



# SITE LOGISTICS

## GUIDELINES

VERSION 1.1



## **UNOPS Site Logistics Guidelines**

### **Version 1.0 - 2018**

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# Acknowledgments

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The project team wishes to thank, on behalf of UNOPS, the following people who provided valuable feedback during the different stages of development of this publication in its current revision.

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# List of Abbreviations

- IPMG    Infrastructure and Project Management Group
- JIT     Just In Time
- PID    Project Initiation Documentation

# How to use this guidance

This publication forms a part of the UNOPS Infrastructure and Project Management Group (IPMG) Standards Management Framework (SMF) and should not be applied in isolation, but with consideration for related normative and informative publications within SMF.

As with each publication that forms part of the IPMG Standards Management Framework, this publication considers the particular needs of the user. The design facilitates its usage, readability and navigation.

## TARGET AUDIENCE

The intended target audience for this publication are UNOPS Engagement Developers and Infrastructure Practitioners.

## CALL-OUT BOXES

Call-out boxes highlight important information in the form of figures and definitions, key messages, examples and case studies, considerations, and references to additional information.

### FIGURE / DEFINITION

This box contains a figure, box (text and figures combined) or definition.

### KEY MESSAGE

This box contains a key message.

### EXAMPLE

This box contains an example.

### CONSIDERATION

This box contains a consideration.

### MORE INFORMATION

This box contains more information.



# 1. Introduction

The purpose of this guidance is to raise awareness of the logistics considerations and issues associated with implementing infrastructure projects. It should not be considered as a logistics manual, but should rather be used as guidance to help identify common issues and challenges associated with infrastructure project logistics.

UNOPS engagements are generally developed by the Engagement Developer who is responsible for and will complete the Opportunity, Pre-Engagement and Initiation Stages, after which the project is handed over to the Project Manager to undertake the Implementation and Closure Stages.

Given that logistics considerations can impact across all of these stages, this guidance is intended to provide support to Engagement Developers and Project Managers to highlight and identify logistics considerations that are relevant for each stage of the project lifespan.

Further, depending on the role that UNOPS will be taking on an infrastructure project, the guidance can be used:

- **Where UNOPS is managing a contract being executed by a Contractor,** it will provide the Project Manager with some of the key issues related to logistics that can be used to inform and verify the design, procurement and implementation of the project.
- **Where UNOPS is implementing the works (Direct Implementation),** it will provide support and help the Project Manager to directly identify common issues and understand risks associated with logistics that are most likely to have an adverse effect on project delivery.

## 2. Structure of the Guidance

The guidance is structured around the Stages in UNOPS Project Lifespan. Logistics considerations can have different impacts at each of the project stages and these impacts need to be understood and considered as part of the entire project lifespan. Given that logistics should be viewed from a risk perspective, it is important to identify the logistics risks, what mitigation measures will be put in place and who is best placed to manage those risks.

The guidance identifies the typical logistics risks and mitigation measures, however, each project is unique and each context within which a project is delivered is unique, so this should not be viewed as a “tick box” exercise. The guidance sets out the general logistics principles and considerations applicable to each project stage, supported by a series of checklists for each stage in the Appendices. The check lists are not definitive but cover many of the key issues for each stage. Not all of the issues are relevant to each project so the checklists should be used as prompts to help identify the most relevant issues.

Each of the project stages should not be viewed as a “stand-alone” stage but rather as a progressive development of logistical information as the project moves through the different stages as shown in **Figure 1: Logistics Risk (p.10)**. The progressive development of information is important to reduce the likelihood of logistics becoming a risk to the successful implementation of the project.

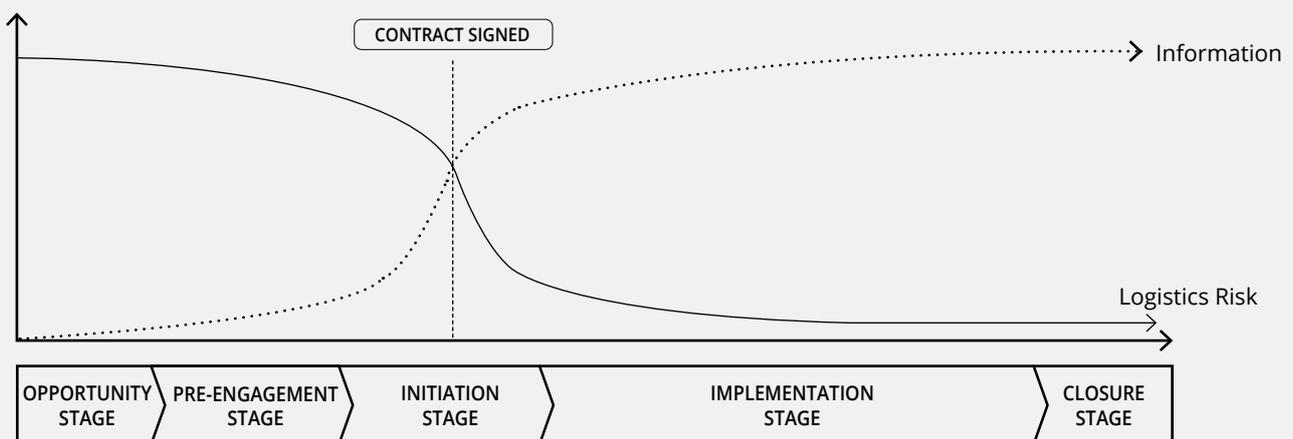


Figure 1: Logistics Risk

# 3. Logistics in Infrastructure Projects

## 3.1 What is Logistics?

Logistics can be described as the process of planning, implementing, and controlling procedures for the efficient and effective transportation and storage of goods. It involves the planning, execution, and control of the procurement, movement, and stationing of personnel, material, and other resources to achieve the objectives of a project. It may be defined as the 'management of inventory in motion and at rest.'

Logistics is critical to the successful delivery of an infrastructure project. It requires careful planning, implementation and management to ensure that it does not adversely impact on the time, cost or quality of the project.

Viewed in another way logistics helps fulfil the project needs according to the six 'rights' of logistics identified in **Figure 2: The 6 Rights of Logistics (p.11)**. Note that these are sequentially arranged and when the six rights of logistic are fulfilled, it assists the Project Manager to deliver the project on time, within budget and to the right quality.

## 3.2 UNOPS Project Stages

Projects are one of the main means by which UNOPS fulfils its purpose. In order to effectively deliver projects, UNOPS projects are broken down into the stages shown in **Figure 3: UNOPS Project Lifespan (p.12)**

- **Opportunity Stage** – The stage at which UNOPS identifies and develops possible opportunities
- **Pre-engagement Stage** – The stage at which UNOPS formulates and negotiates an engagement and its related projects. During this stage the scope, schedule, budget, among others will start to be defined in the draft Legal Agreement and in the draft Project Initiation Documentation (PID).
- **Initiation Stage** – The stage at which Legal Agreement is completed and prepared for the implementation of the engagement related projects.
- **Implementation Stage** – The stage at which projects are delivered to the agreed scope, time, budget and quality requirements as per the Legal Agreement, the PID, the approved Project Plan (Baseline), and the approved Quarterly Plan.
- **Closure Stage** – The stage at which the project is operationally and financially closed. During this stage, the engagement related projects will be closed in a timely and professional manner.

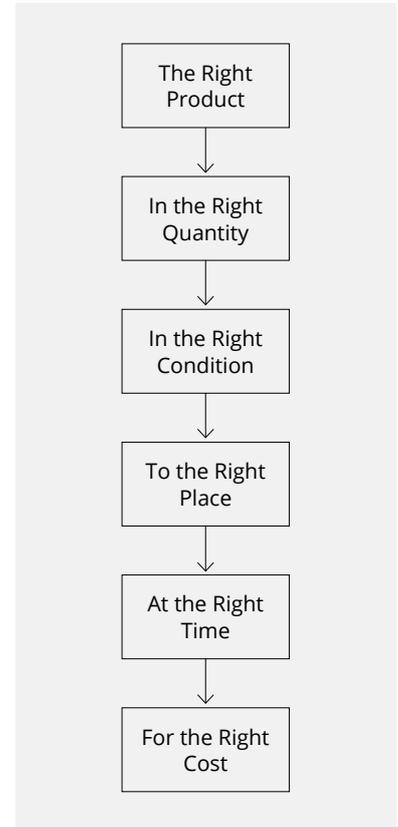


Figure 2: The 6 Rights of Logistics

### MORE INFORMATION

<http://www.businessdictionary.com/definition/logistics.html>

### MORE INFORMATION

For further details on project stages see UNOPS Project Management Manual Rev 1.0 - 2018

## UNOPS PROJECT LIFESPAN

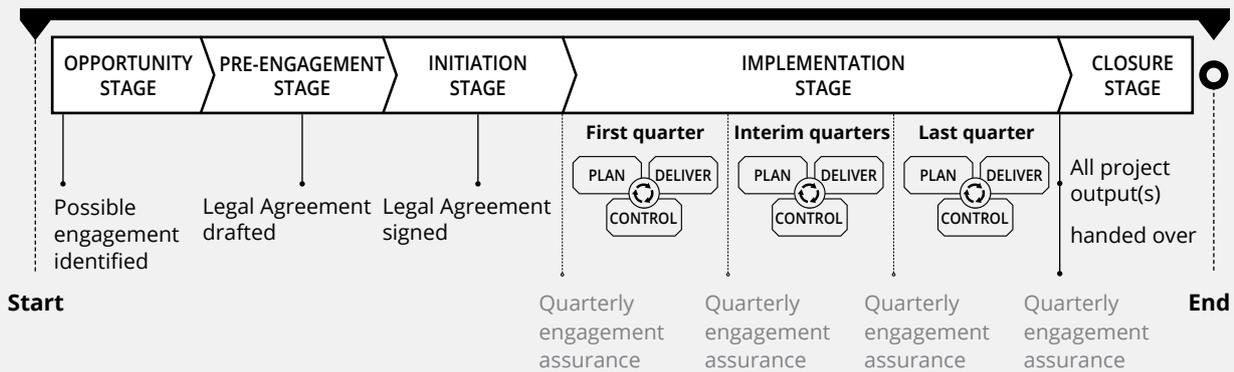


Figure 3: UNOPS Project Lifespan

### 3.3 General Considerations in Logistics Planning

Most infrastructure projects delivered by UNOPS are in a complex operating environment, which influences the project context and can be described as challenging in many aspects. These may include a wide range of issues such as remote locations, poor road access, extreme weather conditions and natural events, lack of rudimentary resources such as power, armed conflict etc.

UNOPS delivers a wide range of infrastructure projects that can vary in scope, size, budget and type of contract. Hence, no two projects have the same logistics needs; however, there is some common information needed that can be applied to all infrastructure projects. It is important that this information and any consequent issues are not left “to the last minute” and only identified when the project is about to move into the implementation stage.

#### CONSIDERATION

A key principle to remember is that it is never too early to start identifying issues that will impact on the project logistics.

### 3.4 Logistics Risk

Logistics on infrastructure projects is primarily concerned with the **Implementation Stage (Section 7)** when actual delivery or construction of the works takes place. However, logistics is a very important consideration during all of the project stages prior to the Implementation Stage.

Logistics can have a significant impact on the project scope, schedule and budget that are developed during the Opportunity and Pre-engagement Stages. Identification of logistics risks during these stages ensures alignment with the revised Opportunity and Engagement Acceptance (OEA) process. The OEA process aims to support colleagues with the assessment of opportunity and engagement risks. Some of these risks are directly linked to logistics risks.

## 4. Opportunity Stage

The Opportunity Stage is where UNOPS identifies and develops possible opportunities. During this stage, all formal or informal information about the opportunity is gathered by consulting potential or existing funding sources and/or clients. During this stage, a required activity is the completion of the one UNOPS OEA risk assessment. This should be supported by reviews and contributions from subject matter experts, including regional and corporate supporting units such as legal, financial, technical: infrastructure, project management, etc.

If all the logistics risks and issues are not considered, in addition to all the other issues, it may result in an under-evaluation of the project risk and over-evaluation of UNOPS capability to effectively manage the risks and deliver the project. The consequence is often over promising to partners and clients due to an unrealistic view of the situation and a desire to “win the project”. This situation can put the project, the Project Manager and Contractors at risk of failure. Project risk ultimately escalates into corporate risk, and UNOPS may have significant reputational risk as a result of the escalation.

It should be understood that even if the actual risk lies with a Contractor, Sub-contractor or Vendor in some delivery modalities, UNOPS will still be perceived as responsible to some degree. Hence, it is important at the Opportunity Stage to ask the right questions so that information can be obtained to avoid an unrealistic assessment of the project context and setting unrealistic expectations.

During the opportunity stage, Engagement Developers will need to know information related to logistics that could impact on the project time, cost and quality. The more information and the more accurate it is, the easier it will be to make a correct decision. Logistics decision-making is always a trade-off. The right information will enable the Engagement Developer to make conscious decisions about the trade-offs early on when it is still possible to make changes and negotiate with the client or donor before an agreement is signed.

Having the right information will also enable a more informed discussion with the client or donor to manage expectations. UNOPS is often placed under pressure to deliver quickly within very tight timeframes or budgetary constraints. Understanding the logistic implications of delivering a project can play an important role in guiding the negotiations with the client or donor in respect of time, cost and quality.

### 4.1 PESTLE Analysis

One of the tools available to collect information during the opportunity stage is the PESTLE analysis as shown in **Figure 4: PESTLE Analyses (p.14)**. The PESTLE analysis helps the project team understand the **P**olitical, **E**conomic, **S**ocial, **T**echnological, **E**nvironmental and **L**egal context within which the project will be delivered. Security is also an important aspect to be considered at this stage.

The analysis will enable identification of the external factors within the delivery context that could have an impact on the project and its operations. Many of these will be outside UNOPS control but the implications of them need to be clearly understood. The analysis provides a framework to investigate the external environment by asking questions for each factor and then assessing the likely implications.

#### CONSIDERATION

The consideration of logistics risks is embedded in the OEA Risk Assessment questions. For example Question 1.1.3 - Do we foresee challenges with physical access to location/site?

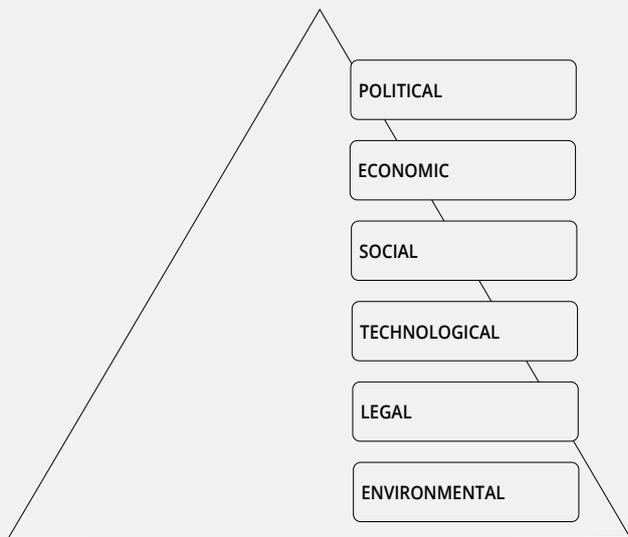


Figure 4: PESTLE Analyses

Typical questions to answer are:

- What are the key political factors?
- What are the important economic factors?
- What cultural/social aspects are most important including gender considerations?
- What technological innovations or shifts are likely to occur?
- What current and impending legislation will impact on the project?
- What are the environmental considerations that could impact on the project?

Last but not least, Security is also an important factor to take into consideration as the UNOPS operates in complex environments. It is not necessary to accurately categorise each issue as the aim of the analysis is to identify as many factors as possible. An impending change in legislation for example, may be political or legal but that is not important, what is important is the impact it could have on the project implementation.

## 4.2 Key Considerations for the Opportunity Stage

The table in **Appendix 1 – Opportunity Stage Checklists and Considerations (p.32)** sets out some of the initial considerations that need to be addressed during the Opportunity Stage of the project. Some of these may be general project considerations but they will have an impact on the logistics decisions of the project and ultimately how the project is delivered.

### 4.2.1 Transportation

Transportation is fundamental to logistics and should be considered early in the project. As noted above, a key aspect of logistics is related to the movement of resources for a project and it is important to understand how goods and other resources will get to and from the site. In some locations just getting personnel to the site can be difficult but making the same journey with substantial amounts of materials (could be waste as well) and heavy machinery can be even more problematic. The seasonal impact of weather, security and other aspects on transport should be considered along with the potential hazards.

During the Opportunity Stage, the logistical information gathered can have a major influence on the project design, time and cost, which will impact the legal

agreement. When the site location and the type of project deliverable is known it is possible to consider the logistics supply channels required to support delivery of the project. This may require collecting more comprehensive data to answer some key questions. Different transport options, characteristics, advantages and disadvantages are set out in **Appendix 1 – Opportunity Stage Checklists and Considerations (p.32)** to guide the thinking on transport logistics.

## 5. Pre-engagement Stage

During this stage UNOPS formulates and negotiates an engagement and its related projects. During this stage the scope, schedule, budget, among others will start to be defined in the draft Legal Agreement and in the draft Project Initiation Documentation (PID).

The drafting of the Legal Agreement needs to be informed by some of the key risks that UNOPS will have to manage on the project. The identification of the key issues relating to logistics will form the basis for some of this input. Any information that may not have been available during the Opportunity Stage needs to be clarified or confirmed.

As noted in the previous section, the more logistics information the Engagement Developer has, the more informed they will be during the negotiation process.

To provide this information, the Engagement Developer needs to consider three different groups of factors (with the input of the relevant infrastructure technical advisors, specialists and experienced personnel from procurement and logistics who are familiar of the organizational requirements as well as the context ):

1. Transport factors
2. Operational factors
3. Consignment factors.

### 5.1 Transport Factors

This builds on the information developed in the Opportunity Stage to describe the advantages and disadvantages of different types of transport modalities required for all the resources used during the project lifespan.

### 5.2 Operational Factors

These factors are very important to consider in the international environment in which UNOPS operates. The operational factor can change significantly from country to country. For example if the supply chain crosses more than one country, then the operational factors of all countries involved need to be taken into consideration. Customs clearances and tax free status certification processes can be challenging and time consuming in the transfer of goods and raw materials across borders. In some of the complex environments that UNOPS operates in, there is possibility that even within a country depending on the location there could be restrictions and other requirements that need to be considered earlier during the engagement development stage. Security and access are key operational factors that should be also taken in to account at this stage as these factors significantly influence budget and time lines.

### 5.3 Consignment Factors

Consignment refers to the collection of goods to be sent, in transit or having been sent. It determines how goods are grouped and packed for sending. These factors have to be evaluated before any shipments are made as these may change from one shipment to another. However, at the Pre-Engagement Stage, it is sufficient to have a general understanding of these factors in order to estimate the risks, time, handling requirements, etc. for each shipment.

Collecting the correct and most accurate data available during the this stage will be very useful in the later Implementation Stage, when more detailed planning takes place and more specific questions have to be answered.

#### CONSIDERATION

The logistics supply chain is the lifeblood of an infrastructure project. The delivery of the right resources to the project is critical in ensuring that the project is delivered on time, within budget and to the right quality.

#### MORE INFORMATION

Checklists for consideration of each factor are included in **Appendix 2 – Pre-Engagement and Initiation Stage Checklists (p.34)**

## 6. Initiation Stage

This stage is to complete the Legal Agreement and to prepare for the implementation of the engagement related projects. It is at this point that the Engagement Developer will usually hand over the Engagement to one or more Project Managers for the Implementation Stage, when actual delivery takes place.

It is very important to note that any logistics risks that have not been identified and considered, will be handed over to the Project Manager who may have no ability to mitigate them. This can result in a direct impact on time, cost and quality on the project.

Further to this, when developing a budget estimate to finalise the Agreement and the PID, the supply and cost factors with logistics support must be taken into consideration. This can be done by way of a check of the market at the project location, the availability at site location, the number of suppliers available, what was the pre-conflict or disaster situation in the area, etc. to get the best estimate possible.

It is important that all the information relating to the project is handed over to the Project Manager. In particular, the information gathered about logistics must be part of this hand over. The logistical information gathered in respect of site access, modes of transport, permits, etc. might have a significant impact on the design of the infrastructure, choice of materials, construction methodology and sequencing and on-site logistical arrangements.

### EXAMPLE

If for example the PID does not address issues of cross border transport permissions then the Project Manager may be faced with significant time delays to obtain them with no recourse for extensions of time or cost variations associated with the delay.



# 7. Implementation Stage

During this stage, each of the projects are delivered, to the approved Project Plan (Baseline) developed at the start of the Implementation Stage. A significant aspect in refining and approving the Project Plan is the definition of design, procurement and associated logistics implications as these are critical for the planning of actual construction work on site.

Infrastructure projects usually contain a number of phases during implementation, each with its own associated logistical considerations. Dependant on the nature of the project, some of these may be outside the control of UNOPS, for example projects in which UNOPS are provided with full design documentation by others such as a Ministry of Roads for bridge construction. However, even in these circumstances it is essential to review and understand the logistical implications of the design solution in completion of the planning process.

An infrastructure project will generally comprise of the following activities during the implementation stage:

- **Design** – The design process is where the project concept is moved through various stages of design from the Design Brief through to full Design Documentation. At each stage of the design the level of detail progresses and the design becomes more developed. As the design develops it should be a two way process to update the logistical information and in turn for logistics to inform the design process so that the logistics expectations are aligned with the design solution. For example in some contexts the choice of construction materials and method of construction are dictated by availability of materials and practicality of getting materials delivered to site. This has a direct impact on the design decisions. The procurement requirements and effectiveness needs to be considered such as indicated in the procurement manual and guidance.
- **Construction** – This is the stage when physical construction takes place and the infrastructure asset is actually built. This is also when a Contractor will mobilise and establish on site to deliver the works. There may be considerable temporary work required to accommodate specific logistical requirements. For example in the construction of temporary warehousing or leasing of existing warehouses to enable safe storage of delivered materials or equipment ready for installation.
- **Commission and Handover** – This is the end stage of the construction cycle when the infrastructure is tested, commissioned and handed over to the end-user, owner or operator. For example the installation of school furniture in the delivery of a school. It is unlikely to be the construction contractors' work and UNOPS may need to apply significant resources to rapidly complete the installation of the furniture to enable use of the facility.
- **Demobilisation** – This is the process where the Contractor moves off the site during the Defects Notification Period. It may also signal a reduction in UNOPS presence as well which will have logistical implications. For example a decision to remove or relocate a temporary site office and storage facility.

At each of these stages logistical information plays an important role and different logistics activities are carried out to ensure the project will be delivered on time, within budget and to the agreed quality.

## 7.1 Design

During the design stage, the Project Manager should normally complete the understanding of the logistical environment of the project. All aspects of the

### CONSIDERATION

**Identifying** appropriate Incoterms taking in to account the operational challenges and nature and type of the goods to be procured and delivered.  
**Deciding** whether UNOPS has better leverage than the Contractor to procure and deliver some of key construction materials such as bitumen, reinforcement bar, geogrids , equipment, bridge parts, cement etc

operating environment that affect the logistics should be defined within or in regard to the design documents, procurement documents and any other supporting planning material. These will have an impact on the way that the construction activity is controlled and monitored. Some key questions to help identify the issues for each of the dimensions below are set out in **Appendix 3 - Implementation Stage Check Lists (p.36)**.

### 7.1.1 Supply and Inventory

UNOPS delivers infrastructure works in many different operating environments. These may include very remote areas, conflict and post-conflict areas, disaster and post-disaster areas. Equipment and materials that are usually easy to source in the developed world or in stable environments can be hard to acquire, or even impossible to get, in these contexts. The same can apply when it comes to the cost of these items. Items that are usually perceived as cheap can sometimes become very expensive due to a shortage of supplies, lack of competition in the market and the potentially very substantial cost of transport.

To support this process it is good practice to develop a product purchase classification matrix. The purchase classification matrix helps to maximise the security of supply and reduces the costs of purchasing. It classifies the project commodities, materials, equipment, etc. according to two parameters.

- **Supply risk** - Based on the information available determine the availability of the product or service required. The lower the availability of a specific product or service, the higher the risk.
- **Value impact** - this is defined by how valuable the item or service is to the project output. The more essential the item or service is to the project, quality or production, the higher the impact value.

Based on these two parameters the items, products, equipment and services can be assigned into four classifications as shown in **Figure 5: Value Impact vs Supply Risk (p.21)**. It is important to include into the supply risk parameter not only the purchasing availability risk but also the delivery risk.

### 7.1.2 Suppliers

During this stage it is important to carefully assess the market options, and process of choosing suppliers to ensure they can deliver what is required to successfully complete the project. The ability to fully define the design and materials specifications, understanding the logistic context of a particular project, especially if there are multiple individual sites for buildings or linear sites such as roads, is an important process in the design phase of a project.

A clear understanding and recognition of relevant logistics issues associated with purchasing and delivery are important strategies to reduce the risk of appointing suppliers at a later date who over promise and under deliver. A useful source of information when arriving in a new and unfamiliar environment is to examine other UN agencies supplier LTA's. The aim is to ensure that the supply contracts are realistic and achievable.

#### MORE INFORMATION

For more information, please see UNOPS Procurement Manual, Chapter 5, Sourcing.

### 7.1.3 Human Resources

Human resources are an important issue in any managerial operation. From the logistic perspective, it can be challenging trying to support UNOPS personnel and contractors for a number of reasons. Insufficient personnel resources in infrastructure projects specific to a particular project’s scope or complexity may require additional support to the site. The more qualified and experienced these workers are, the less eager they may become to work in remote and dangerous areas and the more logistics is required to support these teams.

This has multiple implications for the overall planning and design of the infrastructure asset and the associated logistics as it may require solutions such as temporary camps, security infrastructure such as armoured vehicles (and their fuel and service costs), bunkers or protective walls for life safety, food and water delivery to remote areas to keep the project team able to deliver the project outputs.

Transport and logistics related to the people employed by UNOPS, whether UNOPS personnel or contractors, must also be considered. The way in which these personnel move to and from the site as well as to and from the country needs to be addressed. Security limitations can also prevent personnel from accessing the site. In some cases the absence of a certain key person can delay the entire project. .

### 7.1.4 Communication

The methods of communication that will be used during the project, particularly in remote areas, can affect the project budget and the way in which the project is supervised and managed. This may entail use of satellite communications and mobile phone technologies that may increase the need for logistics input. For example, a team delivering health clinics in multiple remote locations may require transport, satellite phone and internet links, and HF radios for backup communication. It is important to understand these communication options in advance so they can be factored into the Project Plan.

### 7.1.5 Security and Emergency Situations

The United Nations Department of Safety and Security (UNDSS) is responsible for providing leadership, operational support and oversight of the security management system, to ensure the maximum security for personnel and eligible



Figure 5: Value Impact vs Supply Risk

dependants as well as enable the safest and most efficient conduct of the programmes and activities of the United Nations System. UNDSS is a key resource for identification of security threats and development of mitigation measures.

The security aspects of the project always need to be considered, as many UNOPS infrastructure projects are in conflict and post-conflict areas. The security situation can change rapidly and might influence the supply of materials, physical access to sites, UNDSS requirements for personnel, amongst others, that will in turn affect the project budget and schedule. As part of the PESTLE analysis the security situation should have been assessed and evaluated, including how security influences the logistics and design aspects of the project. This should, of course, be an ongoing assessment process to ensure a suitable understanding of the situation and any emerging threats throughout the project lifespan.

### 7.1.6 Health and Safety Planning

During the design stage, it is important to consider all the Health and Safety requirements associated with the project and how they will influence the logistic plan. Key considerations are:

- What equipment and supplies need to be purchased to meet the demands of the health and safety plan and how is it going to be transported?
- What is the site evacuation plan?
- Where the closest support facilities are and what are their response times? (Security unit, hospital, doctor, fire department etc.)

Key considerations can be design choice of appropriate construction materials that will have little or no HSE impact. For example, use of emulsion bitumen rather than cutback for road paving works, use of lap splice instead of welded splice for steel reinforcement bar etc.

### 7.1.7 Transportation

During the design stage the final planning of the relevant transportation activities should be completed. For example, a bridge is to be constructed with 20m long 2m high steel girders, transport can be arranged for delivery however the road access is not suitable. The design is therefore modified to suit smaller spans and on site fabrication techniques are included in the design documents rather than transportation of finished girders.

This planning process will require a review of the data collected during the initiation stage, and its re-evaluation as the design progresses. In some contexts no conventional methods of transport are available and there is a need to think outside the box. This could mean using other means of transport, for example river rafts, mules or other pack animals for essential materials deliveries. Example, Mules were used to transport a welding unit, generator, fuel and steel pipe to build handrails on a school in a very remote highland location without road access. It is critical to understand the characteristics and limitations of these unconventional methods if they are to be used.

The two main aspects of transport that are typically under-evaluated during the design stage are the physical route and its distance. If possible it is advisable to drive the route/s that is going to be used during the project. This will help identify the small issues that can sometimes be overlooked but can develop into big problems during the construction phase. For example a hairpin corner could affect load length, or significant distances without refuelling facilities may require temporary fuel storage and its associated security.

Remember to check all the relevant routes as well as back up routes. It may be

#### MORE INFORMATION

The levels included in the EOI on the Implementation of Three Levels of Requirements for Health & Safety and Social & Environmental Management ([EOD.ED.2017.03](#)) range from UNOPS minimum and mandatory H&S and S&E requirements (Level 1) to UNOPS intermediary H&S and S&E requirements (Level 2), and external certification requirements (Level 3).

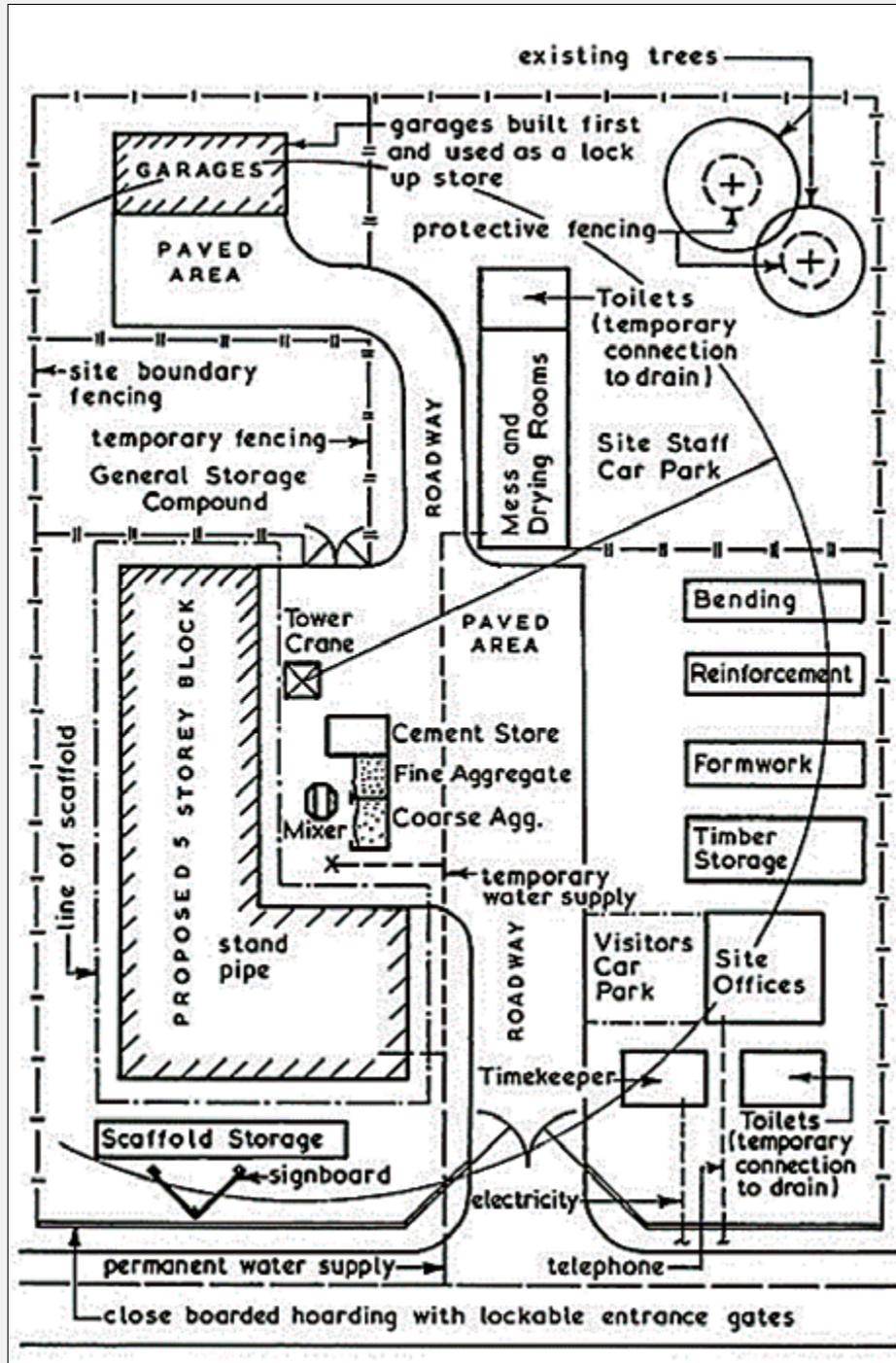


Figure 6: Example Site Layout Plan

necessary to use different routes for different shipments depending on the source and type of the shipment. Additional information regarding transportation at the procurement phase, incoterms and packaging is available in UNOPS Procurement Manual.

### **7.1.8 Regulatory environment**

This aspect relates to rules, regulations, fees, trade restrictions, licences, permits and any other issues that need to be considered for the logistics operations of the project. All of these should be understood as they may affect the proposed design solution in terms of choices and sources of materials, delivery timeframes and transport options.

## **7.2 Construction**

The construction process is a key phase in the Implementation Stage. It follows the design process and it enables the actual delivery of the project. In the construction phase, there are more considerations related to short-term planning and practical logistics decisions on the site. On some projects UNOPS will have a Contractor implementing the works and on others UNOPS itself will be responsible for the construction. In both cases, there is a need for supervision and continuous management to keep the project on track.

### **7.2.1 Operating Environment and Site Planning**

Site layout plans should be prepared by Contractors as part of their mobilisation activities before work on site commences. They are a crucial part of construction management, as sites can be very complex places involving the co-ordination and movement of large quantities of materials as well as high-value products, plant and people.

Effectively and accurately laying out a site can help ensure that the works are undertaken efficiently and safely. Careful sizing and positioning of temporary facilities can help reduce travel times, congestion, waiting times and double or even triple handling of materials on the site. A typical site layout plan is shown in **Figure 6: Example Site Layout Plan (p.23)**.

Site layout planning involves four basic processes:

- a. Identifying the site facilities that will be required.
- b. Determining the sizes, and other constraints of those facilities.
- c. Establishing the inter-relationships between the facilities.
- d. Optimising the layout of the facilities on the site.

Problems caused by poor site layout planning can include:

- Inappropriate storage which can result in damage to products and materials.
- Poor siting of plant.
- Poor siting of welfare facilities.
- Inadequate space provision.
- Unsatisfactory access.
- Security and safety issues.
- Poor wayfinding (due to complex layouts or inadequate signage).
- Delays and increased costs.

As sites will change in nature during the course of the works, there may be a number of different site layout plans for different phases, and there may be more detailed plans showing particularly complex areas or sequences or describing specific functions.

Examples include a crane space required for lifting that stops vehicular access to a storage area resulting in manhandling and double handling of materials to get them into the storage area. Personnel welfare facilities at the back of a site making access and supplies/servicing difficult. A generator set fuel tank location that is not vehicular accessible for refilling.

Whenever possible, it is always better to have a “keyhole” turning space suitable for trucks within a site so there is no need to make a lot of small manoeuvres in the compound with trucks in order to turn around. Very tight manoeuvres can damage and increase issues with temporary surfaces, especially in wet conditions.

Assigning areas for specific functions in a logical sequential manner layout can save time later during construction, by minimizing travel distances and improving efficiency of movement around the site. The objective is to arrange the different areas on site in a way that the functions that communicate and depend more on one another are closer together such as storage area and unloading/ delivery areas.

The other element to consider is potential conflict between pedestrian and vehicular paths that may increase the safety risks. This is particularly important on work sites that have to maintain access for public use. These may require additional protective measures such as hoardings, fences, signage and temporary paths. These aspects should all be considered in the site layout plan due to their logistics implications.

## **7.2.2 Transportation**

During the construction phase, the project transportation practices must be aligned with a defined transportation plan where possible. It is important to monitor and control the delivery schedule, vehicle location, fuel consumption and route condition so that adjustments can be made if needed. It is essential to be as prepared as possible before dispatching any shipments.

Challenging locations with access difficulties can amplify issues that were first considered irrelevant. This is especially important if there is a requirement for use of convoys for movement of materials. During transit small issues can mean the difference between a disaster and success. This should include having an experienced and responsible driver leading the convoy with effective briefing, monitoring and control routines established. It could also mean how the shipments are loaded by splitting the shipment into “hot & cold” in order to prevent unwanted spread of fire or preparing vehicle loads by offload sequence.

When using rural roads it is important to consider the weight, structure and capabilities of the vehicles used for transport. This could affect the vehicles ability to cross small bridges, navigate bends and narrow sections of road. If a vehicle gets stuck or even overturns, how easy will it be to provide assistance and recover the vehicle and the load? Or even to continue past the disabled vehicle?

It is important to not only think about the route and issues that may affect the movement along the route, but to also understand the activities required at the destination. It is critical to know how the vehicles will enter the site, how they will move around the site and if the capability exists to unload and handle the goods on site.

Learning from one shipment to the next is an easy and helpful action to do to avoid repeating the same or similar mistakes during the life of the project. It can also be helpful in planning the frequency and timing of shipments to coincide with the most favourable times and conditions such as early morning or during dry periods.

### 7.2.3 Supply and Inventory

From a logistics point of view, only three things can happen to supplies in a pipeline—they can be stored, moved (in transit), or consumed (used). The Project Manager needs to monitor products at all times in the pipeline, so three types of logistics records are required to track the products. Each record type has a distinct form and use.

- Stock keeping records. Holds information about products in storage.
- Transaction records. Holds information about products being moved.
- Consumption records. Holds information about products being consumed or used.

The inventory and supply strategy chosen for the project will influence the procurement strategy. Firstly the levels and amount of inventory stored on site needs to be determined. The most common form of inventory is Just-in-time (JIT) inventory which refers to an inventory management system where inventory is readily available to meet demand, but not to a point of excess where extra products have to be stockpiled and stored. In the UNOPS context, particularly for remote sites or those in insecure areas, this approach may not be appropriate due to uncertainty of supply as and when required. In these instances some material needs to be stored to cover the maximum duration of days delay at the expected consumption rate per day.

Once the inventory level required for each product is known, it will be possible to plan the supply strategy. This will determine how the inventory is going to be spread across the supply chain. It will cover the issues of frequency of deliveries, and the quantities of products ordered each time, in order to fulfil the inventory level requirements.

This information can assist with procurements and requisition, by providing the following information

- The quantity to be procured,
- Required delivery date or start-up/completion date
- Delivery location or location of works/services to be performed
- Estimated price
- Any additional information.

For more information on the procurements strategy, refer to Chapter 4 of the UNOPS Procurement Manual.

During the construction stage, supply needs to be controlled, making sure the status of all the shipments and goods related to the project are known. Developing and implementing a system that enables a good overview of all the resource logistics across the supply chain, will help highlight if and when there is a problem of inventory levels or delays with any of the shipments. This will enable the Project Manager or responsible person to extract the right information, identify the consequences of the problem and make adjustments to minimise its effect on the project.

Updating and reporting on the logistics status should be done regularly, most probably on a weekly basis, and in the case of critical supplies, even more often. Any new information available, whether it is an update email from the contractor or suppliers or an online GPS tracking system, has to be compared to the project plan, its effect on the plan evaluated and the necessary decisions on remediation steps taken if required.

Another procedure facilitating more control is the action of receiving and assigning supplies. A shipment, received or handed over, should be processed through a conformation and verification system to ensure that it meets the required standards and specifications. This system should help reduce shipments mistakes and errors, either accidental or deliberate. Common errors could be:

- Incorrect number of items.
- Damaged products.
- In correct packaging or labelling.
- Poorer quality than promised.
- Product substitution.
- Different products characteristics changes such as colour, size etc.

Making sure what was paid for is actually received is not always an easy task. Some of the methods to overcome these errors could be.

- Thoroughly check the paper work, shipping certificate, receipt etc.
- Checking quality control certificates where applicable, such as steel or concrete deliveries.
- Counting the shipment before accepting.
- Make the payment only after confirming the entire contract has been fulfilled.
- Use of seals, locks and closures.
- Remove a sample before and after a shipment and compare them to confirm the quality.
- Escort the shipment.

#### **7.2.4 Human Resources**

As the project construction starts it is important to ensure that sufficient logistics resources and an adequate workforce is available so that the project can be delivered according to plan without excessively over working the logistics personnel.

#### **7.2.5 Communication Lines**

During the construction phase there needs to be a focus on the quality and consistency of the information flow in the supply chain. The communication processes must ensure that the Project Manager gets the right information as soon as possible in order to effectively control the project logistics activities. This way the Project Manager can plan ahead in anticipation of the changes instead of managing by crisis and being surprised by events.

#### **7.2.6 Security and Emergency Situations**

During the construction phase compliance with health & safety requirements especially in the event of an emergency can have a significant impact on the project logistics plan. Emergency situations can develop slowly providing sufficient lead time for alternative planning scenarios to be considered, however, in some of UNOPS more conflict affected operating environments an emergency may occur with little warning.

The Project Manager needs to be prepared and understand the relationship between such an event and the construction activities, transport activities, storage methods, etc. For example using the same route for both emergency evacuation and incoming shipments, might make it difficult to use the route in an emergency situation because of traffic. There may need to be temporary bunkers with provision for food and water maintained on construction sites for use in emergency situations. It is good practice to have pre-planned options available to address possible impacts and reduce lost time in the event of an emergency situation. These risk mitigation plans should be incorporated in the project risk register and be discussed with project and logistics personnel.

## 7.3 Commissioning and Handover

The commission and handover activities are the final phase in the Implementation Stage of the contract delivery when the outputs are tested, activated and handed over to the client or end-users. Logistics planning might need the transport of specific testing equipment and personnel to the site for a limited duration to ensure that the outputs are operational and compliant with all specifications. Any delay in this process has a direct impact on the ability to handover the works. This may have further financial implications for UNOPS if there are performance dates agreed in the Legal Agreement.

It is important to communicate and agree testing and commission plans and demobilisation activities with the end-users or owners with a clear recognition of what activities this may require prior to Handover. An example is the end user who wants to use a building immediately and their plan to install furniture and equipment may be delayed due to logistic delays for testing equipment prior to official Handover.

### 7.3.1 Demobilisation

In essence, demobilisation is the reverse of mobilisation. Demobilisation includes all activities and costs for transporting personnel, equipment, and materials not required or included in the contract from the site; including the disassembly, removal, and site clean-up of offices, buildings, and other facilities assembled on the site specifically for delivery of the project. The general principal is that the site must be handed back in a condition that it can be safely occupied and used and in similar condition to which it was originally handed over.

There may also be specific environmental issues or permit requirements to be considered during this process. This may affect logistics planning due to decontamination or hygiene processes requiring time or specialised treatment. Examples could be mud removal to avoid transfer of biological agents, remediation of temporary settling ponds.

In some cases, the contract will require specific items of plant, equipment or materials to be handed over to the client or end-user at the end of construction. These items need to be clearly identified and documented at the time of Handover.

### 7.3.2 Defects Notification Period

The Defects Notification Period is the time period usually included in the Works Contract (normally 12 months) during which the Contractor is responsible to repair or remedy any defects as a result of workmanship related to the Contract. This may require logistics operations to mobilise resources and materials to the site to carry out any quality assurance on the Contractors works to remedy defects.

Note that when a Direct Implementation modality is used by UNOPS, there is no Works Contract and consequently UNOPS may be directly responsible for any rectification activity. This may have considerably more logistics implications depending on the Legal Agreement and the nature of the works completed. A provision for potential logistics associated with this should be considered in the Agreement.

## **8. Closure Stage**

In this stage the Engagement is operationally and financially closed.

During this stage, all projects will be closed in a timely and professional manner. All documentation and finances related to the project should be finalised and completed. This will include all documents relating to project logistics.



# **Annexes**

## Appendix 1 – Opportunity Stage Checklists and Considerations

PROJECT DETAILS	
Type of Project	<ul style="list-style-type: none"> <li>• What will be delivered? (Building, road, bridge)</li> <li>• Who will design it? (UNOPS, Client/Donor, 3rd Party)</li> <li>• How will it be constructed? (pre-fabricated, built on site)</li> <li>• Who will construct it? (UNOPS, Sub-contractor)</li> <li>• What is UNOPS role on the project? (Contractor, Construction Manager, Quality control)</li> </ul>
Budget	<ul style="list-style-type: none"> <li>• What is the project budget?</li> <li>• How has the budget been developed? (Pre-feasibility estimate, unit rates, benchmarking)</li> <li>• Is there a contingency in the budget?</li> </ul>
Time	<ul style="list-style-type: none"> <li>• What is the project time-frame?</li> <li>• What is the possible start date and required end-date?</li> <li>• What are the time constraints or time drivers on the project? (donor/clients financial year end, government expectation, community need)</li> </ul>
Quality	<ul style="list-style-type: none"> <li>• To what standards does the project have to be delivered?</li> <li>• Are there any preferences for choice of materials?</li> <li>• Are there any preferences for type of construction?</li> </ul>
SITE DETAILS	
Physical location of the site	<ul style="list-style-type: none"> <li>• Is there an accurate site location or does the location still have to be identified/determined?</li> <li>• Do we have any maps or drawings showing the site location or possible site location/s?</li> <li>• Who will make the final decision on the site location?</li> <li>• Are there multiple site locations?</li> <li>• Are the sites close together or dispersed over a wide area?</li> <li>• Is it located within an urban, peri-urban, rural or remote area?</li> </ul>
Access to the site	<ul style="list-style-type: none"> <li>• How is it possible to access the site?</li> <li>• What modes of transport are available to access the site? (air, rail, road, water, foot)</li> <li>• Are there any constraints to accessing the site? (Permits, permissions, security issues, geographical constraints)?</li> <li>• Is the site accessible all year round?</li> <li>• How long does it take to get to the site from the nearest transport node/hub?</li> </ul>
Land Legal	<ul style="list-style-type: none"> <li>• Does the Client/Donor or end-user have legal right to access the site?</li> <li>• Are any legal approvals/rights needed to occupy the site?</li> <li>• Is the site subject to land tenure (ownership) disputes?</li> <li>• Is the site subject to traditional forms of ownership or occupancy?</li> </ul>

TRANSPORTATION CONSIDERATIONS		ADVANTAGES	DISADVANTAGES
Road transportation	Is the most commonly used method of transport. It is flexible, relatively fast and has a good balance between cost, speed and reliability of delivery. Nevertheless it is not always fastest or the cheapest option of transport	<ul style="list-style-type: none"> <li>• Very High flexibility.</li> <li>• Relative high-speed delivery.</li> <li>• Low likelihood for damages to occur</li> <li>• Low handling and packaging cost.</li> </ul>	<ul style="list-style-type: none"> <li>• Not the fastest speed delivery.</li> <li>• Not the cheapest.</li> <li>• Inefficient when not operating in full load capacity</li> </ul>
Sea/Water transportation	Is ideal for materials with a heavy weight to value ratio such as bulky items, equipment, generators, etc. it is a low-speed delivery method but at the same time one of the cheaper transport options. This mode of transport is generally widely available and can fit most types of cargo	<ul style="list-style-type: none"> <li>• Very cost-effective for high weight to value ratio as Bulky items, equipment, generators, etc.</li> <li>• Fit most type of cargo.</li> <li>• High availability</li> </ul>	<ul style="list-style-type: none"> <li>• Limited locations.</li> <li>• Low reliability.</li> <li>• Low-speed delivery.</li> <li>• High handling needed</li> <li>• Damage &amp; Delay to cargo can occur often</li> </ul>
Air transport	Is considered as the opposite of water transport. It is ideal for materials with low weight value ratio such as very expensive electronic equipment. It is a fast and flexible mode of transport but at the same time expensive	<ul style="list-style-type: none"> <li>• The fastest mode of transport.</li> <li>• Very flexible.</li> <li>• Good for low weight to value items as electronic parts.</li> <li>• Safe method of transport.</li> </ul>	<ul style="list-style-type: none"> <li>• The most expensive mode of transport.</li> <li>• Security limitations</li> </ul>
Rail	Is similar to water transport and is used for bulky items and high weight to value ratio of the material. In many contexts it is a little more flexible than other modes of transport.	<ul style="list-style-type: none"> <li>• Very cost-effective for high weight to value ratio as Bulky items, equipment, generators, etc.</li> <li>• Easy to link with other transport methods</li> </ul>	<ul style="list-style-type: none"> <li>• Limited location.</li> <li>• Damage to cargo can occur.</li> <li>• High handling needed.</li> <li>• Low speed</li> </ul>
CONSIGNMENT CONSIDERATIONS			
Routing and transit	There may be compelling reasons to use routes that will limit transit options. These need to be understood and how they may affect the project.		
Distance	The overall distance to be covered as well as the length of each section of the logistics route can influence the cost, the resources needed and mode of transport. The route can include long distances with no logistic support along the way such as fuel stations, shops or urban areas. Such circumstances could raise questions regarding the very feasibility of such a logistics operation.		
Type of cargo	In addition to the physical nature of the product, some products can also come in specific shapes or packages that can impact on how the cargo is handled and if any specialist equipment is needed to move or protect the cargo.		
Quantity	This can have a big influence considering the cost effectiveness of full or part load in the transport of goods. Making the adjustments of quantity efficiently may be challenging as quantity can have impacts on the supply change from production/sourcing to final storage and use.		

## Appendix 2 – Pre-Engagement and Initiation Stage Checklists

TRANSPORTATION DETAILS	
	• How long does it take to make each shipment and how will it affect the time-frame of the project?
	• What are the expected transportation related costs?
	• What are the general transport risks in this project?
	• What methods of transport are going to be used? road, air, sea, or rail?
	• What other modes of transport (this could include animals) can be used?
	• Should the shipments be UN based or by a third party company?
OPERATIONAL DETAILS	
Country Transport Infrastructure	<ul style="list-style-type: none"> <li>• What Transport infrastructure support is available in the country?</li> <li>• What is the condition and functionality of the available transport infrastructure?</li> </ul>
Trade barriers	<ul style="list-style-type: none"> <li>• What are the customs requirements related to the goods being transported?</li> <li>• Are there any additional payments to be charged for a certain transport mode?</li> <li>• Do any charges make it uneconomical to use a mode of transport for a project?</li> </ul>
Export and licenses	<ul style="list-style-type: none"> <li>• Are any licenses required to transport the goods or materials?</li> <li>• Are there any restrictions on the quantity or volume that it is permissible to ship?</li> <li>• Will any changes in shipment size influence the transport cost and service efficiency?</li> </ul>
Legal	<ul style="list-style-type: none"> <li>• What are the legal restrictions and regulations regarding transport, environment, health and safety?</li> <li>• Are there any additional costs such as different packaging requirements regarding the materials being transported?</li> </ul>
Services and economic elements	<ul style="list-style-type: none"> <li>• Are there any exchange rates and currency fluctuations that could make significant unexpected differences in costs associated with transport?</li> </ul>
Climate conditions	<ul style="list-style-type: none"> <li>• What weather related factors could influence the considerations of the method of transport directly or indirectly? <ul style="list-style-type: none"> <li>- Indirectly: Such as weather effects on the road route to the destination, forcing suppliers to use an alternative route or method of transport.</li> <li>- Directly: Such as a hot climate requires suppliers to use a cooled supply chain for certain products</li> </ul> </li> </ul>
Physical nature of the product	<ul style="list-style-type: none"> <li>• What are the characteristics of the product such as volume to weight ratio or value to weight ratio that could influence the cost of a shipment due to different charging methods?</li> <li>• Are there any special product characteristics such as hazard materials, time constraints, temperature, security etc that will impact on its transportation?</li> </ul>
Supply locations	<ul style="list-style-type: none"> <li>• How will the location of the raw material influence the preferred method of transport?</li> <li>• What transport infrastructure is located close to the supply/ storage facility?</li> </ul>
Supply philosophy	<ul style="list-style-type: none"> <li>• How does the inventory level choice impact on the size of a shipment?</li> <li>• How do the usage characteristics affect timing of shipments?</li> </ul>

CONSIGNMENT DETAILS	
Road Usage and Purpose	<ul style="list-style-type: none"> <li>• Who normally uses this road?</li> <li>• Is there any traffic we need to be aware of?</li> <li>• Are there any checkpoints or barriers on the way?</li> </ul>
Road Condition and Size	<ul style="list-style-type: none"> <li>• What are the widths, weight, speed, height limits of the road and will it accommodate the vehicles?</li> <li>• Can the return journey be made the same way?</li> <li>• Are there any physical issues that can slow or stop its use?</li> <li>• What is the road made of and what is the surface material?</li> </ul>
Emergency and Support	<ul style="list-style-type: none"> <li>• What support or security support units are needed to use this road?</li> <li>• Is it possible to stop for an emergency event without blocking the route?</li> <li>• What are the options of evacuation or rescue from this route?</li> <li>• What is the security level along the route and what does it entail?</li> </ul>
Bridges	<ul style="list-style-type: none"> <li>• What is the condition of the bridge?</li> <li>• Is it possible to cross safely with the weight of the intended loads?</li> <li>• Does the load need to be split or change the weight distribution to cross safely?</li> </ul>
Distance & Refuelling Points	<ul style="list-style-type: none"> <li>• What is the distance to be covered?</li> <li>• What is the impact on vehicles and drivers?</li> <li>• Are there refuelling or rest facilities?</li> <li>• Is there a need to carry extra fuel?</li> <li>• Is there a need to establish a temporary refuelling and rest point?</li> <li>• What are the needs of a temporary refuelling point In terms of cost, security, people etc.?</li> </ul>

## Appendix 3 - Implementation Stage Check Lists

### Design Planning Considerations

KEY QUESTIONS	EXAMPLES
What technologies are available and how do they influence the materials and equipment we can use?	Technologies such as Satellite Imagery Data for site planning and project design, drones to monitor the progress of the project and 3D printing to produce spare parts instantly, may be helpful in some projects. Unfortunately, these technologies can be difficult to find, maintain or operate in some operating environments.
Which resources are available on site and to what extent?	Access to potable water, electricity and cellular reception can vary in quality and quantity. If there is limited water available on site, it might be sufficient for accommodations and other relatively minor uses but not enough for mixing concrete or laying roads.
What temporary works should be done on site?	Typically, temporary works are needed on site before the main construction work starts. These works take time and resources; therefore, they must be considered when planning the implementation of the project.
What are the expected weather conditions and how will they influence the construction?	If construction is expected during the rainy season, this may heavily influence logistics and movement of vehicles. This could include protection over the work area, temporary design measures to prevent vehicles getting stuck in the mud and protection against flooding or landslides.
Investigations and surveys of the site?	Many projects will require topographical and geotechnical surveys as key inputs into the design process. They are usually prepared early in the project design and can provide useful information for logistical planning on the site. Site services survey should also be undertaken to assess the presence of services that could affect site logistics. For example, overhead power lines can restrict the use of lifting equipment.

### Supply Considerations

SUPPLY AND INVENTORY	
Suppliers	<ul style="list-style-type: none"> <li>• Are contracts in place with approved suppliers?</li> <li>• Have suppliers been given a delivery or supply schedule?</li> <li>• Have lead times between order and delivery been agreed with suppliers?</li> <li>• Have insurances been agreed with suppliers – at which point does UNOPS accept responsibility for the goods?</li> <li>• What mechanisms exist to replace defective or non-compliant goods?</li> <li>• Can UNOPS meet suppliers requirements in terms of installation and use of materials or goods so as not to void any warranties?</li> <li>• Are any special installation techniques required that have to be done by suppliers?</li> </ul>
Logistics personnel	<ul style="list-style-type: none"> <li>• How many workers are available for any manual handling requirements?</li> <li>• Do applicants / employees have sufficient experience in infrastructure projects and of the particular project's scope or complexity?</li> <li>• Are qualified workers prepared to work in remote and dangerous areas?</li> <li>• Have they previously worked with the materials and equipment planned for use on the project?</li> </ul>
Communication	<ul style="list-style-type: none"> <li>• Is there any cellular reception or is there a need for a satellite phone?</li> <li>• Is internet connectivity available or is it to be provided?</li> <li>• How will the site communicate with other offices, contractors, suppliers, HQ and regional office?</li> <li>• Are there any other adjacent UN agencies or organizations we need to communicate with?</li> </ul>
Security and Emergency Situations	<ul style="list-style-type: none"> <li>• Is there an official security level and requirements?</li> <li>• Is it a conflict area or post-disaster area?</li> <li>• Is the area stable? How long has it been stable? What is the history of stability?</li> <li>• Are there any fly restrictions limiting aircraft movements?</li> <li>• Is there a curfew time enforced in the area?</li> <li>• Are there any other UN agencies or peacekeeping forces operating in the area?</li> <li>• Are evacuation vehicles available?</li> </ul>

## Supply Considerations

SUPPLY AND INVENTORY	
Operational	<ul style="list-style-type: none"> <li>• Are there any local permits or limitations that affect the logistics?</li> <li>• How are the shipments packed?</li> <li>• What equipment is needed to handle the materials/shipment?</li> <li>• How will it be loaded and unloaded?</li> <li>• Are there any seasonal conditions?</li> </ul>
Consumption rates	<ul style="list-style-type: none"> <li>• What will be the itemized consumption rate throughout the project?</li> <li>• Ratio of supplies to be used for accommodations and utilities?</li> <li>• What is the relationship between the consumption rate and the lead time?</li> <li>• Scheduled maintenance for machinery or gear replacement?</li> </ul>
Safety stock.	<ul style="list-style-type: none"> <li>• What level of safety stock is required for each item?</li> <li>• Is it necessary to use a replaceable safety stock level to be able to cope with different seasonal risks?</li> </ul>
The expiration date and shelf life of the products.	<ul style="list-style-type: none"> <li>• What is the shelf life of the product?</li> <li>• Is there a need for special storage conditions?</li> <li>• Do the goods have an expiration date?</li> </ul>
Market condition and prices.	<ul style="list-style-type: none"> <li>• When are the preferred times to purchase?</li> <li>• Where are the preferred locations to purchase?</li> <li>• Are there any seasonal prices or availability for the products?</li> <li>• Is the market reliable, assuring the quantities needed are available?</li> </ul>
Storage cost and capability	<ul style="list-style-type: none"> <li>• What are the storage costs?</li> <li>• How much storage space is available?</li> <li>• What are the security and weather protection requirements, for the materials?</li> <li>• Can the materials be protected?</li> <li>• Are there any security requirements for the product?</li> </ul>
SUPPLY STRATEGY	
The lead time of the product	<ul style="list-style-type: none"> <li>• What is the total lead-time for delivery of the products?</li> <li>• Where in the supply chain can inventory be stored?</li> <li>• What does the flow of materials look like in the supply chain and how much time is required for each part of the chain?</li> </ul>
The size of the orders	<ul style="list-style-type: none"> <li>• Can full loads be ordered?</li> <li>• What is the most economical size to order?</li> </ul>
Delivery risks along the supply chain	<ul style="list-style-type: none"> <li>• What are the transport risks and how will they affect the number of orders and preferred shipments ?</li> <li>• Are there any risks that could cause delivery delays?</li> </ul>
Consistency of supply	<ul style="list-style-type: none"> <li>• How consistent and predictable is the supply line?</li> <li>• Is it necessary to stock up before the rainy season?</li> <li>• Is it necessary to stock up to assure any key products?</li> </ul>
Transport	<ul style="list-style-type: none"> <li>• Do all the shipments come via the same route, location and origin?</li> <li>• How much time is needed for transportation, loading and unloading?</li> <li>• Has consideration been given to the return journey?</li> <li>• What kinds of escorts or support vehicles are needed?</li> <li>• Have there been any changes in the route's physical condition between planning the shipment and when it actually occurs?</li> </ul>

## Site Planning Considerations

SITE PLANNING CONSIDERATIONS	
Site Facilities for personnel	<ul style="list-style-type: none"> <li>• What site facilities are required?</li> <li>• Is the site large enough for the facilities?</li> <li>• Are toilet and wash facilities required?</li> <li>• Are cooking and eating facilities required?</li> <li>• Are security facilities required?</li> </ul>
Site Layout Plan	<p>Has a site layout plan been prepared?</p> <ul style="list-style-type: none"> <li>• Does the plan show all the locations of the required facilities such as : <ul style="list-style-type: none"> <li>- Zones for particular activities.</li> <li>- Cranes (including radii and capacities).</li> <li>- Site offices.</li> <li>- Welfare facilities.</li> <li>- Off-loading, temporary storage and storage areas.</li> <li>- Sub-contractor facilities.</li> <li>- Car parking.</li> <li>- Emergency routes and muster points.</li> <li>- Access, entrances, security and access controls, temporary roads and separate pedestrian routes.</li> <li>- Vehicle wheel washing facilities.</li> <li>- Waste management and recycling areas.</li> <li>- Site hoardings and existing boundaries.</li> <li>- Protection for trees, existing buildings, neighbouring buildings etc.</li> <li>- Signage.</li> <li>- Temporary services (including; electrical power, lighting, water distribution, drainage, information and communications technology, site security systems etc)</li> <li>- Any test or fabrication facilities.</li> </ul> </li> </ul>
Environmental	<ul style="list-style-type: none"> <li>• How will waste disposal be dealt with on the site? Solid waste, liquid waste, spills etc and the logistics implications?</li> <li>• What environmental controls are required and how will they impact on the logistics?</li> </ul>
Storage	<ul style="list-style-type: none"> <li>• The amount and types of material to be stored?</li> <li>• What are the security and weather protection requirements?</li> <li>• How will materials be moved around the site?</li> <li>• Where and how will unloading and uploading of materials and goods take place?</li> <li>• Allocation of adequate areas for storing materials and allocating adequate working space around storage areas as required?</li> <li>• Siting of storage areas to reduce double handling to a minimum without impeding the general site circulation and/or works in progress?</li> </ul>
Accommodation	<ul style="list-style-type: none"> <li>• The number and type of site staff anticipated?</li> <li>• Size and select units of accommodation in compliance with relevant Health and Safety requirements?</li> <li>• Siting for offices to give easy and quick access for visitors but at the same time giving a reasonable view of the site?</li> <li>• Siting to reduce walking time to a minimum without impeding the general site circulation and/or works in progress?</li> </ul>
Temporary Services	<ul style="list-style-type: none"> <li>• What, when and where are they required?</li> <li>• What is the possibility of having permanent services installed at an early stage and making temporary connections for site use during the construction period?</li> </ul>
Plant	<ul style="list-style-type: none"> <li>• How many trucks or vehicles can occupy the site simultaneously?</li> <li>• What plant, when and where is it required? Is it static or mobile plant? If static select the most appropriate position and provide any necessary hard standing, if mobile check on circulation routes for optimum efficiency and suitability,</li> <li>• Provide space and hard standing for on-site plant maintenance if required</li> </ul>

SITE PLANNING CONSIDERATIONS	
Fencing and Hoarding	<ul style="list-style-type: none"> <li>• What is mandatory and what is desirable?</li> <li>• What security measures are required for the site and how do they affect the site layout?</li> <li>• Is local vandalism or theft an issue?</li> <li>• What type or types of fence and/or hoarding is required?</li> <li>• Is there the possibility of using fencing which is part of the final output by erecting this at an early stage in the contract?</li> <li>• Where are the site access and egress points?</li> <li>• How will site access and egress be controlled during and after working hours?</li> </ul>
Site Clearance	
Contaminated areas	<ul style="list-style-type: none"> <li>• Where ground has been contaminated with unwanted material, is there sufficient logistics capacity to remediate the situation?</li> <li>• Are there any specific processes required for decontamination of plant and equipment before removal from site?</li> </ul>
Disconnection of services	<ul style="list-style-type: none"> <li>• Have arrangements been made for transfer of services and connections to the end-user/owner where applicable?</li> <li>• Have all temporary services been removed?</li> </ul>
Removal of site fencing/ barriers	<ul style="list-style-type: none"> <li>• Before removing any fencing it must be established if the fence is required to be left in place until the end of the maintenance period or is part of the works to be handed over?</li> <li>• If fencing is to be removed, have all post holes etc. been filled in with specified materials and all the fencing removed off site?</li> </ul>
Removal of Signs	<ul style="list-style-type: none"> <li>• Have all advance warning signs and other signs unless agreed with the end-user/owner, been removed from site together with contract sign boards etc?</li> </ul>





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