situ treatment of contaminated material is often preferable to removing large quantities of material from the shoreline.

Each site will have to be constructed in a specific manner. It is therefore essential that the construction of temporary storage sites be done through close liaison with the Local Authority concerned and SEPA. Temporary storage may take the form of United Nations approved International Bulk Containers (IBC) which are better suited for liquid waste or watertight skips which will hold solid or liquid waste. Larger volumes of waste can be held in specially constructed pits lined with heavy duty sheeting. It is vital to ensure that no sharp objects which could puncture the lining are put into the pit. Temporary pits should be constructed in consultation with both SEPA and the Local Authority concerned but for guidance should be dug on level ground above the high water mark and the water table.

Registered Exemption from Waste Management Licensing. The temporary storage of oil collected on shores and beaches would require consultation with SEPA for a paragraph 41 Exemption under Schedule 3 of the Waste Management Licensing Regulations 1994. Waste oil is likely to be classified as Special Waste and should be treated as such until otherwise determined. It would therefore be subject to the Special Waste Regulations (as amended) 1996. Mixes of crude oil/ sand and oil/ seawater etc. would probably be considered as Special Waste if the percentage of carcinogenic compounds is above 0.1%. It is therefore likely that oily beach materials and oil/ water liquids would have to be handled as Special Waste.

A8.3 TAKE TO A REFINERY/ INCINERATOR (MAINLY FOR OILY LIQUIDS ONLY)

This material should be removed from site by a licensed waste handling company who will then arrange for its disposal in an appropriate manner. If there is suitable access, oily liquids produced from a shoreline clean-up operation can be removed from site by road tanker. If the oily liquids are on board a dedicated recovery vessel following an at sea containment and recovery operation then it can be transferred across the quay, at a suitable berth, to a road tanker or other suitable waste reception facility. Alternatively this waste can be fed directly into the reception facility at a marine terminal of an oil refinery. It is the responsibility of the Ships Master to ensure that this waste is disposed of appropriately. However, the Council/ Council's nominated representative must confirm that any contractors have the necessary licenses to handle and dispose of the waste. The disposal route should also be agreed with SEPA to ensure it meets with their satisfaction. Waste oil is likely to be classified as Special Waste and should be treated as such until otherwise determined. It would therefore be subject to the Special Waste Regulations (as amended) 1996. Mixes of crude oil/ sand and oil/ seawater etc. would probably be considered as Special Waste if the percentage of carcinogenic compounds is above 0.1%. It is therefore likely that oily beach materials and oil/ water liquids would have to be handled as Special Waste.

A8.4 DIRECT TO APPROPRIATE DISPOSAL SITE

All disposal sites require a Waste Management Licence. The licence is specific to the type of material that can be disposed of at the site. There are only a few sites that are licensed to receive organic or chemically polluting materials (includes oily waste). The Landfill (Scotland) Regulations 2003 ban the landfill of liquid wastes including oily waste. There will be a charge levied by the site operator for depositing material at the site. In addition there is landfill tax/ levy applied to all waste deposited in a landfill. Furthermore, waste oil is likely to be classified as Special Waste and should be treated as such until otherwise determined.

It would therefore be subject to the Special Waste Regulations (as amended) 1996. Mixes of crude oil/ sand and oil/ seawater etc. would probably be considered as Special Waste if the percentage of carcinogenic compounds is above 0.1%. It is therefore likely that oily beach materials and oil/ water liquids would have to be handled as Special Waste. The transportation of Special Wastes generally requires that the Scottish Environment Protection Agency (SEPA) be informed before the waste is removed. This is done by filling in parts A, B and D of a Special Waste Consignment Note, available from SEPA, which is sent to the receiving facility. This should be done at least three clear working days before the waste is to be moved. However, in the event of an 'emergency' SEPA may waive the requirement for pre-notification. The licensed waste carrier completes part C of the Consignment Note and takes it with the load to the receiving facility. The licensed operator of the receiving facility then signs the consignment note to say that they have accepted the load and that they are authorised to manage it properly. The requirement for pre-notification generally does not apply to special waste from ships. Therefore oil recovered at sea by a dedicated Oil Recovery Vessel could be discharged within a harbour to an appropriate waste reception facility without having to pre-notify SEPA. However a consignment note will have to be supplied with each load sent for disposal. To ensure that oily waste material is transported and disposed of in an appropriate manner, a licensed waste carrier and disposal company should be contracted. The Council and Waste Disposal Company should then liaise with SEPA to confirm that the disposal route identified meets with their satisfaction.

ANNEX 9: OIL POLLUTION

A9.1 CLASSIFICATION OF OILS AND ENVIRONMENTAL EFFECTS

The following generalised classification emphasises the characteristics of oils which have the greatest effect on living organisms.

- **Category I:** Light Oils are mostly paraffin's and diesel oils.
- **Category II:** oils; the moderate to heavy oils, are most crude's and intermediate products such as marine diesel.
- **Category III:** the heavy oils, include very waxy crudes, in water emulsions, and heavy lubricating oils.
- **Category IV**: the residual oils, are bunker and heavy fuel oils and weathered oils in the form of tarry lumps and asphalt (O'Sullivan, A. J. & Jacques, T. G. 2003) and will remain in the environment indefinitely (ITOPF 2006/2007).

A9.2 FATE OF OILS

Oil contains a variety of different types of hydrocarbons. The exact composition is dependent upon its origin. Oil may also contain a variety of impurities such as sulphur and nitrogen products. Generally medium to heavy oil is of relatively low toxicity and lighter oils of higher toxicity. However this is dependent upon the properties of the source oil (*Section 1.2.3*). The route of human exposure is via inhalation and skin absorption. This is of primary concern to this SPSP report via health and safety protocol. Oil when released in a spill will be subjected to various actions:

- Spreading
- Evaporation
- Oxidation
- Dissolution
- Emulsification
- Microbial degradation

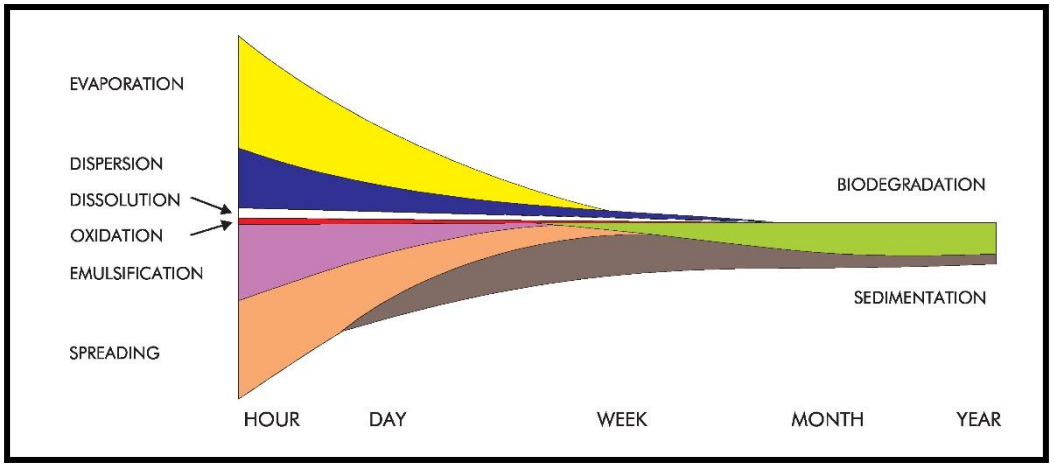


FIGURE 14: FATE OF OILS SHOWS A SCHEMATIC REPRESENTATION OF THE FATE OF A CRUDE OIL SPILL OVER TIME. IT GIVES A VISUAL REPRESENTATION OF THE CHANGES IN THE RELATIVE IMPORTANCE OF WEATHERING PROCESSES ESPECIALLY ON EXPOSED COASTAL AREAS. IN THIS CASE, THE WIDTH OF EACH BAND INDICATES THE IMPORTANCE OF THE PROCESS.

The effect of all these actions is to reduce the original oil volume by evaporation but increase it by emulsification, also reduce its flammability and its toxicity. The rate of these actions is dependent upon the physical composition of the oil and environmental conditions prevailing at the time. Therefore to be able to effectively combat a spill these factors must be known.

A9.3 TOXIC EFFECTS OF OIL

Light oils will evaporate quickly but spread rapidly and in the initial stages of a spill is highly toxic to marine life being it mobile, migratory or sessile organisms. Moderate to heavy oils have varying levels of toxicity depending on the content of aromatic hydrocarbons. The volatile ends rapidly evaporate off leaving a less toxic weathered residue. Heavy oils have a relatively low toxicity which occurs more from the smothering effects of the oil rather than from chemical impacts. The thickness of this oil may contribute to thermal stress caused by increased temperatures in oiled habitats. Residual oils are relatively non-toxic; toxicity only increases if the oil is trapped for long periods in sensitive areas.

3.14 A9.4 THE IMPACT OF OIL POLLUTION

The impact of an oil spill will depend on the type of oil, the volume of oil and the sensitivity of the Angus shoreline. A small volume of oil on a highly sensitive shoreline can cause mass mortality of sensitive organisms and significant long-term damage where a large volume of oil on a high energy rocky shoreline may have little impact.

A9.5 ENVIRONMENTAL IMPACTS OF OIL SPILLS

The nature and duration of any impacts arising from an oil spill will depend on a number of factors including:

- The type and amount of oil and its behaviour once spilled,
- The physical characteristics of the affected area; weather conditions and season,
- The type and effectiveness of the clean-up response,
- The biological and economic characteristics of the area; and, their sensitivity to oil pollution

Typical effects on marine organisms range across a spectrum from toxicity (especially for light oils and products) to smothering (heavier oils and weathered residues). The presence of toxic components does not always cause mortality, but may induce temporary effects like narcosis and tainting of tissues, which usually subside over time. Surface oil can have lethal effects on species which feed at the surface of the water, such as seabirds, which ingest amounts of oil during feeding or diving. Consumption of the oil will have lethal effects but the most common cause of mortality is due to fouling of feathers resulting in the loss of buoyancy and insulating properties leading ultimately to drowning or hypothermia. Marine mammals can suffer similarly should their fur become matted in oil. Shoreline species such as limpets can suffer high mortality due to the smothering effects of heavy oil or the toxicity of dispersants. Shorelines can broadly recover from a loss of keystone species such as limpets as coloniser from other areas move in. In the long term however there are discernible differences between shoreline communities on previously oiled beaches to those on uncontaminated shorelines.

Soft sediment shores consisting of fine sands and mud which are found within the Angus Coastline are found in areas which are sheltered from wave action, including estuaries, and tend to be highly biologically productive. They often support large populations of migrating birds, indigenous populations of specialist sediment dwellers and shellfisheries. They also act as nursery areas for some key note species. Oil can become incorporated in fine sediments through a number of mechanisms. Examples include flocculation with sediment stirred up by storm activity and penetration down worm burrows and open plant stems. If oil does penetrate fine sediments it can persist for many years, increasing the likelihood of longer-term effects. The upper fringe of 'soft' shores is often dominated by saltmarsh which is generally only temporarily harmed by a single oiling. However, damage lasting many years can be inflicted by repeated oil spills or by aggressive clean-up activity, such as trampling or removal of oiled substrate (www.itopf.com).

A9.6 SOCIO-ECONOMIC IMPACTS OF OIL SPILLS

Temporary or longer term economic losses can affect livelihood and be experienced by businesses in the local area which depend on recreational or tourist activities both in the short and longer terms. A loss of confidence in the area can affect tourism for many years and a return to pre-pollution levels of business can only be achieved by a swift and effective clean-up campaign accompanied with a strong marketing and public relations campaign. Industries which reply on a source of clean water such as power stations for cooling can be adversely affected as can the routine operations of ports and harbours in the local area. Local fishing and aquaculture activities can suffer a significant impact particularly the effects to static fish and shellfish pens. Oily contamination to farmed fish may result in entire stocks being deemed unfit for human consumption. Loss of confidence in local produce may also endure beyond the period of contamination. In the majority of cases as Angus Council is extremely isolated a lot of these socio-economic considerations are minimised but its international media and the possible impact of an oil spill that will have a bearing or effect on international MOD reputations in such a sensitive environment and historical location.

ANNEX 10 HAZARDOUS MATERIALS RESPONSE PROCEDURE

A10.1 RESPONSE PROCEDURES

A10.1.1 GENERAL

This plan is to be used in conjunction with the following supporting plans and procedures where necessary:

- National Contingency Plan
- Arbroath Harbour OSCP
- International Ship and Port Security Code
- Shipboard Oil Pollution Emergency Plan (SOPEP)
- Angus Council Emergency Plan
- Montrose Port Authority OSCP
- Port Marine Safety Code
- Tay Area, Oil Pollution, Multi-Agency Guidance
- Tayside Local Resilience Partnership Response Plan
- Tayside Local Resilience Partnership communication and media guidance
- Operators Oil Pollution Emergency Plan (OPEP)

A10.1.2 EMERGENCY NOTIFICATIONS

The Police are normally the first to receive information of an emergency and alert other services using the appropriate call out procedures. However notification may also come from one of the other emergency services or another source.

A10.1.3 EMERGENCY SERVICES

The Tayside Local Resilience Partnership and in particular the Emergency Services follow well-rehearsed procedures for responding to a major incident and will call on the resources of Angus Council when necessary and appropriate in accordance with current plans.

Tayside Fire and Rescue are skilled, trained and equipped to respond to Hazmat incidents to protect people and the natural and built environment. After the incident has been made safe or declared unsafe to enter, Tayside Fire and Rescue will work in partnership with Angus Council and specialist contractors to ensure that hazardous materials are no longer a threat to local communities and/or the natural and built environment.

A10.2 ANGUS COUNCIL RESILIENCE SERVICE

If a call is received that there has been a Hazmat incident, the Resilience Manager/Officer or out of hours Emergency Response Duty Officer will take the following action:

- Start an incident log.
- Find out all available information on the incident from Scottish Fire and Rescue Service Control Room.
- Co-ordinate immediate assistance as requested by the emergency services.
- Call out Briggs Environmental Services Incident Response Team. 0800 374 348
- If necessary, call out the Council Emergency Management Team in accordance with the Angus Council Generic Emergency Plan.
- Advise the Emergency Management Team throughout the incident.

- Prepare the Post Incident Report for the incident. This report will include as a minimum:
- A written statement of the incident summarising the spill/release, actions taken and recommended future monitoring (if needed).
- All Hazardous Materials Initial Incident Report forms.
- All contract documents that may have been required to help contain the spill/release and/or clean up and removal of the hazardous material.
- Maps, sketches, or photographs of the incident.
- All hazardous waste manifests.
- All other documents pertinent to justifying actions taken at the site.

A10.3 ANGUS COUNCIL EMERGENCY CO-ORDINATION

The Angus Council initial response to any Hazmat incident will be managed in accordance with Tactical Environmental Response/Recovery Team responsibilities as detailed in the Council Generic Emergency Plan.

A10.4 BRIGGS ENVIRONMENTAL SERVICES LTD

BESL will deploy an appropriate Incident Response Team to the incident location in accordance with their current operating procedures and formal agreement with Angus Council.

They will carry out containment, clean up and removal of contamination and contaminated waste material duties as directed by Angus Council.

During the Site Clearance phase BESL Operational management will work from the Angus Council Emergency Centre. The level of command required will be dependent on the scale of the incident.

A10.5 RECOVERY

Angus Council will take the lead role with the clean-up operation and removal/disposal of all hazardous materials in accordance with established Recovery arrangements. They will form a Site Clearance Group and work with BESL and other partners to complete necessary site clean-up and disposal.

A10.6 POST INCIDENT REPORTING

Reports can and will be used as legal documents in court cases involving hazardous materials. They MUST be precise.

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