



MEDITERRANEAN ACTION PLAN (MAP)

REGIONAL MARINE POLLUTION EMERGENCY RESPONSE CENTRE FOR THE MEDITERRANEAN SEA (REMPEC)

# Mediterranean Guidelines on Oiled Shoreline Assessment



REGIONAL MARINE POLLUTION EMERGENCY  
RESPONSE CENTRE FOR THE MEDITERRANEAN SEA (REMPEC)

CENTRE REGIONAL MEDITERRANEEN POUR L'INTERVENTION  
D'URGENCE CONTRE LA POLLUTION MARINE ACCIDENTELLE (REMPEC)

MEDITERRANEAN ACTION PLAN  
PLAN D'ACTION POUR LA MEDITERRANEE

# **Mediterranean Guidelines On Oiled Shoreline Assessment**

**September 2009**

## Note

This document has been prepared by the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC), in the framework of the Mediterranean Technical Working Group (MTWG) Programme, under Project ME/XM/6030-08-11, as a contribution to the implementation of the Protocol concerning Cooperation in Preventing Pollution from Ships and, in Cases of Emergency, Combating Pollution of the Mediterranean Sea.

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The Guidelines are downloadable from REMPEC's website ([www.rempec.org](http://www.rempec.org)) in the section "Information resources/Regional Guidelines/Manuals".

For bibliographic purposes this document should be cited as follows:

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# 1 Preface

As agreed by its 8<sup>th</sup> Focal Points Meeting, the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC) initiated the implementation of a project on the Comparative Study and Development of Standard Guidelines on Oiled Shoreline Assessment.

REMPEC carried out the project in collaboration with the Mediterranean Technical Working Group (MTWG) and the International Maritime Organization's OPRC-HNS Technical Group. This project had two interrelated phases:

Phase I: Comparative study on existing oiled shoreline assessment guidelines

Phase II: Production of Mediterranean guidelines on oiled shoreline assessment

The objectives of the project were stated as:

*The primary objective of the development of the standard guidelines for the Mediterranean region on oiled shoreline assessment based on best practices is to provide any coastal State affected by a pollution incident with the basic knowledge needed to undertake on its own, immediately after an oil spill and during the cleanup operations, detailed and complete shoreline surveys. The activity should focus on the data collection element of the oiled shoreline assessment and not for the data analysis or data applications of the information gathered.*

*The ultimate objective of this activity is to obtain guidelines prepared at the regional level and recognized at the international level to be used by any Mediterranean State requiring information on oiled shoreline assessment.*

The *Mediterranean Guidelines on Oiled Shoreline Assessment* are the output from Phase II of the project. The content and format of these guidelines are based on the recommendations from Phase I, the comparative study - a report on this study is available from REMPEC. This report contains a bibliography and full list of references used during the project.



## 2 Introduction

These guidelines are based on and fully compatible with international approaches to oiled shoreline assessment. They may be regarded as representing best practice. The guidelines do not reflect particularities related to any national framework and are applicable to any State, independently from its national requirements.

The primary approaches from which the guidelines are derived from are those utilized within the Shoreline Cleanup Assessment Technique (SCAT), originally developed by Environment Canada.

### 2.1 What is SCAT?

During an oil spill, Shoreline Cleanup Assessment Technique (SCAT) teams survey the affected area to provide geo-referenced documentation on oil and shoreline conditions in a rapid, accurate and systematic process, using standardized methods and terminology. The data and information generated by the SCAT surveys are crucial to the decision process and are the basis of the operational stages of the shoreline response.

The purpose and value of a structured, systematic and repeatable approach to assessing and recording oiling conditions during incidents has been well documented and the SCAT is now recognised as part of the response process in many countries.

### 2.2 How Does SCAT Fit into the Response Process?

SCAT activities are flexible to different organizational structures. The SCAT approach can be used on spills of different oils and volumes, in different environments. Although many elements of technique are standardized, the procedures and process are also adaptable and scalable to match the unique spill conditions. Any such adjustments and tailoring are done early in the incident. Figure 1 generically illustrates how SCAT integrates with the oiled shoreline response process for a relatively large or complex spill. SCAT outputs are used in various ways through the phases of an incident. For example,

- in the *reactive* stage of the response
  - to define the regional scale and scope of the oiling;
  - to establish shoreline protection priorities and remobilization potential
- in the *planning* stage of the response
  - to help developing treatment objectives, priorities, endpoints and constraints;
  - to assess treatment strategies and tactics and prepare treatment plans
- in the *operational* stage
  - to provide very specific instructions to cleanup crews on each segment of shoreline;
  - to provide overviews of the spill response status and progress



- in the *termination* stage
  - to provide a basis for post shoreline treatment inspection and evaluation;
  - for the provision of long-term monitoring.

SCAT data can also be used in other ways, including the production of a range of maps and displays, not only to support incident planning and operations but also to generally simplify and display the state of conditions and response progress to stakeholders, politicians and the wider community.

It is emphasised that this project was concerned with the habitats of the Mediterranean Sea region and its main focus was on shoreline assessment data gathering and not on the application and use of these data by decision-makers, which encompasses the complete SCAT process.

### 3 Purpose

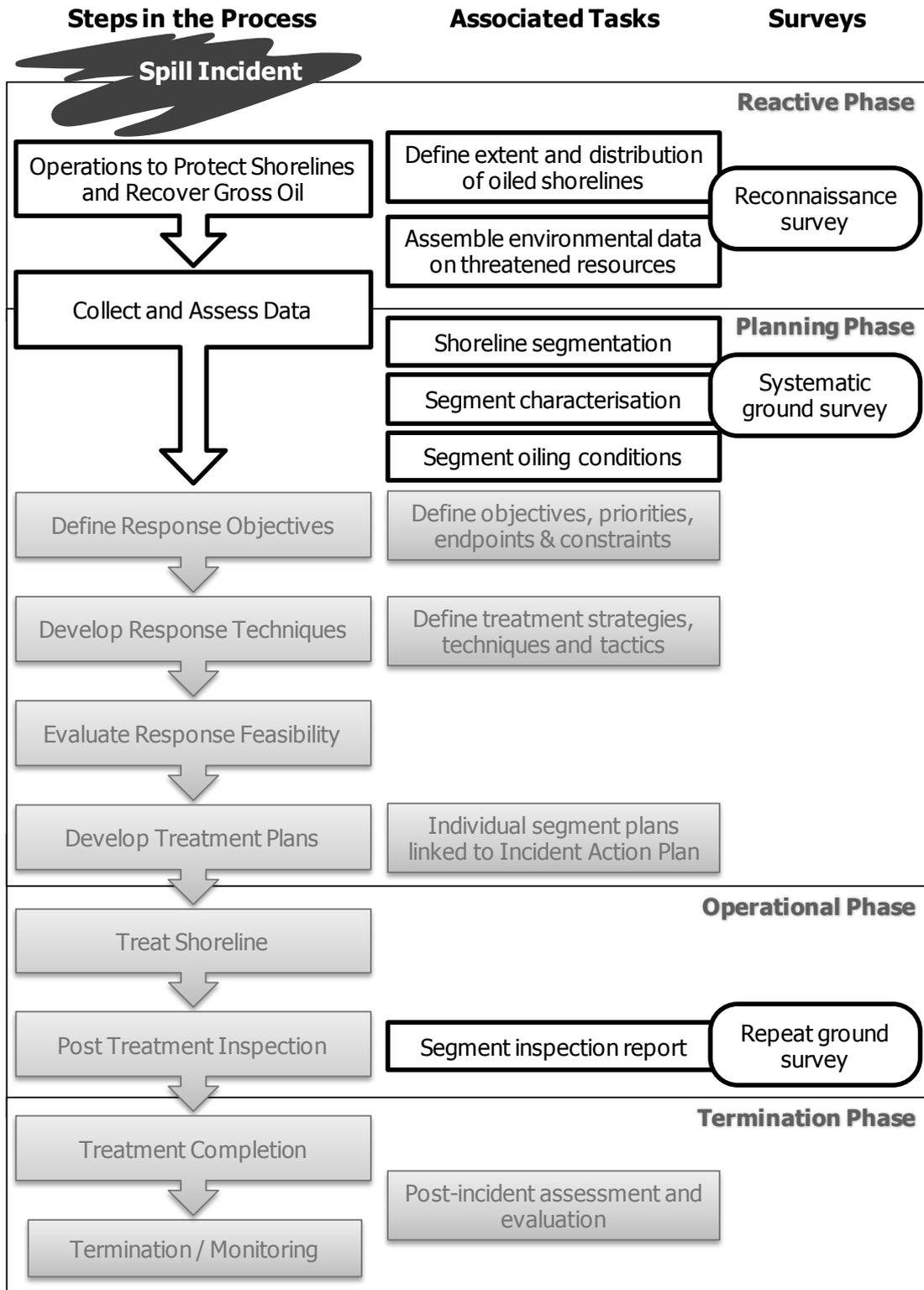
The cornerstone activity of SCAT is the shoreline assessment survey and its fundamental objective is to collect and document data on oiled shoreline conditions in a rapid, accurate and systematic fashion.

The purpose of these guidelines is to provide Mediterranean coastal States with the basic knowledge and methods needed to undertake the shoreline assessment surveys, so as to provide a consistent approach to this important activity. The guidelines are primarily targeted for use in the *reactive* and *planning* stages of response.

The main challenge in developing a shoreline assessment system is the infrequency of its use and the need to avoid complexity. Complicated guidelines and related assessment forms are discouraging to the occasional user. Experience shows that a complex approach either remains unused or forms are incorrectly filled-out during incidents. Therefore, these guidelines are designed to be relatively simple and user-friendly. They accept that some non-essential detail, which could be collected by highly experienced shoreline assessors, is better excluded in the interests of useable documentation. The guidelines have avoided obscure terminology whenever possible.

These guidelines are structured into four main sections:

<b>Preface and Introduction</b>		Background and purpose of the guidelines
<b>Planning Surveys</b>		How to prepare for shoreline surveys
<b>Completing Assessments</b>		How to complete the Shoreline Assessment Form and make sketches
<b>Forms and Guidance</b>		Supporting documentation



White boxes illustrate the elements addressed by these guidelines

Figure 1 Key Phases in the SCAT Process



## 4 How to Plan the Survey

This section provides details on the shoreline assessment survey, a keystone of the SCAT process.

### 4.1 Principles of Shoreline Assessment Surveys

Shoreline assessment surveys are based on several fundamental principles. These include:

- a division of the coastline into homogeneous geographic units or 'segments';
- the use of a standard set of terms and definitions for documentation;
- systematic assessment of all shorelines in the affected area;
- a survey team that is objective and trained;
- the timely provision of data and information for decision making and planning.

Figure 1 provides an overview of the SCAT process and the main elements covered by these guidelines. This section gives further detail on these elements, particularly in relation to planning surveys.

### 4.2 Incident

The need for a coordinated and systematic shoreline assessment programme will be triggered by an incident, leading to marine or coastal oil pollution. Those responsible for dealing with the incident will have received reliable information (either from field observations or from predictive models) that oil has reached, or is threatening, shorelines.

A major incident, perhaps involving 100s or 1,000s of tonnes of spilled oil is very likely to benefit from a systemic approach to shoreline assessment. However smaller incidents may also derive benefit from such an approach, albeit the level of effort and number of persons involved will be scaled down compared to larger events.

### 4.3 Reconnaissance Survey

Initial reconnaissance is crucial to provide a 'strategic overview' and obtain a broad awareness of the oiling conditions at sea and an indication of shorelines actually oiled or threatened by floating oil. It is very likely that aerial reconnaissance will be organized to support at-sea response; however it is important that those with responsibility for shoreline response are involved and participate in planning or executing the overflights.

Aerial surveys cannot provide detail on shoreline oiling conditions or characteristics but they can provide a quick strategic picture over relatively large areas. Such information is very useful in determining the scale, priorities and targeting of shoreline survey areas from the ground.



Furthermore aerial surveys can also help in the identification of gross oiling, especially those areas with a potential for remobilization of oil from the shoreline. This information will be used by operational teams for their initial shoreline recovery operations. The aerial surveys can also assist in identifying or verifying shoreline protection priorities for operational teams.

Aerial surveys are therefore recognized as a very important part of response to significant oil spills. The International Maritime Organization (IMO) is producing a 'Manual on identification and observation of spilled oil' which offers specific guidance on planning and undertaking aerial surveys.

## 4.4 Plan the Shoreline Ground Survey

### 4.4.1 Segmentation of the coastline

The essential first step of a ground survey is to divide the coastline into planning and operational work units called 'segments', within which the shoreline character is relatively homogeneous (uniform) in terms of physical features and sediment type. These segments are the basis for the development of treatment plans. Ultimately, each segment of shoreline would be considered individually in both planning and operational stages.

It may be possible to draw on work done through environmental sensitivity mapping to assist in defining segments. Satellite images, such as those freely available from Google Maps may also be useful, depending on the resolution of images available for the area.

Boundaries between segments are established on the basis of prominent geological features such as a headland, changes in shoreline or substrate type, a change in oiling conditions, or establishment of the boundary of an operations area. Segment lengths are typically 200 - 2,000 m. If there is long uniform coast, segment may be established on the basis of operational features, such as access points, or simply by uniform distances along the shore.

Each segment should be given a unique identification code. There are no rules to how this is done but simple schemes are effective e.g. a code for each municipality followed by sequential numbers for each segment within that municipality.

### 4.4.2 Survey team members

The number of persons in a survey team and the number of teams required will depend on the circumstances of the incident. A survey team will comprise primarily:

- a person with previous oil spill response experience with familiarity of shoreline surveys and the ability to quickly identify and document oil on shorelines; and ideally
- a person familiar with the ecological sensitivities of the affected area who can advise on real-time environmental constraints, priorities and end points;



- in areas where archaeological or cultural resources exist, a specialist who can advise on precautions and constraints to protect those resources; and
- a person with operational experience who can identify practical and logistical issues of potential clean-up options.

Although team members can be drawn from a wide variety of organizations, typical candidates for shoreline survey teams include:

- conservation agency personnel;
- industry or governmental environmental specialists;
- oil spill response contractors; and
- local authority or municipality representatives.

These guidelines are designed to enable a person to carry out meaningful and consistent assessments, which will provide useful data for decision makers in the command centre.

Practical considerations limit an assessment team to at least two and seldom more than five participants. There may be safety concerns in remote locations or on more treacherous shorelines that would lead to a requirement for a minimum of a two person team. Furthermore, two people are able to survey a site faster than one, because tasks such as photography, sketching and completion of the shoreline assessment form can be done simultaneously.

The number of teams required is not possible to define in advance due to the variables of an incident, such as the geographic area to be surveyed, access routes available and complexity of the shoreline. It is feasible that in smaller spills, affecting a few kilometres or a limited number of sites, it may require only one team. However if the shoreline is complex, or the affected area extends over tens of kilometres, it is likely that two or more teams will be required.

### **4.4.3 Preparing the survey team**

Prior preparation is required before any field activities are carried out by the survey team(s). The team(s) should be given a basic briefing, which should not be time-consuming but is crucial to ensuring systematic and consistent results. At the briefing the following should be covered:

- allocation of segments to be surveyed;
- health, safety and welfare issues;
- communications and reporting channels;
- distribution of maps and assessment forms and guidance;
- check field equipment and supplies; and
- all team members are comfortable with the assessment methodology.

If there are multiple teams due to a large or complex incident, it will be beneficial to have a pre-survey session on a representative oiled shoreline, with all the teams participating, and should focus on descriptive terminology for the level of oiling and



different shoreline types. This session will facilitate a high degree of consistency and calibration between the teams.

#### **4.4.4 Health, safety and welfare issues**

The paramount concern during an oil spill incident is that persons either affected by the spill or involved in response remain safe. This includes personnel undertaken shoreline surveys. A risk assessment for shoreline surveys must be performed; taking into account the specific hazard of a location and ensuring all identified risks are minimized. In the case of shoreline surveys the primary hazards will relate to the environmental conditions and potential exposure to spilled oil, for example:

- exposure to noxious gases;
- adverse weather;
- difficult access to shorelines;
- sea cliffs;
- slippery rocks;
- aggressive or dangerous wildlife;
- sun exposure.

The IPIECA Report Series Volume Eleven, Oil Spill Responder Safety Guide, provides further information on hazards likely to be encountered during oil spills. This guide is freely available from the IPIECA website as a PDF file ([www.ipieca.org](http://www.ipieca.org)).

Shoreline surveyors should ensure they have access to adequate food and drink in remote areas and that there are effective emergency communications to raise assistance if needed. Schedules should be lodged with a coordinator and reports made to base if there are any significant deviations from the planned itinerary.

#### **4.4.5 Equipment checklist**

Survey teams will require some equipment to maximise the benefits of their assessment. A comprehensive checklist of items which may be required is provided in the 'Forms and Guidance' section of these guidelines.

### **4.5 Perform the Shoreline Survey**

Figure 2 provides a guide to the key activities that a team needs to perform for an efficient and effective assessment.

Note that topographical maps, environmental sensitivity maps and satellite images can all be useful in the assessment process. This is particularly the case with the initial step i.e. gaining an overview of the segment.



## 4.6 Data Collation

The data collected by shoreline survey team(s) needs to be made quickly available to decision makers. For smaller incidents it may be relatively simple for documentation/information to be collated within the command centre, even in a 'raw' state as meaningful interpretation by the decision makers may still be possible. However for large incidents, with multiple shoreline segments surveyed, simply providing raw field data may rapidly lead to information overload or bottlenecks. In these cases a data management system should be instigated.

Information from the shoreline assessments can be fed to the command centre by telephone, radio or email in the early stages of an incident, where time is critical and decisions on the following day's operational priorities and activities need to be made by the early evening.

## 4.7 Analyses and Recommendations

These guidelines do not address data analyses and management systems, which can be implemented for shoreline assessments. However the systematic nature of the assessment process in these guidelines do generate information that provides a very good basis for such analyses.

A dedicated unit within the command centre is needed to manage such a system, not only to ensure efficient use of information to facilitate decisions on clean-up priorities, techniques and endpoints but also to create an historic record for later analyses and possible cost recovery.

Data from the assessment can be cross-referencing to any existing sensitivity maps as part of the analyses and subsequent decision making.



Step	Comments
<p style="text-align: center;">Gain Segment Overview</p> 	<p>Try to gain an overall perspective of the segment to be surveyed, either by viewing from an evaluated position or, for shorter segments, walking its length.</p> <p>Acquire a good perspective of the extent of shoreline oiling.</p>
<p style="text-align: center;">Detailed Observations</p> 	<p>It is recommended to walk along the whole segment making general notes, returning to oiled areas that require more detailed documentation.</p> <p>On longer segments it maybe more efficient to carry out detailed note-taking as the team progresses along the shore.</p>
<p style="text-align: center;">Take Photographs / Video</p> 	<p>Photographs and video are very useful tools in documenting the shore's appearance. Ensure accurate notes of photograph or video locations are made. Use the unique numbers of images from the digital camera used. GPS can be used to identify photo location if available and needed. See section 5.9 for more guidance.</p>
<p style="text-align: center;">Draw Sketch / Annotate Map</p> 	<p>A sketch is a very important part of the assessment. The sketch complements photographs and is closely linked to documenting oiling conditions on the Form. Location of all key features should be marked. See section 5.10 for more guidance.</p>
<p style="text-align: center;">Complete Assessment Form</p> 	<p>The completed Oiled Shoreline Assessment Form provides all the detailed information on the oiling conditions.</p>
<p style="text-align: center;">Site Departure</p>	<p>Team reviews assessments and discuss treatment or cleanup options to ensure nothing has been overlooked, and to reach agreement on major points. At a minimum, there must be a consensus on oil character and distribution.</p> <p>Check that Forms and sketch maps are complete. Ensure that all photographs and videos have been accurately logged.</p> <p>Avoid secondary pollution by cleaning any oiled footwear prior to departure.</p> <p>Check that all equipment, survey gear, personal items and, litter is taken when leaving the site.</p>

Figure 2 Key Steps in the Shoreline Segment Survey Process



# 5 Completion of an Oiled Shoreline Assessment Form

**SITE INFORMATION**

**1. GENERAL INFORMATION**  
 Incident: \_\_\_\_\_ Date (dd/mm/yy): \_\_\_\_\_ Survey time (local): \_\_\_\_\_  
 Segment ID: \_\_\_\_\_ Organization: \_\_\_\_\_ Sun / Cloud / Fog / Rain / Windy: \_\_\_\_\_  
 Telephone number: \_\_\_\_\_

**2. SURVEY TEAM**  
 Organization: \_\_\_\_\_

**3. SEGMENT**  
 Total length: \_\_\_\_\_ m. Length surveyed: \_\_\_\_\_ m.  
 Start GPS: LAT \_\_\_\_\_ LONG \_\_\_\_\_  
 End GPS: LAT \_\_\_\_\_ LONG \_\_\_\_\_

**4. SHORELINE TYPE**  
 ✓ = primary (one only) ✓ = secondary  
 Circle the boxes of oiled shoreline types and other features

<input type="checkbox"/>	Bedrock cliff	<input type="checkbox"/>	Mud sediments
<input type="checkbox"/>	Bedrock slope/platform	<input type="checkbox"/>	Sand sediments
<input type="checkbox"/>	Man-made solid	<input type="checkbox"/>	Mixed sediments
<input type="checkbox"/>	Man-made permeable	<input type="checkbox"/>	Pebble-cobble-shingle
<input type="checkbox"/>	Salt marsh	<input type="checkbox"/>	Boulder
<input type="checkbox"/>	Other (describe): _____	<input type="checkbox"/>	Wave exposure (circle one): very exposed / exposed / partially sheltered / very sheltered
<input type="checkbox"/>	Estuary/river outlet	<input type="checkbox"/>	Historical artefact/structure
<input type="checkbox"/>	Amenity area	<input type="checkbox"/>	Pools
<input type="checkbox"/>		<input type="checkbox"/>	Dead seagrass (Posidonia) deposits
<input type="checkbox"/>		<input type="checkbox"/>	Deep cracks or crevices

**5. OPERATIONAL FEATURES**  
 Debris? Yes/No. Oiled? Yes/No. Amount: \_\_\_\_\_ bags/trucks  
 Direct backshore access? Yes / No  
 Access restrictions: \_\_\_\_\_  
 Along from next segment? Yes / No  
 Backshore cliff? Yes / No. Ht. \_\_\_\_\_ m. Suitable lay-down area? Yes / No  
 Ongoing clean-up activity? Yes / No

**6. SURFACE OILING**  
 TICK HERE IF NONE OBSERVED:

Zone ID	Position			Oil Cover		Oil Thickness										Oil Character				
	L	M	U	S	Length	Width	Distr.	PO	OV	CT	ST	FL	FR	MS	TB	PT	SR	AP		

L, M, U & S = Lower, Middle, Upper & Supra tidal PO = Pooled Oil, OV = Cover, CT = Coat, ST = Stain, FL = Film  
 FR = Fresh, MS = Mousse, TB = Tar Balls, PT = Tar Patties, SR = Surface residue, AP = Asphalt Pavement

**7. SUB-SURFACE OILING**  
 TICK HERE IF NO INVESTIGATION:

Pit ID	Position			Pit depth (cm)	Oiled zone (cm - cm)	Sub-surface Oil Character				Water table (cm)		
	L	M	U			S	Oil filled pores	Partial filled pores	Oil residue		Oil film	Trace

Completion of an Oiled Shoreline Assessment Form for each segment is a fundamental part of the recording information obtained.

The Assessment Form is one side of paper, which is supported by a sketch, photographs and video as appropriate. It is recommended that multiple copies of the Form are carried by the assessment team(s) – enough for each segment allocated to the team plus spares. Ideally the Form should be copied onto waterproof paper and used in conjunction with a clipboard.

The Form comprises eight elements and the following provides step-by-step instructions on the completion of each element of the Oiled Shoreline Assessment Form. Illustrations are included to demonstrate how a Form is typically completed. A blank copy of the full Form is included in the 'Form and Guidance' section.

Although the Assessment Form has been designed to be relatively simple to complete, there are circumstances when full information may not be available. In these cases it is acceptable for Forms to be only partially completed. This is most likely to occur in the early stages of an incident and may relate to elements such as the unavailability of accurate latitude and longitude readings, or no available information on sub-surface oiling.

It is important that potential users of the Assessment Form are given training on its purpose and how it is most effectively completed. This training may be carried out before an incident occurs, as part of contingency planning, or it may be arranged as an 'induction' during an actual incident, prior to 'live' surveys. The former is preferable, as there is much less time pressure and scope for better learning.



## 5.1 General Information

The first three elements of the Form are intended to collect basic site information and they are largely self-explanatory.

The 'Segment ID' is the unique code which should be issued by the command team during the survey design. The prevailing weather should be circled as shown.

<b>1. GENERAL INFORMATION</b>	Date (dd/mm/yy)	Survey time (local)
Incident: <i>Burst Cloud</i>	<i>09 / 01 / 09</i>	<i>10:00 to 11:15</i>
Segment ID: <i>WB - 03</i>		Sun ( <i>Cloud</i> ) Fog / Rain / Windy

## 5.2 Survey team

The names of all survey team members should be entered, along with their affiliation and telephone contact number (in case of need for subsequent clarifications).

2. SURVEY TEAM	Organization	Telephone number
<i>John Tullow</i>	<i>Environment Ministry</i>	<i>+12 345 6789</i>
<i>Jose Ballesteros</i>	<i>Municipality</i>	<i>+12 456 7891</i>

## 5.3 Segment details

In most cases the total segment length and length surveyed will be the same. Map grid coordinates may be used in place of latitude and longitude.

<b>3. SEGMENT</b>	Total length: <i>600</i> m.	Length surveyed: <i>600</i> m.
Start GPS:	LAT <i>35° 46' 03.20" N</i>	LONG <i>14° 35' 46.38" E</i>
End GPS:	LAT <i>35° 46' 08.02" N</i>	LONG <i>14° 36' 09.80" E</i>



## 5.4 Shoreline Type

It is important to identify the nature of the shoreline types within the whole segment, paying particular attention to the oiled areas.

4. SHORELINE TYPE		✓✓ = primary (one only) ✓ = secondary Circle the boxes of oiled shoreline types and other features	
	Bedrock cliff		Mud sediments
✓	Bedrock slope/platform	✓✓	Sand sediments
✓	Man-made solid		Mixed sediments
	Man-made permeable	✓	Pebble-cobble-shingle
	Salt marsh		Boulder
	Other (describe):	Wave exposure (circle one):	
Other features:		Very exposed / exposed / partially sheltered / very sheltered	
	Estuary/river outlet		Historical artefact/structure
✓	Amenity area		Dead seagrass ( <i>Posidonia</i> ) deposits
			Pools
			Deep cracks or crevices

Identify all notable shoreline types and other features present on the whole shore; double tick (✓✓) the one primary shoreline type. The primary shoreline type typically corresponds to the clearly predominant shoreline character located in the upper intertidal zone. This is the zone in which oil usually becomes stranded and where treatment or cleanup activities take place. If there is no clear predominant character in the upper intertidal zone, then it is based on the type most sensitive to oil. By default, if salt marsh is predominant in the segment, then these are selected as the primary type.

There can only be one (overall) primary shoreline type but several secondary shoreline types within a shoreline segment. Secondary shoreline types can be associated with any of the intertidal zone (not just the upper). A single tick (✓) identifies all secondary shoreline types.

**See the 'Forms and Guidance' section for a descriptive and photographic guide to shoreline types.**

Other features are any modifying aspects of the shoreline which may influence the behaviour of stranded oil or the human or wildlife usage of the shoreline. These should also receive a single tick (✓).

Circle the ticks of those shoreline types & other features that have been oiled e.g. (✓✓)

Circle the wave exposure that best describes the shore. **See the 'Forms and Guidance' section for an explanation of wave exposure.**



## 5.5 Operational Features

Operational features will assist decision makers and logistics or operational personnel make an initial evaluation of the viable options for clean-up activity.

<b>5. OPERATIONAL FEATURES</b>	Debris? Yes/No Oiled? Yes/No Amount: ___bags/trucks
Direct backshore access? Yes/No Along from next segment? Yes/No	Access restrictions <i>None - there is good access from the beach car park</i>
Backshore cliff? Yes/No Ht. ___m.	Suitable lay-down area? Yes/No
Ongoing clean-up activity? Yes/No	

Record whether debris is present on the shore and the approximate amount of any that is oiled.

Record any useful information on access to the site (private property, locked gates etc.), features that may limit movement across the shore and, the amount of back-shore space for lay-down of equipment and temporary storage.

If the backshore has cliffs indicate these and take note of their height (Ht.) in metres.

Briefly note if cleanup or treatment is ongoing on the site at the time of the survey and the type and approximate scale of that activity (e.g. number of workers and vehicles).

## 5.6 Surface Oiling

Making a detailed record of oiled areas is one of the most important elements of the shoreline assessment. The Form requires some quantitative measurement of oiled zones, using descriptive terminology widely recognised.

6. SURFACE OILING					TICK HERE IF NONE OBSERVED:													
Zone ID	Position				Oil Cover			Oil Thickness					Oil Character					
	L	M	U	S	Length	Width	Distr.	PO	CV	CT	ST	FL	FR	MS	TB	PT	SR	AP
A			✓		200 m	4 m	60%		5mm				✓					
B			✓		30 m	3 m	25%			✓			✓					

L, M, U & S = Lower, Middle, Upper & Supra tidal PO = Pooled Oil, CV = Cover, CT = Coat, ST = Stain, FL = Film  
FR = Fresh, MS = Mousse, TB = Tar Balls, PT = Tar Patties, SR = Surface residue, AP = Asphalt Pavement

### If No Surface Oil Is Present:

Tick (✓) NONE OBSERVED – no further information is required in the boxes of this section.



**If Surface Oil Is Present:**

STEP 1 Identify as many oiled Zones as necessary for an accurate description of oiling conditions. Give each Zone an ID (A, B, C...).

STEP 2 Define for each Zone:

- Position (in relation to tidal height)
- Oil Cover (i.e. Length, Width of the oiled zone and the percentage Distribution of oil within it)
- Oil Thickness (estimate actual thickness in cm or mm for 'Pooled Oil' and 'Cover')
- Oil Character.

See the '**Definitions of Terminology Used on the Form**' and the '**Visual Aid for Estimating Oil Distribution**' for further guidance on the various codes used.

Note: The tidal range in Mediterranean varies from very small to up to 2 m. In those areas where there is little or no tide present, the words "NO TIDE" should be written across the Position:

Position			
L	M	U	S
NO TIDE			

STEP 3 Annotate map and/or draw sketch map with the location of oiled Zone(s). See Section 3.9 for guidance on drawing sketches. Ensure photographs or videos of zones are taken.

**5.7 Sub-surface Oiling**

The presence of sub-surface (buried) oil can only be revealed by digging trial pits or trenches in the shoreline. Such investigation should only be undertaken if there is expectation or suspicion that oil is buried. This may be due to the nature of the beach material (e.g. pebbles or gravel that may allow penetration by oil) or because of known movement in beach material during the incident (e.g. due to a storm event).

7. SUB-SURFACE OILING							TICK HERE IF NO INVESTIGATION:					
Pit ID	Position				Pit depth (cm)	Oiled zone (cm – cm)	Sub-surface Oil Character					Water table (cm)
	L	M	U	S			Oil filled pores	Partial filled pores	Oil residue	Oil film	Trace	
1			✓		20	0 - 5		✓				15
2		✓			25	0 - 10		✓				20
3			✓		20	NONE						15

**If No Sub-surface Oiling is investigated tick (✓) the NO INVESTIGATION box - no further information is required in this section.**



**If investigation is made:**

Give each Pit an ID (1, 2...).

**A. If No Sub-surface Oil Is Present**

Write 'NONE' in the 'Oiled zone'.

**B. If Sub-surface Oil Is Present**

STEP 1 For each Pit define:

- Position (in relation to tidal height)
- Pit depth
- Oiled zone depths (the upper and lower height of penetrating or buried oil)
- Character
- Water table height (if evident)

See the '**Definitions of Terminology Used on the Form**' for further guidance on how to define the criteria and the various codes used.

STEP 2 Annotate map and/or draw sketch map with the location of pit(s). See Section 3.9 for guidance on drawing sketches. Ensure photographs or videos of pits are taken.

**5.8 General Comments**

The second part of the Assessment Form is for general comments. This may be copied onto the reverse of part 1 of the Form and used to highlight particular points of interests or anomalies in the segment. This may include comments relating to:

- actual or potential resource sensitivities observed or known to be present; including ecological, recreational, cultural, commercial or any other socio-economic interests;
- any notable wildlife observations, particularly any casualties;
- estimates of volumes of oil within the segment, based on dimensions of stranded oil observed and recorded;
- storms surges which may have deposited oil above the normal water mark;
- any recommendations on cleanup or other treatment - these could include a description of the recommended technique, suggested scale of operation required and any practical constraints; and
- add recommendations on appropriate end points for terminating the cleanup.



**8. GENERAL COMMENTS:**

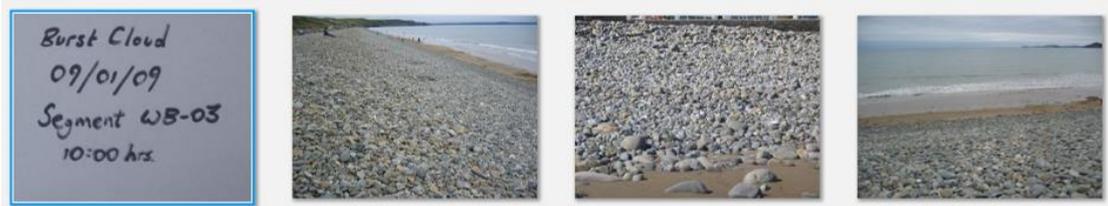
- ~ Flock of about twenty seagulls observed on rocks at southern end of segment. Two birds appeared to be oiled on their bellies. Report made to Wildlife Branch.
- ~ Small number of public using the beach, mainly walking dogs. Advised them to avoid use of beach due to risk of oil contamination of footwear and pets.
- ~ Largest patch (Zone A) estimated to contain about 2.5 cubic meters of stranded oil

**5.9 Taking Photographs**

Photographs are very useful tools in documenting the shore’s appearance. However some discipline is needed and care should be taken not to take too many photographs, which is very easy to do with digital cameras. Enough photographs should be taken to:

- record general views along and across the shoreline;
- capture the appearance and location of oiled areas;
- identify key environmental and modifying features on the shoreline; and
- identify access routes or other operational features and on-going activities.

It is useful to write basic details about the incident, the date, the segment ID and time on blank sheet and photograph this sheet prior to taking any pictures at the site. This allows an easy identification of segment pictures when imported into photographic management applications e.g.



Most photographic management applications (e.g. Google Picasa is freely available) enable simple tagging of photograph sets and storage by date. If photographs can be downloaded at the end of the survey or at least on the same day, this will aid their cataloguing and secure storage. It also frees memory within a camera for future photographs.

Accurate indication of photograph locations should be made on the segment sketch. As a rule of thumb, if you have taken more than 20-30 photographs at a site, then you have probably taken an excessive number.



## 5.10 Drawing Sketches

The field sketch is an important component of the shoreline assessment process for two principal reasons:

1. it provides a focused picture of the oil distribution within the entire segment on a single piece of paper (or image); and
2. it adds discipline to the field observation process, because it forces the person doing the sketch to make detailed notes of all the relevant features.

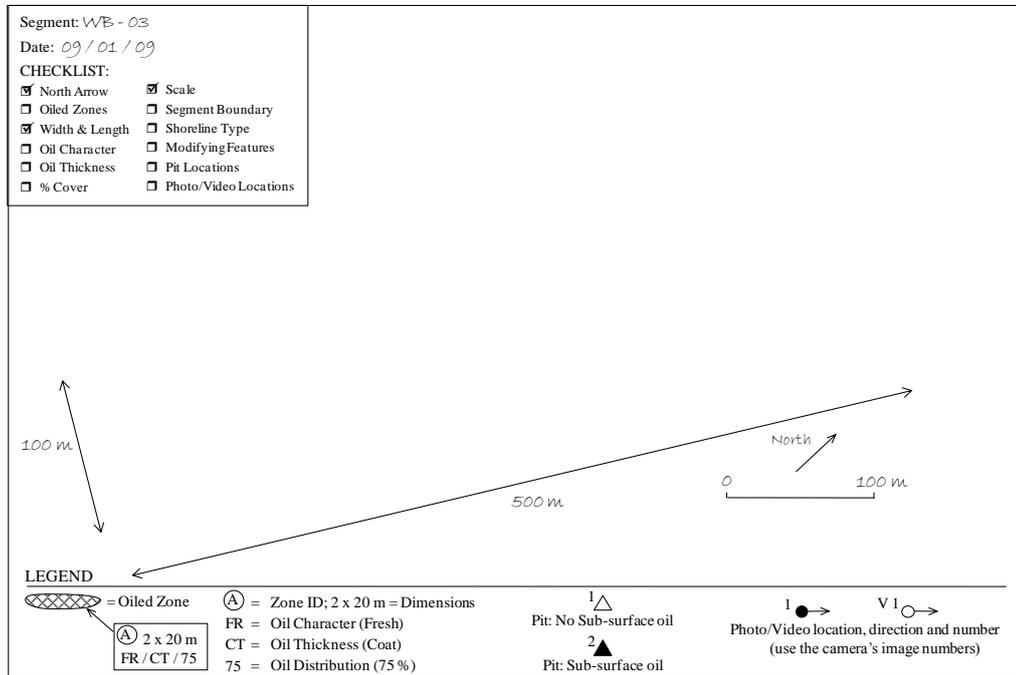
The following provides a step-wise guidance to drawing a sketch:

① The surveyor should have gained an overview of the segment as their first task. Drawing the sketch may come before or after the completion of the Assessment Form and taking photographs – this is largely a matter of preference and circumstances. However, if it is done early in the survey, care should be taken to ensure key information such as photograph locations and any dug pits are annotated on the sketch before leaving the site. Note that if there are two or more members in the survey team, the various activities can be carried out simultaneously.

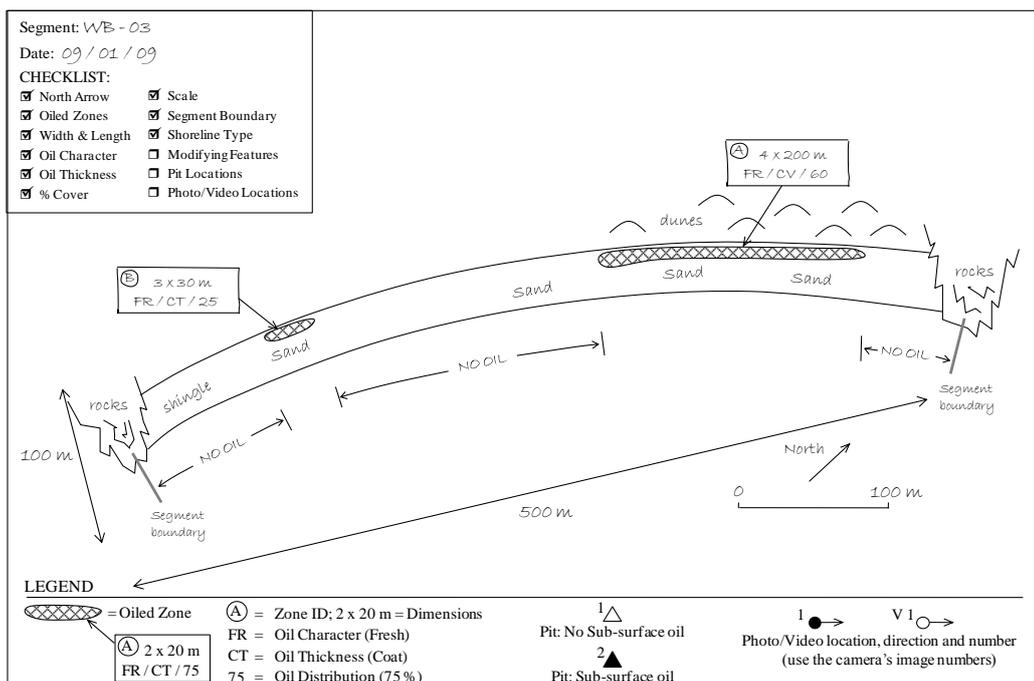
Segment: <i>WE-03</i> Date: <i>09/01/09</i> CHECKLIST: <input type="checkbox"/> North Arrow <input type="checkbox"/> Oiled Zones <input type="checkbox"/> Width & Length <input type="checkbox"/> Oil Character <input type="checkbox"/> Oil Thickness <input type="checkbox"/> % Cover					
<b>LEGEND</b> <table style="width: 100%; border: none;"> <tr> <td style="width: 25%; border: none;">  = Oiled Zone   2 x 20 m                      FR / CT / 75                 </td> <td style="width: 25%; border: none;">  = Zone ID; 2 x 20 m = Dimensions                      FR = Oil Character (Fresh)                      CT = Oil Thickness (Coat)                      75 = Oil Distribution (75%)                 </td> <td style="width: 25%; border: none;">                       Pit: No Sub-surface oil                        Pit: Sub-surface oil                 </td> <td style="width: 25%; border: none;">                            Photo/Video location, direction and number                      (use the camera's image numbers)                 </td> </tr> </table>		= Oiled Zone 2 x 20 m FR / CT / 75	= Zone ID; 2 x 20 m = Dimensions FR = Oil Character (Fresh) CT = Oil Thickness (Coat) 75 = Oil Distribution (75%)	 Pit: No Sub-surface oil  Pit: Sub-surface oil	 Photo/Video location, direction and number (use the camera's image numbers)
= Oiled Zone 2 x 20 m FR / CT / 75	= Zone ID; 2 x 20 m = Dimensions FR = Oil Character (Fresh) CT = Oil Thickness (Coat) 75 = Oil Distribution (75%)	 Pit: No Sub-surface oil  Pit: Sub-surface oil	 Photo/Video location, direction and number (use the camera's image numbers)		



② Determine the dimensions of the segment. Pace the length and width of the intertidal zone as well as some of the more conspicuous features, such as groins or seawall segments. Using a pencil, lightly sketch these measurements on the field sheet. Orient the longest dimension along the long axis of the paper. Add scale (use metric units) and north arrow.



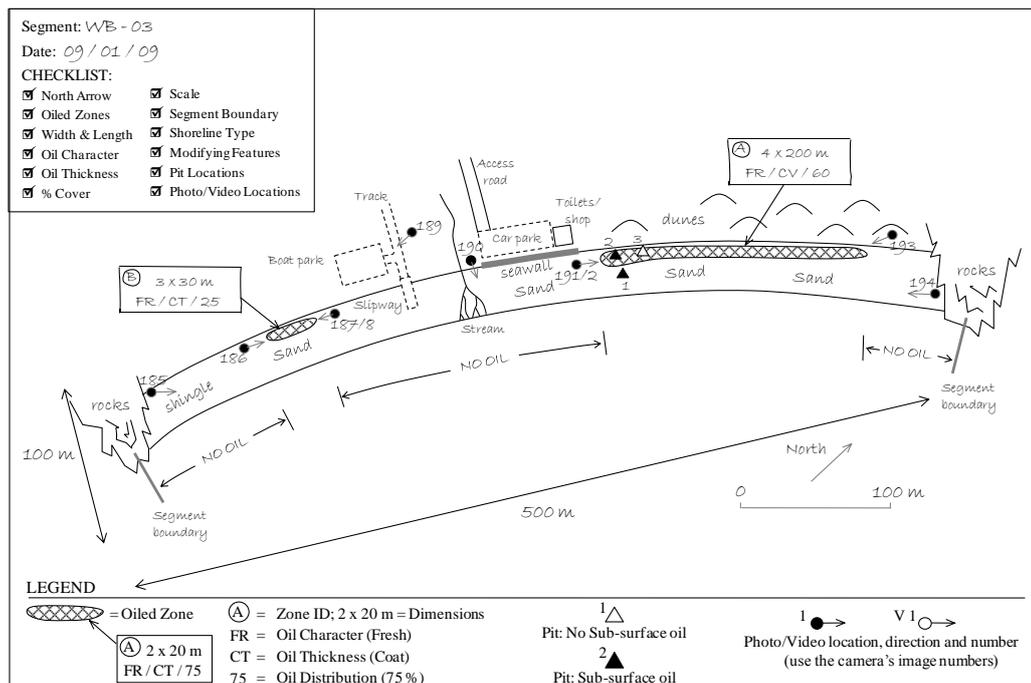
③ Lightly sketch in the outline of the intertidal zone or habitat being surveyed. Show in final form (i.e. heavy pencil marks) the oiled zones, using a hatched pattern. These zones should be the most conspicuous feature on the sketch, as shown in Figure 3. An alphabetic designation is given to each oiled zone on the sketch that corresponds to the 'Zone ID' on the Assessment Form. Indicate in a box the width and length for each oiled area, as well as the oil Character, Thickness and Distribution estimates (which should also be entered on the Form).





④ Use the checklist to indicate:

- Conspicuous features, such as fences and seawalls that would help identify the site; zones of vegetation; and access points, such as roads and parking areas.
- Pits by a triangle, and give them a numerical designation that corresponds to the one on the Assessment Form. The triangle is filled in to represent oil found in the pit; an open triangle is used if no oil is found.
- Photograph locations by a dot with a connecting arrow indicating the direction in which the photo was taken.
- Location(s) where any video was recorded.





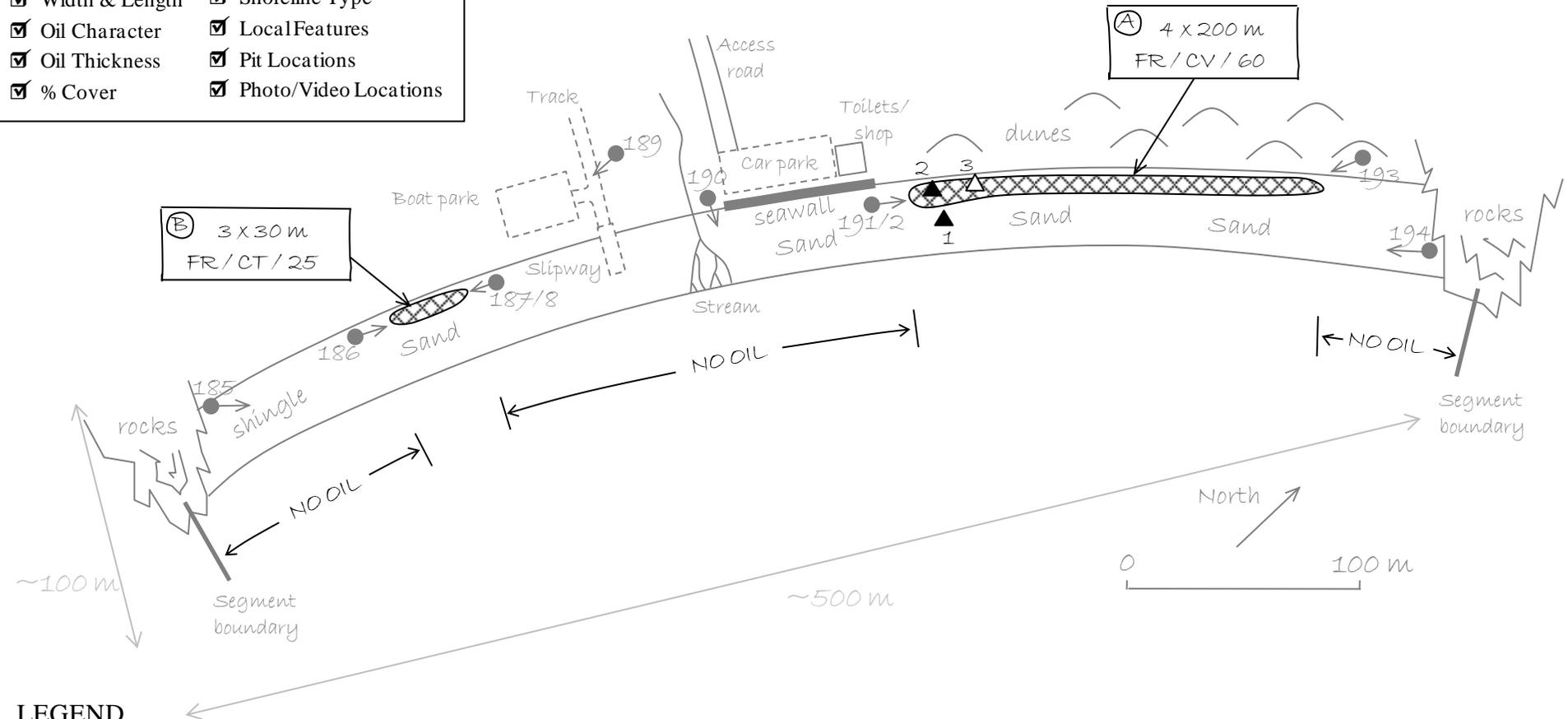
Segment: WB - 03

Date: 09 / 01 / 09

CHECKLIST:

- North Arrow
- Oiled Zones
- Width & Length
- Oil Character
- Oil Thickness
- % Cover
- Scale
- Segment Boundary
- Shoreline Type
- Local Features
- Pit Locations
- Photo/Video Locations

Figure 3 Example of a Completed Sketch Map



LEGEND

	Zone ID	<b>(A)</b> 2 x 20 m	Zone Dimensions		Pit: No Sub-surface oil		Photo/Video location, direction and number (use the camera's image numbers)
Oiled Zone	Oil Character	FR / CT / 75	Oil Distribution (%)		Pit: Sub-surface oil		
	Oil Thickness						





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## **6 Forms and Guidance**

**Oiled Shoreline Assessment Form**

**Definitions of Terminology Used on the Form**

**Visual Aid for Estimating Oil Distribution**

**Field Equipment Checklist**

**Photo Scales**

**Photographic Guide to Shoreline Types**

**Photographic Guide to Oiling Thickness and Character**





## Oiled Shoreline Assessment Form (Part 1)

**SITE INFORMATION**

<b>1. GENERAL INFORMATION</b>				Date (dd/mm/yy)		Survey time (local) From                      to													
Incident:						Sun / Cloud / Fog / Rain / Windy													
Segment ID:																			
<b>2. SURVEY TEAM</b>			Organization			Telephone number													
<b>3. SEGMENT</b>			Total length:                      m.			Length surveyed:                      m.													
Start GPS:		LAT		LONG															
End GPS:		LAT		LONG															
<b>4. SHORELINE TYPE</b>			✓✓ = primary (one only)    ✓ = secondary Circle the boxes of oiled shoreline types and other features																
Bedrock cliff						Mud sediments													
Bedrock slope/platform						Sand sediments													
Man-made solid						Mixed sediments													
Man-made permeable						Pebble-cobble-shingle													
Salt marsh						Boulder													
Other (describe):			Wave exposure (circle one): Very exposed / exposed / partially sheltered / very sheltered																
Other features:																			
Estuary/river outlet				Historical artefact/structure				Dead seagrass ( <i>Posidonia</i> ) deposits											
Amenity area				Pools				Deep cracks or crevices											
<b>5. OPERATIONAL FEATURES</b>				Debris? Yes/No    Oiled? Yes/No    Amount: _____bags/trucks															
Direct backshore access?    Yes / No				Access restrictions															
Along from next segment?    Yes / No																			
Backshore cliff? Yes / No    Ht. _____m.				Suitable lay-down area? Yes / No															
Ongoing clean-up activity?    Yes / No																			
<b>6. SURFACE OILING</b>					TICK HERE IF NONE OBSERVED:														
Zone ID	Position				Oil Cover			Oil Thickness				Oil Character							
	L	M	U	S	Length	Width	Distr.	PO	CV	CT	ST	FL	FR	MS	TB	PT	SR	AP	
L, M, U & S = Lower, Middle, Upper & Supra tidal    PO = Pooled Oil, CV = Cover, CT = Coat, ST = Stain, FL = Film FR = Fresh, MS = Mousse, TB = Tar Balls, PT = Tar Patties, SR = Surface residue, AP = Asphalt Pavement																			
<b>7. SUB-SURFACE OILING</b>					TICK HERE IF NO INVESTIGATION:														
Pit ID	Position				Pit depth (cm)	Oiled zone (cm – cm)	Sub-surface Oil Character					Water table (cm)							
	L	M	U	S			Oil filled pores	Partial filled pores	Oil residue	Oil film	Trace								

**Oiled Shoreline Assessment Form (Part 2)****8. GENERAL COMMENTS:**

Use the space above as needed to provide comments about the site not covered by part 1 of the Form. If no further comments write 'NONE'. Comments may address:

- actual or potential resource sensitivities observed or known to be present; including ecological, recreational, cultural, commercial or any other socio-economic interests;
- any notable wildlife observations, particularly any casualties;
- estimates of volumes of oil within the segment, based on dimensions of stranded oil observed and recorded;
- storms surges which may have deposited oil above the normal water mark;
- any recommendations on cleanup or other treatment - these could include a description of the recommended technique, suggested scale of operation required and any practical constraints; and
- add recommendations on appropriate end points for terminating the cleanup.



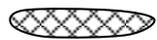
Segment:

Date:

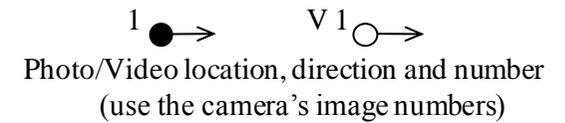
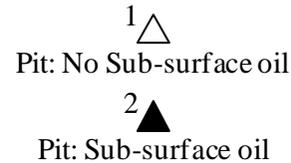
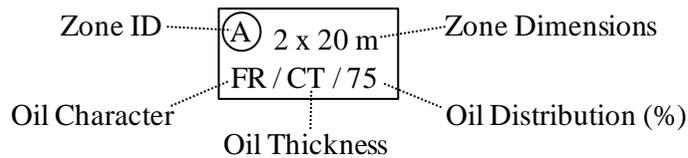
CHECKLIST:

- North Arrow
- Oiled Zones
- Width & Length
- Oil Character
- Oil Thickness
- % Cover
- Scale
- Segment Boundary
- Shoreline Type
- Local Features
- Pit Locations
- Photo/Video Locations

LEGEND



Oiled Zone



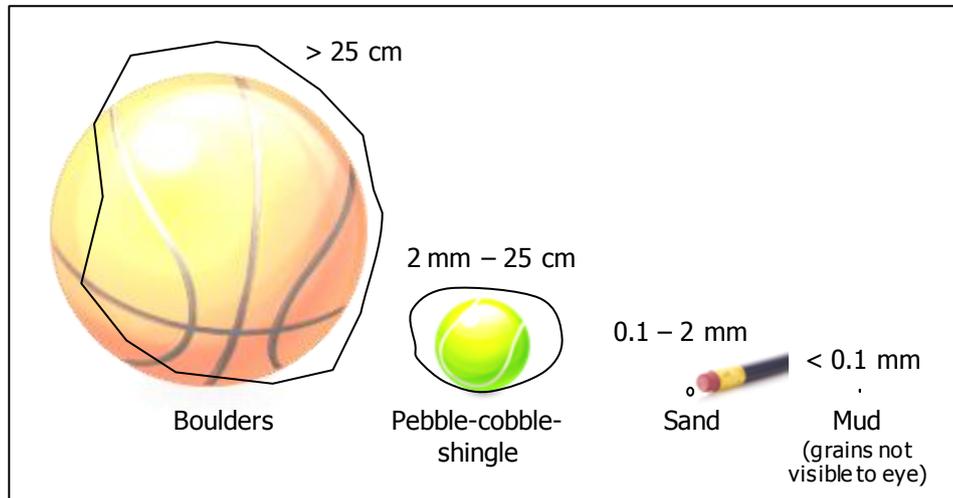




## Definitions of Terminology Used on the Form

### Sediment beach type

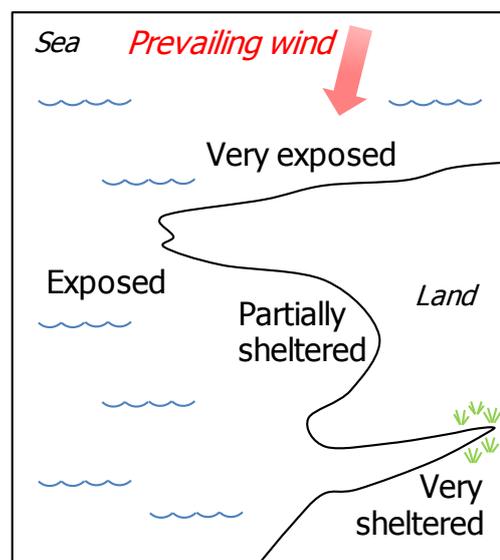
There are various scales for classifying sedimentary beaches. For the purposes of this shoreline assessment, broad categories have been used. Use the following as a guide to the size of sediment to determine the nature of the beach:



### Wave exposure;

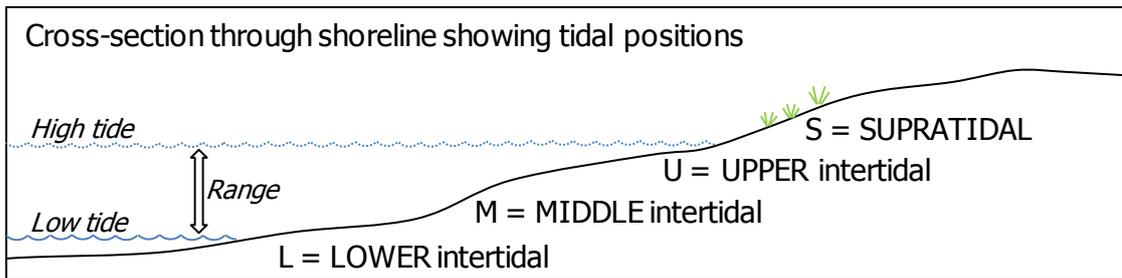
This refers to the approximate overall exposure rating of the upper shore (or oiled) parts of the segment:

- Very exposed:** Sites which face into prevailing winds and receive oceanic swell.
- Exposed:** Sites where onshore strong winds are frequent (but not necessarily prevailing) but also has a degree of shelter because of extensive shallow areas or other obstructions to seaward.
- Partially sheltered:** Sites with a restricted sea area over which the wind blows (e.g.  $< 10 \text{ km}$ ). They can face prevailing winds but with extensive shallow areas to seaward or they may face away from prevailing winds.
- Very sheltered:** Sites with a very restricted sea area over which the wind blows (e.g.  $< 2 \text{ km}$ ) and which face away from prevailing winds or have obstructions such as reefs to seaward or are fully enclosed.





**Position (Tidal);** Use the codes to indicate the position of the *oiled zone* being described. Oil may be thrown into the Supratidal by large waves during storms.



### Surface Oiling Thickness

- PO = Pooled Oil (fresh oil or mousse > 1 cm thick)
- CV = Cover (oil or mousse from >0.1 cm to <1 cm on any surface)
- CT = Coat (visible oil <0.1 cm, which can be scraped off with fingernail)
- ST = Stain (visible oil, which cannot be scraped off with fingernail)
- FL = Film (transparent or iridescent sheen or oily film)

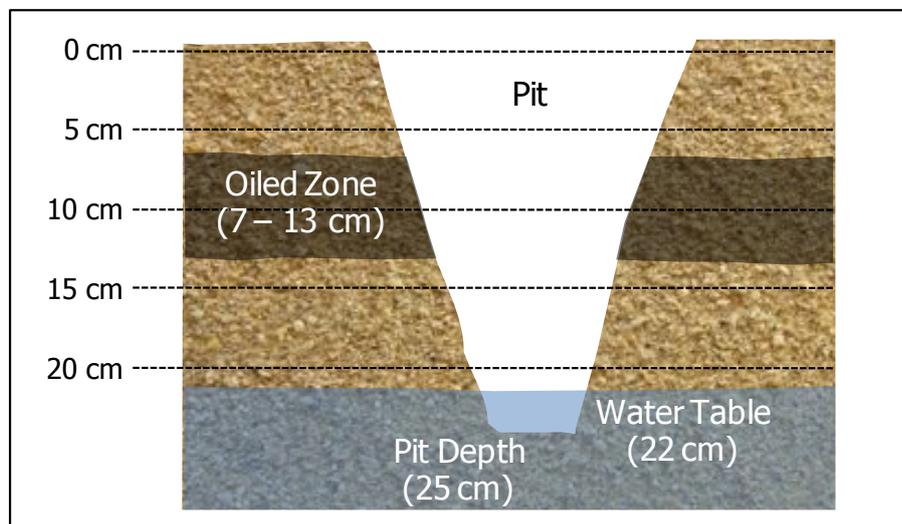
Note that for PO and CV use ACTUAL thickness in cm and mm whenever possible.

### Surface Oiling Character

- FR = Fresh Oil (un-weathered, liquid oil)
- MS = Mousse (emulsified oil occurring over broad areas)
- TB = Tar balls (discrete accumulations of oil <10 cm in diameter)
- PT = Tar Patties (discrete lumps or patches >10 cm diameter)
- SR = Surface Oil Residue (non-cohesive, oiled surface sediments)
- AP = Asphalt Pavements (cohesive, heavily oiled surface sediments)

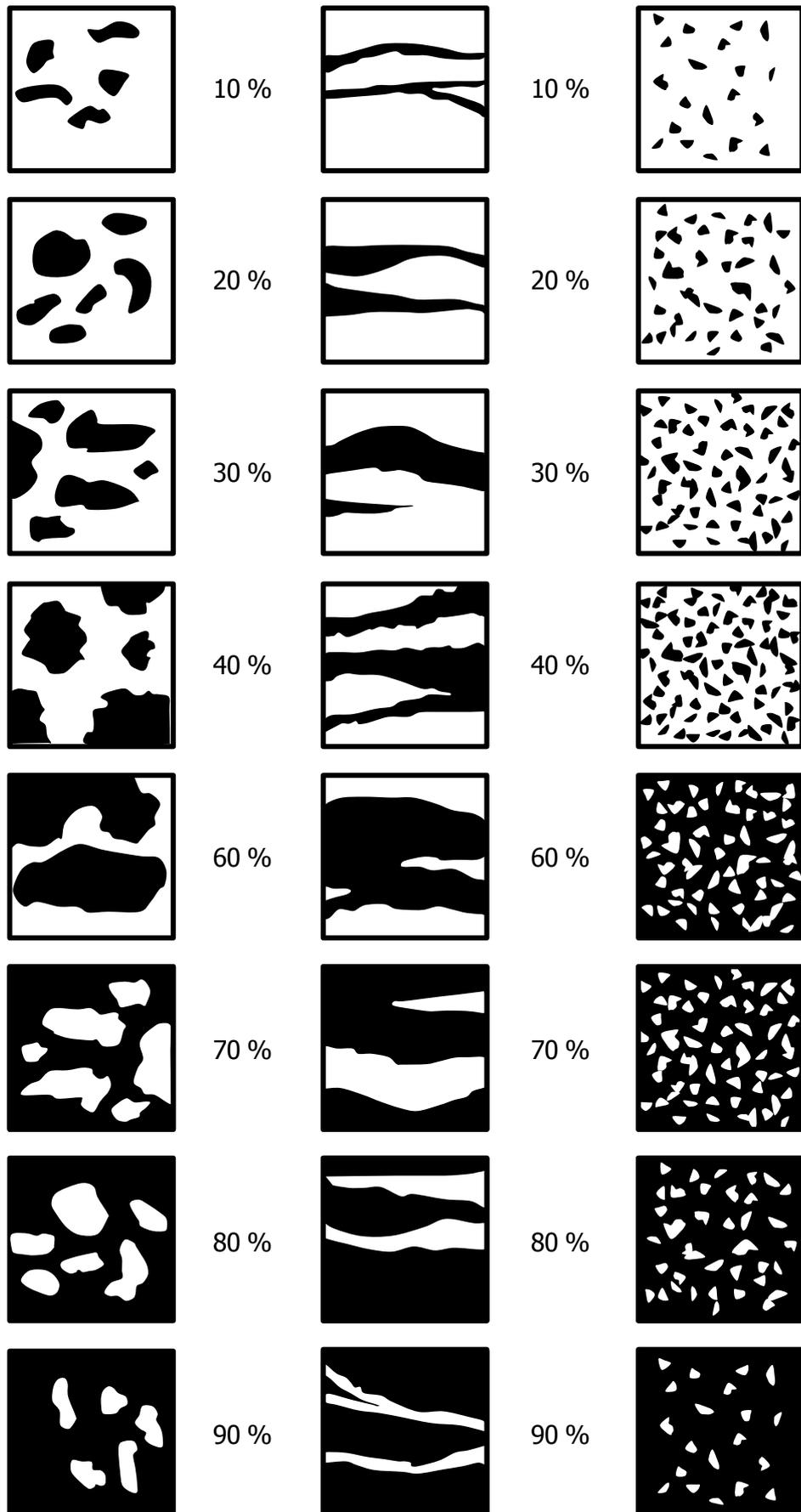
### Sub-surface Oiling Character

- Oil filled pores: pore spaces are completely filled with oil.
- Partial filled pores: the oil does not flow out of the sediments when disturbed.
- Oil residue: sediments are visibly oiled with black/brown coat or cover, but little or no accumulation of oil within the pore spaces.
- Oil film: sediments are lightly oiled with an oil film or stain.
- Trace: discontinuous film or spots of oil, or an odour or tackiness.





Visual Aid for Estimating Oil Distribution





### Field Equipment Checklist

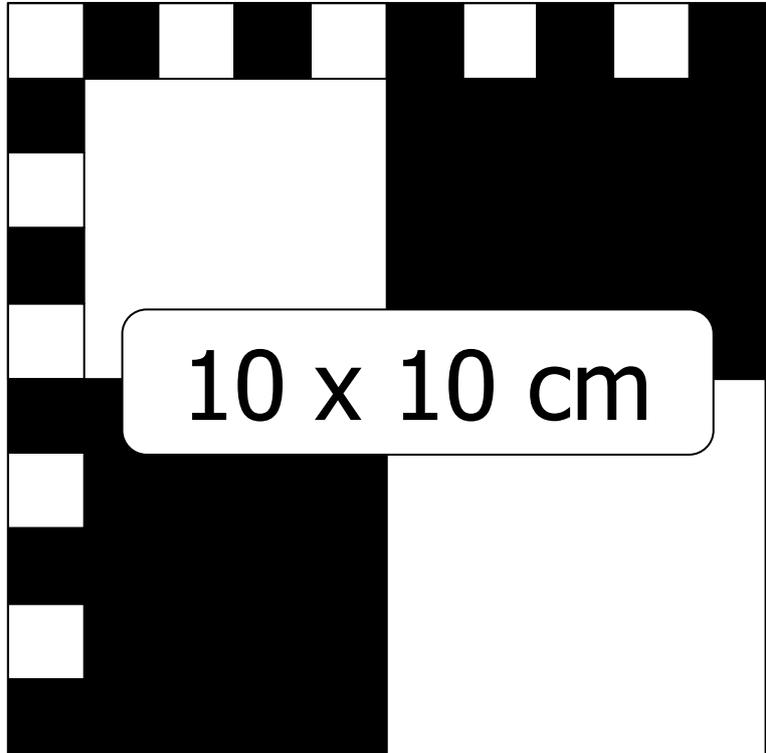
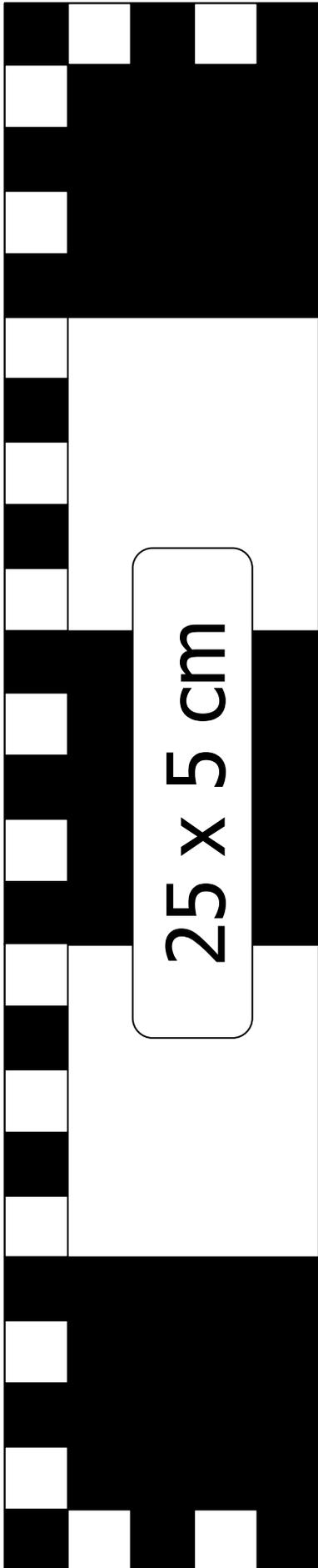


Tick (✓)	Item	
	Suitable maps of relevant shore segments, ideally on waterproof writing paper and other relevant maps (e.g. road or topographical maps for access) or nautical charts of area	
	Oiled Shoreline Assessment Forms, ideally printed on waterproof writing paper	
	Clipboard	
	Spare blank waterproof writing paper or waterproof field notebooks	
	Stationery - pencils, waterproof markers, rulers, paperclips	
	Compass	
	Small shovel or spade	
	Tape measure	
	Digital camera	
	Video camera and storage media (if required)	
	Batteries, charged battery packs (for GPS, cameras, etc.)	
	10 cm or 25 cm long photo scale with 1 cm increments	
	Portable Global Positioning System (GPS) device	
	Communication device (e.g. radio or mobile telephone)	
	The surveyors should also have appropriate clothing and personal protective equipment for the conditions, for example: <ul style="list-style-type: none"> <li>- rain gear, sun screen, hat, rubber boots, non-skid soles</li> <li>- first aid kit</li> <li>- hand wipes/cleaner and rags for decontamination</li> </ul>	
	Refreshments should be carried in remote locations	



**Photo Scales**

The scales may be copied and placed in photographs to illustrate the size of sediments or other shoreline features etc...





**Photographic Guide to Shoreline Types**

<p><b>Bedrock cliff</b></p> <p>Vertical or steeply sloping solid bedrock</p> <p>Photo courtesy: ITOPF</p>	
<p><b>Bedrock slope / platform</b></p> <p>Gently sloping or horizontal solid bedrock</p> <p>Photo courtesy: The Oil Spill Training Company</p>	
<p><b>Man-made solid</b></p> <p>Solid seawalls, piers or quays, usually made from concrete, wood or metal</p> <p>Photo courtesy: The Oil Spill Training Company</p>	



<p><b>Man-made permeable</b></p> <p>Revetments or riprap that may allow penetration of stranded oil</p> <p>Photo courtesy: ITOPF</p>	
<p><b>Salt marsh</b></p> <p>Marine vegetated areas on muddy sediments</p> <p>Photo courtesy: The Oil Spill Training Company</p>	
<p><b>Mud sediments</b></p> <p>Mud shores are typical of very sheltered inlets and estuarine conditions</p> <p>Photo courtesy: ITOPF</p>	



<p><b>Sand sediments</b></p> <p>May be fine-grained and hard packed or coarser soft sand – this should be noted</p> <p>Photo courtesy: ITOPF</p>	
<p><b>Mixed sediments</b></p> <p>Made from a mix of different sediment sizes, including sand smaller stones – the mix can be seasonal</p> <p>Photo courtesy: The Oil Spill Training Company</p>	
<p><b>Pebble / cobble / shingle</b></p> <p>Medium sized sediments which can also include shell fragments; they may be steeply sloping with berms on the upper beach</p> <p>Photo courtesy: ITOPF</p>	



<p><b>Boulder</b></p> <p>Characterised by attached seaweed, lichens or animals on upper or under-boulder surfaces, indicating that they are not often turned over by the sea.</p> <p>Photo courtesy: ITOPF</p>	 A photograph of a rocky beach. The foreground and middle ground are filled with large, smooth, greyish-brown boulders of various sizes. A person wearing a red hat and dark clothing is walking across the boulders. In the background, there is a steep, grassy hillside with some trees and a building on top. The sky is clear and blue.
<p><b>Estuary</b></p> <p>Photo courtesy: ITOPF</p>	 A wide-angle photograph of an estuary. The water is shallow and calm, reflecting the sky. The banks are covered in mudflats with patches of green seaweed. The sky is blue with scattered white clouds. In the distance, there are green hills and some buildings.
<p><b>Pools</b></p> <p>Photo courtesy: ITOPF</p>	 A photograph of a rocky coastline. The foreground is dominated by dark, jagged rocks. Small tide pools are scattered among the rocks, reflecting the sky. In the background, the sea is blue, and a large, dark building is visible on a cliffside. The sky is blue with white clouds.



Photographic Guide to Oiling Thickness and Character

<b>SURFACE OIL THICKNESS</b>	<p><b>Pooled Oil (PO)</b></p> <p>Photo courtesy: OTRA</p>	
	<p><b>Cover (CV)</b></p> <p>Photo courtesy: OTRA</p>	
	<p><b>Coat (CT)</b></p> <p>Photo courtesy: ITOPF</p>	



<b>SURFACE OIL THICKNESS</b>	<p><b>Stain (ST)</b></p> <p>Photo courtesy: ITOPF</p>	
	<p><b>Film (FL)</b></p> <p>Photo courtesy: ITOPF</p>	



<b>SURFACE OIL CHARACTER</b>	<p><b>Fresh (FR)</b></p> <p>Photo courtesy: ITOPF</p>	
	<p><b>Mousse (MS)</b></p> <p>Photo courtesy: ITOPF</p>	
	<p><b>Tar Balls (TB)</b></p> <p>Photo courtesy: ITOPF</p>	



<b>SURFACE OIL CHARACTER</b>	<p><b>Tar Patties (PT)</b></p> <p>Photo courtesy: ITOFP</p>	
	<p><b>Surface Oil Residue (SR)</b></p> <p>Photo courtesy: OTRA</p>	
	<p><b>Asphalt Pavement (AP)</b></p> <p>Photo courtesy: OTRA</p>	



SUB-SURFACE OIL CHARACTER	<p><b>Oil filled pores</b></p> <p>Photo courtesy: OTRA</p>	
	<p><b>Partial filled pores</b></p> <p>Differentiate from above by lack of oil flow when disturbed</p> <p>Photo courtesy: OTRA</p>	
	<p><b>Oil residue</b></p> <p>Photo courtesy: ITOPF</p>	



<b>SUB-SURFACE OIL CHARACTER</b>	<b>Oil film</b> Photo courtesy: ITOFP	
	<b>Trace</b> Photo courtesy: OTRA	

# Note for the customs

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