CLOCS Handbook
Assessment for on-site ground conditions

Construction Logistics and Community Safety
In 2012, Transport for London (TfL) commissioned a review of the construction sector’s transport activities to understand the causes of collisions with cyclists. The resulting ‘Construction Logistics and Cyclist Safety’ report laid the foundation for the CLOCS programme. The programme has since broadened to cover the safety of all vulnerable road users and the name changed to Construction Logistics and Community Safety to reflect this.

CLOCS aims to achieve a visionary change in the way the construction industry manages work related road risk whilst providing an opportunity for clients and developers to look out for the wider community. This is moving forward in three key ways:

- Improving the safety of vehicles
- Addressing the imbalance between on-site health and safety and work related road safety
- Encouraging wider adoption of best practice across the logistics industry

The CLOCS Standard for construction logistics: Managing work related road risk has been developed as a common national standard for use by the construction logistics industry. Implemented by construction clients through contracts, it provides a framework that enables ownership in managing road risk which can be adhered to in a consistent way by fleet operators.

Supplementary guidance has been developed to accompany the CLOCS Standard and provide further information on the key requirements:

- CLOCS Guide – Managing driver training and licensing
- CLOCS Guide – Vehicle safety equipment
- CLOCS Guide – Managing supplier compliance
- CLOCS Guide – Managing work related road risk in contracts
- CLOCS Toolkit – Managing collision reporting and analysis
- CLOCS Compliance toolkit
- CLOCS Handbook – Assessment for on-site ground conditions

Representatives from different organisations – vehicle manufacturers, construction logistic clients, operators, regulatory and enforcement bodies are actively engaged with CLOCS representing a united response to road safety and greater social responsibility.

Acknowledgements

The CLOCS Handbook – Assessment for on-site ground conditions has been developed in collaboration with key industry stakeholders. The expert contributions made from organisations and individuals consulted in the development and review of this guide are gratefully acknowledged.

The handbook will be reviewed at intervals not exceeding two years, and any amendments arising from its review will be published in an amended version.

Users are responsible for the correct application of the information provided in this guide.
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CLOCS Standard for construction logistics: Managing work related road risk

The CLOCS Standard for construction logistics sets out a series of individual requirements for logistic operators and construction clients. Each requirement is designed to help you manage work related road risk (WRRR), particularly in relation to the safety of vulnerable road users (VRUs).

Section 3.4.2 of the CLOCS Standard requires a site to be suitable for vehicles fitted with safety features.

This handbook is designed to assist you in ensuring the condition of sites is suitable for vehicles fitted with safety features and side under-run protection.

3.4.2 Suitability of site for vehicles fitted with safety features

Requirement
Clients shall ensure that the condition of sites is suitable for vehicles fitted with safety features and side under-run protection.

Purpose
To ensure the site is suitable for all vehicle types fitted with safety features and side under-run protection.

Demonstration
Clients should carry out regular reviews of the topography of the site and where necessary implement diversions as the site landscape changes.

Clients should ensure that the ground is graded where the construction phase allows.
Terminology

Certain terms are used within the CLOCS Standard and in this guide.

In the CLOCS Standard’s requirement:

- **Shall** – indicates something which is mandatory as part of the requirement, or in order to achieve the requirement
- **Should** – indicates something which is recommended as emerging practice
- **May** – indicates permission or an emerging practice option

**Client** – an organisation employing suppliers. This may be a developer employing a principal contractor or a principal contractor employing a sub-contractor

**Fleet operator** – any organisation or part thereof which operates one or more vehicle(s)

**Site operator** - any organisation or part thereof which is responsible for the operation of construction, supply and waste sites

**Vulnerable road user (VRU)** – a pedestrian, cyclist, motorcyclist, equestrian or person of reduced mobility

**Direct Vision** - what a driver can see through windows rather than using mirrors or cameras

**Indirect Vision** - what a driver can see through mirrors and cameras

**Heavy Goods Vehicle (HGV) categories:**

- **On-road (N3)** – a vehicle designed and constructed for the carriage of goods and having a maximum mass exceeding 12 tonnes
- **Off-road (N3G)** – a vehicle designed and constructed for the carriage of goods and having a maximum mass exceeding 12 tonnes with off-road capabilities
- **Low Entry Cab (LEC)** – a vehicle with enhanced safety features including large panoramic windscreens, cross cab vision and provision for external cameras and sensors. A variant of category N3, LEC vehicles have reduced ground clearance capability compared with the other vehicle categories.
Section 1
Introduction

1.1 Purpose of this handbook
This handbook will help you to meet the site suitability requirement of the CLOCS Standard. It outlines the recommended measures to help you ensure your suppliers comply with the requirements of the CLOCS Standard.

1.2 Who should read this handbook?
This handbook is for construction sector clients and principal contractors who require construction, supply and waste site ground conditions to be rated by site operators.

Site operators required to rate construction, supply and waste sites should follow the guidance in this assessment handbook.

For further information: CLOCS Standard for construction logistics: Managing work related road risk

1.3 How do I get started?
The first step is to read through this handbook. The assessment of on-site ground conditions shall be completed by site operator.

The assessment shall provide a CLOCS site rating to inform the types of vehicle that can operate on the site. The rating should also help to identify areas of improvement.

For further information: CLOCS Guide – Vehicle safety equipment
www.clocs.org.uk
Section 2
Assessing and rating site ground conditions

2.1 Why assess and rate ground conditions?

On-site ground conditions are an influential factor in determining which category of HGV fleet operators will specify and purchase.

A variation in on-site conditions has resulted in fleet operators purchasing off-road vehicles as standard to cope with the conditions that may be encountered. However, research has shown that off-road conditions are rarely encountered.

Off-road (N3G) specified construction and waste vehicles are designed to operate in severe off-road conditions. They have increased axle height and are exempt from front and side under-run protection. Research has identified that these vehicles have greater blind-spots that adversely affect driver vision and are significantly over-represented in fatal collisions involving vulnerable road users (VRUs).

Vehicles with low entry cabs (LECs) and improved driver direct vision have a proven safety benefit in urban operations but they require on-site ground conditions to be appropriate to their capability.

If ground conditions on-site were guaranteed to be suitable for LEC and on-road (N3) HGVs, further adoption of these vehicles could take place. As these vehicles have improved driver direct vision compared to N3Gs, collisions involving HGVs and VRUs should be reduced.

The on-site ground condition assessment allows site personnel to identify the categories of vehicles (LEC, N3, N3G or site plant only) that are able to operate on their site. The assessment is formed of five CLOCS ratings (1-5).

A CLOCS 5 rated site is an exemplar site and will be suitable for vehicles designed to operate safely on urban roads. Lower ratings represent poorer ground conditions, based on the assessed criteria (see section 3). Subsequently a CLOCS 1 rated site will be suitable for some N3G variants and site plant only.

There are additional benefits of improved ground conditions, these include:

- Safe working platforms
- Safe tipping areas
- Less vehicle damage
- Reduced towing of stranded vehicles

2.2 Conducting the assessment

Site operators are encouraged to complete and submit this assessment on an annual basis to ensure standards are maintained. The assessment should form part of the overall health and safety manual for sites and inform any improvement plan.

Details of the person(s) conducting the assessment and site details shall be provided by all assessors in the ‘Assessor and site details’ section of the assessment form (Appendix 1 and online at www.clocs.org.uk/site-suitability)

The assessment shall be completed in accordance with the guidance provided in section 3. The assessment should be conducted within the trafficked areas of the site. All of the assessed criteria shall be completed accurately and impartially.

Vehicles on site may be required to traverse all ground condition types assessed. Therefore, once the assessment is complete, the CLOCS site rating will be determined by the most severe conditions encountered. For example, if three out of the four ground conditions assessed score a CLOCS 4 but one of the ground conditions scored a CLOCS 3, your overall site rating shall be a CLOCS 3.

2.3 CLOCS on-site ground condition ratings

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Site ground conditions suitable for all vehicle types including LECs (in all weather conditions)</td>
</tr>
<tr>
<td>4</td>
<td>Site ground conditions suitable for all vehicle types including LECs (weather permitting)</td>
</tr>
<tr>
<td>3</td>
<td>Site ground conditions suitable for most vehicle types including on- and off-road capable HGVs (not LECs)</td>
</tr>
<tr>
<td>2</td>
<td>Site ground conditions suitable for off-road capable HGVs only (in all weather conditions)</td>
</tr>
<tr>
<td>1</td>
<td>Site ground conditions only suitable for plant machinery and weather permitting, may be suitable for off-road capable HGVs</td>
</tr>
</tbody>
</table>
Section 3
Applying the on-site ground condition assessment

The site assessment is based on four ground condition categories; approach angle, materials, rutting and bumps and water. These four categories have been identified as the most important factors in determining which vehicle types can operate on sites safely.

Ground condition 1: Approach angle
The maximum angle of a ramp onto which a vehicle can climb from a horizontal plane without interference.

Ground condition 2: Material type
The surface condition that determines the likelihood of loss of traction.

Ground condition 3: Rutting and bumps
The depth and profile of the ground surface that impacts on tyre penetration.

Ground condition 4: Water
The presence and depth of surface water that impacts the ground material (see Ground Condition 2) and affects vehicle traction.

The ground conditions are assessed in a way that requires limited background experience of the site. Illustrated examples of the assessment criteria, for each of the four ground conditions, can be found in the following pages. Use the description column to best identify your site. The first column will give you the CLOCS rating for that site for that specific ground condition. The overall CLOCS site rating is based on the lowest of the four rated ground conditions.

Weather can considerably impact site conditions and alter the outcome of the site rating. The assessment for on-site ground conditions takes this into consideration.
Ground condition 1
Approach angle

Approach angle

The approach angle is the maximum angle of a ramp onto which a vehicle can climb from a horizontal plane without interference. It is defined as the angle between the ground and the line drawn between the front tyre and the lowest hanging part of the vehicle at the front overhang. LEC vehicles have a lower approach angle than off road capable vehicles therefore it is necessary to quantify any change in gradient on site that may limit vehicle access.

Gradient

The gradient can be measured using an inclinometer, however, many smartphones now have similar functionality using built-in gyroscopes. If required refer back to the diagrams listed under 'example' to find the relevant rating for gradients on your site.
Ground condition 1
Approach angle

Many construction, supply and waste sites will be host to gradients in the trafficked area. This may take the form of access to an elevated area of construction, tipping material atop a spoil heap or to gain access to weight bridges and wheel washes.

The approach angle of a particular vehicle may limit access to a gradient where there is a significant change in slope between the surface and incline. Rating is based on the greatest change in gradient encountered on any part of the trafficked area.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Example</th>
<th>Description</th>
<th>Guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td><img src="image" alt="Approach angle of LEC unencumbered by change in gradient." /></td>
<td>Approach angle of LEC unencumbered by change in gradient.</td>
<td>Change in gradient should not exceed 10°</td>
</tr>
<tr>
<td>4</td>
<td><img src="image" alt="Approach angle of N3 or LEC unencumbered by change in gradient." /></td>
<td>Approach angle of N3 or LEC unencumbered by change in gradient.</td>
<td>Change in gradient between 11° – 16°</td>
</tr>
<tr>
<td>3</td>
<td><img src="image" alt="Approach angle of N3 unencumbered by change in gradient." /></td>
<td>Approach angle of N3 unencumbered by change in gradient.</td>
<td>Change in gradient between 17° – 21°</td>
</tr>
<tr>
<td>2</td>
<td><img src="image" alt="Approach angle of N3G or N3 unencumbered by change in gradient." /></td>
<td>Approach angle of N3G or N3 unencumbered by change in gradient.</td>
<td>Change in gradient between 22° – 25°</td>
</tr>
<tr>
<td>1</td>
<td><img src="image" alt="Change in gradient will require N3G or site plant." /></td>
<td>Change in gradient will require N3G or site plant.</td>
<td>Change in gradient in excess of 25°</td>
</tr>
</tbody>
</table>
Ground condition 2
Material Type

A range of material types can be encountered on-site. This will affect the type of vehicle that can operate. The material type determines surface condition and the likelihood of loss of traction.

Rating should be based on worst conditions encountered on the trafficked area of the site.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Example</th>
<th>Description</th>
<th>Guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td><img src="image1.png" alt="Image" /></td>
<td>Concrete or asphalt surface in good condition. Suitable for LEC.</td>
<td>Surface material not affected by weather conditions. Loss of traction not likely.</td>
</tr>
<tr>
<td>4</td>
<td><img src="image2.png" alt="Image" /></td>
<td>Concrete or asphalt surface in poor condition / unbound hardstanding in good condition. Suitable for LEC and N3.</td>
<td>Localised puddles in potholes with wet material capable of bearing load. Loss of traction unlikely.</td>
</tr>
<tr>
<td>3</td>
<td><img src="image3.png" alt="Image" /></td>
<td>Surface made of granular material with fines. Suitable for N3.</td>
<td>Some soft spots on the surface may occur in wet conditions and localised loss of traction possible.</td>
</tr>
<tr>
<td>2</td>
<td><img src="image4.png" alt="Image" /></td>
<td>Surface made of fine material with some granular. Suitable for N3G.</td>
<td>Soft spots on the surface will occur in wet conditions and localised loss of traction likely.</td>
</tr>
<tr>
<td>1</td>
<td><img src="image5.png" alt="Image" /></td>
<td>Surface made of predominantly fine material (cohesive). Suitable for some N3G types or site plant.</td>
<td>Material will soften with an increase in water content. Loss of traction highly likely.</td>
</tr>
</tbody>
</table>
Ground condition 3
Rutting and bumps

Ruts and bumps will often be encountered on sites where the surface material is unbound and traffic levels are high. Certain LEC and N3 vehicles can be equipped with air suspension able to increase the axle height.

Daily grading of ruts can help reduce tyre penetration of the surface and also prevent ruts and bumps from worsening. Rating should be based on the deepest profile encountered on a trafficked area of the site.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Example</th>
<th>Description</th>
<th>Guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td><img src="image" alt="Concrete or asphalt surface with no rutting present. Suitable for LEC" /></td>
<td>Concrete or asphalt surface with no rutting present. Suitable for LEC</td>
<td>No rutting or bumps witnessed.</td>
</tr>
<tr>
<td>4</td>
<td><img src="image" alt="Tyre tread prints visible on trafficked surface. Suitable for LEC and N3." /></td>
<td>Tyre tread prints visible on trafficked surface. Suitable for LEC and N3.</td>
<td>Ruts and bumps less than 50mm</td>
</tr>
<tr>
<td>3</td>
<td><img src="image" alt="Small ruts and bumps visible on the trafficked surface. Suitable for N3." /></td>
<td>Small ruts and bumps visible on the trafficked surface. Suitable for N3.</td>
<td>Ruts and bumps between 51mm – 100mm</td>
</tr>
<tr>
<td>2</td>
<td><img src="image" alt="Medium sized ruts and bumps present on trafficked surface. Suitable for N3G." /></td>
<td>Medium sized ruts and bumps present on trafficked surface. Suitable for N3G.</td>
<td>Ruts and bumps between 101mm – 150mm</td>
</tr>
<tr>
<td>1</td>
<td><img src="image" alt="Large ruts and bumps visible on the trafficked surface. Suitable for some N3G types or site plant." /></td>
<td>Large ruts and bumps visible on the trafficked surface. Suitable for some N3G types or site plant.</td>
<td>Ruts and bumps in excess of 150mm</td>
</tr>
</tbody>
</table>
Ground condition 4
Water

Well drained sites should allow surface water to drain rapidly. In the worst case scenarios, where drainage is not adequate, the surface will liquify.

Rating should be based on the largest area of ponding encountered on a trafficked area of the site.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Example</th>
<th>Description</th>
<th>Guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td><img src="image1.png" alt="Example" /></td>
<td>Surface is well drained over the entire site. Suitable for LEC.</td>
<td>No surface water present. Water drains rapidly after precipitation.</td>
</tr>
<tr>
<td>4</td>
<td><img src="image2.png" alt="Example" /></td>
<td>Site is mostly drained. Localised puddles forming in un-trafficked locations. Suitable for LEC and N3.</td>
<td>Shallow puddles may be present but disperse within a short time frame.</td>
</tr>
<tr>
<td>3</td>
<td><img src="image3.png" alt="Example" /></td>
<td>Localised ponding present in trafficked area. Suitable for N3.</td>
<td>Water ponding on hardstanding areas.</td>
</tr>
<tr>
<td>2</td>
<td><img src="image4.png" alt="Example" /></td>
<td>Large ponding of water in trafficked area. Suitable for N3G.</td>
<td>Water ponding on firm to soft material. Depth difficult to gauge.</td>
</tr>
<tr>
<td>1</td>
<td><img src="image5.png" alt="Example" /></td>
<td>Ponding and slurry present in the trafficked area. Suitable for some N3G types or site plant.</td>
<td>Surface has liquified.</td>
</tr>
</tbody>
</table>

www.clocs.org.uk
Section 4
Submitting your site rating

Once your site assessment is complete, enter your details and ratings via the online site conditions rating form at www.clocs.org.uk/site-suitability

**Directory of on-site ground conditions**

Your site rating will be added to a directory of CLOCS rated sites. The directory is an online tool that allows operators to view construction, supply and waste sites in a chosen region and identify their on-site ground condition rating.

The directory can be searched and filtered by location, overall site rating and primary site use.

Access the directory via: www.clocs.org.uk/site-suitability
CLOCS - On-site ground conditions assessment form

Site details

Site name: ____________________________
Location: ____________________________
Site address: __________________________
Postcode: ____________________________
Site category:  
- Landfill  
- Waste treatment  
- Waste transfer  
- Supply  
- Construction  
Site operator: ____________________________
Accept London waste:  Yes  No

Contact details

Name: ____________________________
Position: ____________________________
Email: ____________________________
Phone: ____________________________

Assessment details

Assessment date: ____________________________  Assessment type (Initial/update): ____________________________
Approach Angle rating: ____________________________
Rutting and Bumps rating: ____________________________
Material Type rating: ____________________________
Water rating: ____________________________

CLOCS Site Rating

☐  This will be the same as the lowest ground condition rating above
Construction Logistics and Community Safety

To find out more please visit www.clocs.org.uk