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*Original Article*

# Strategic Transportation Planning: Co-Site Planning at Coolwood SA Company

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## ABSTRACT

This technical report presents a meticulous exploration of the site planning endeavours undertaken by CoolWood SA, a distinguished entity in wood furniture production, as it endeavours to relocate its operations to Hasselt, Belgium. With over 15 years of industry expertise, CoolWood SA seeks to optimize spatial utilization and operational efficiency through strategic site planning. The report delves into the intricacies of site location, area adjustment, department allocation, external flow access to the warehouse, and current road infrastructure analysis. Utilizing a multifaceted approach, CoolWood SA collaborated with Afro International Transport Planning Consultants to employ various software tools and adhere to international standards throughout the planning process. Key findings include detailed area adjustments, department allocations aimed at enhancing operational efficiency, and analyses of internal circulation, parking requirements, and external traffic movement. Notable measures such as prioritizing employee safety, accommodating diverse transportation modes, and promoting cleanliness and hygiene within the facility are meticulously outlined. The report concludes with insights gleaned from sight distance analyses, swept analysis simulations, and overarching recommendations for CoolWood SA to elevate safety standards and facilitate industry growth. By implementing the proposed strategies and measures, CoolWood SA stands poised to navigate its relocation journey with precision and foresight.

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## INTRODUCTION

CoolWood SA, a distinguished middle-sized private enterprise boasting over 15 years of industry experience, stands as a beacon in the realm of wood furniture production. Specializing in the design, manufacture, and marketing of high-quality furniture crafted from both hardwood and softwood, CoolWood SA offers a diverse portfolio comprising over 300 models across four distinct lines: Living Room, Dining Room, Office, and Bedroom. With a steadfast commitment to excellence, CoolWood SA embarked on a pivotal journey – relocating its operations. The primary aim is to meticulously craft a site plan that not only maximizes spatial utilization but also amplifies operational efficiency (Cordeau et al.,2021). This endeavor represents a strategic leap forward, driven by a vision to optimize resources and elevate productivity.

Scope: This technical report serves as a comprehensive exploration into the intricate nuances of site planning, focusing exclusively on the technical facets of the process. Herein lies an in-depth examination of the myriad considerations and factors that underpin effective site planning strategies (Cordeau et al.,2021). While financial elements and peripheral components remain outside the purview of this report, the ensuing analysis promises a thorough dissection of the technical intricacies involved.

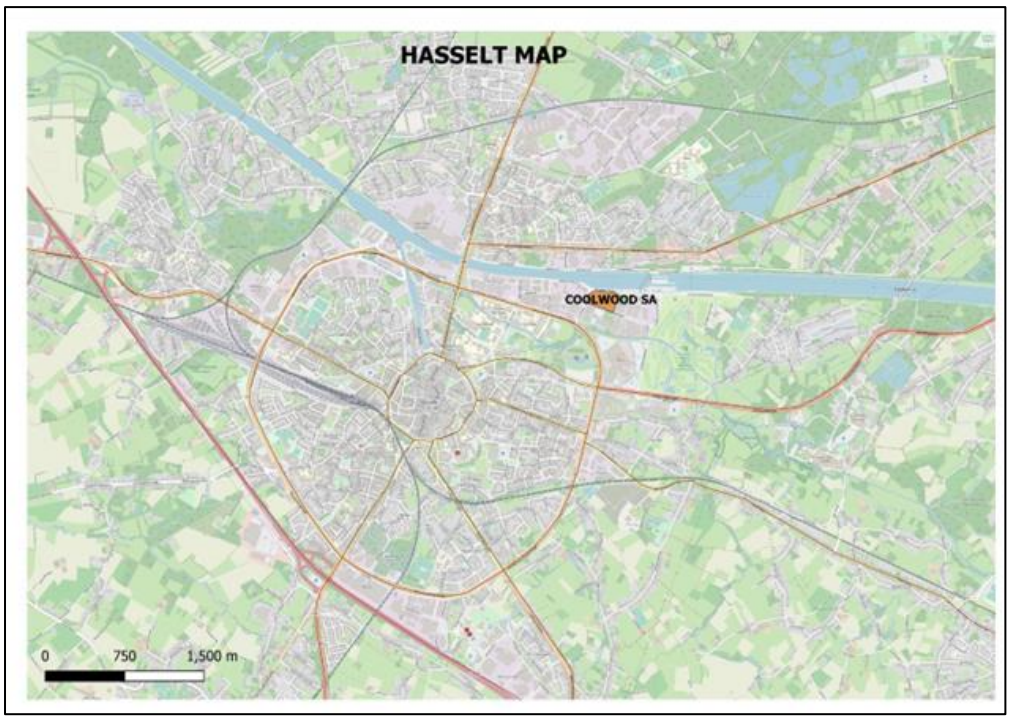
Task Allocation: Undertaking the intricate art of site planning demands a multifaceted skill set – from adept software utilization to analytical prowess, innovative ideation, and the foresight to devise enduring solutions. Within these pages, the culmination of such expertise unfolds, courtesy of Afro International Transport Planning Consultants. Through their collaborative efforts, this report elucidates the technical intricacies of site planning, offering invaluable insights to guide CoolWood SA on its transformative journey.

## SITE LOCATION

### Site Description

Hasselt is a municipality in the Belgian province of Limburg that offers a favourable environment for various industries. It is particularly well-suited for retail, hospitality, tourism, leisure, creative industries, logistics, transportation, and research and development sectors; Hasselt provides a conducive setting for businesses to thrive and succeed.

**Figure 1: Aerial Google maps of the company proposed relocation site**



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### Area Adjustment

To overcome the challenges of limited space, the study developed a solution that involves optimizing land utilization and making necessary adjustments (Sakai et al.,2020). The details of these adjustments, tailored to meet the client's requirements, are meticulously outlined in *Table 1*

**Table 1: Area Adjustment**

| No | Use Type | Use coef (%) | Surface | Adjusted land (%) | Deduction | Allocated |
|---|---|---|---|---|---|---|
| 1 | Offices | 4.8 | 980 | 6 | 7 | 973 |
| 2 | Processing | 14.0 | 2859 | 17 | 22 | 2837 |
| 3 | Assembly | 6.0 | 1225 | 7 | 9 | 1216 |
| 4 | Finishing | 4.0 | 817 | 5 | 6 | 811 |
| 5 | Stockage finished project | 7.0 | 1430 | 9 | 11 | 1419 |
| 6 | Raw processing area | 12.0 | 2451 | 15 | 19 | 2432 |
| 7 | Stockage raw material | 14.0 | 2860 | 17 | 22 | 2838 |
| 8 | Stockage external component | 5.0 | 1021 | 6 | 8 | 1013 |
| 9 | Exhibition building store | 10.0 | 2043 | 12 | 16 | 2027 |
| 10 | Exhibition building collection area | 3.0 | 613 | 4 | 5 | 608 |
| 11 | Restaurant | 2.5 | | 3 | 4 | 507 |
| | Total | 82.3 | 16,810 | | | |
| | Total Area on the ground | | 16682 | | | |
| | Difference | | 128 | | | |

### Department Allocation

The goal of department allocation was to enhance operational efficiency and productivity by creating functional and efficient workspaces (Charrua-Santos, 2019). This involved organizing departments based on functionality, employee needs, and material flow. By strategically grouping departments and utilizing a matrix to prioritize their interdependence and movement, the aim was to optimize operations and increase overall efficiency (Miller,2020). Detailed information on the prioritization of departments can be found in *Figure 2*.

**Figure 2: Department prioritization by importance and frequency in space usage needs**

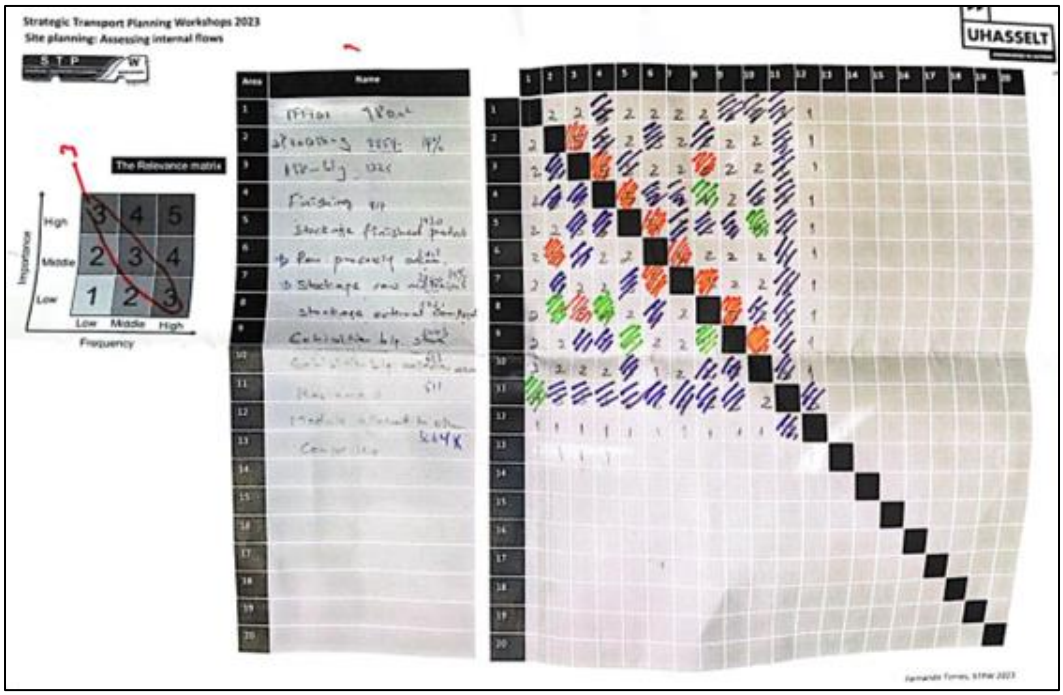


 

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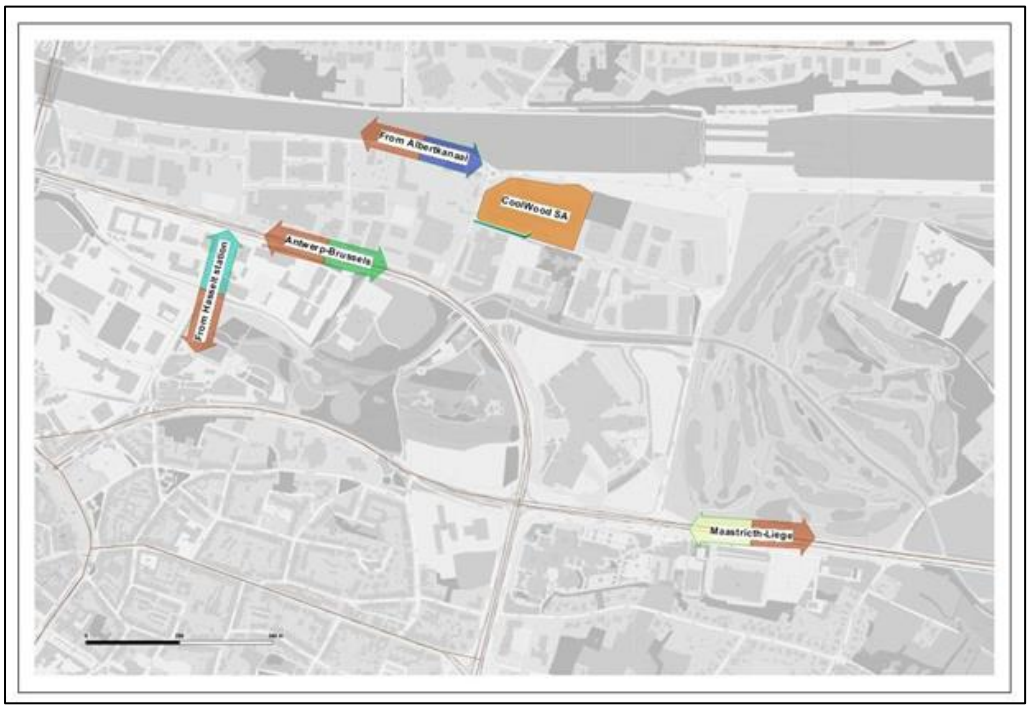
**Table 2 Department allocation**

| Department Allocation | | | | |
|---|---|---|---|---|
| **Building** | **Area in m²** | **Ground floor** | **1st floor** | **Allocated area in m²** |
| Production Facility | 5204 | Processing | NA | 2837 |
| | | Assembly | | 1216 |
| | | Finishing | | 811 |
| | | Stockage of the finished product | | 340 |
| Integrated Facility | 7014 | Stockage raw material | NA | 2838 |
| | | Raw processing area | | 2432 |
| | | Stockage external component | | 1013 |
| | | Stockage of the finished product | | 731 |
| Mixed-use building | 4464 | offices | | 973 |
| | | | Exhibition building | |
| | | | Collection area | 608 |
| | | Exhibition building store | | 2027 |
| | | | Restaurant | 507 |
| | | Stockage of the finished product | | 348 |

### External Flow Access to the Warehouse

The analysis of external flow access to the warehouse was conducted, taking into account the movement of trucks from various locations (Ghiani et al.,2004). This analysis is depicted in *Figure 3*

**Figure 3: Site location access route network using OpenStreetMap in QGIS**




### Current Situation

The analysis of the existing road facilities at the prospective warehouse relocation site is depicted in *Figure 4.*

This analysis offers valuable insights into the road infrastructure and its suitability for a planned relocation.

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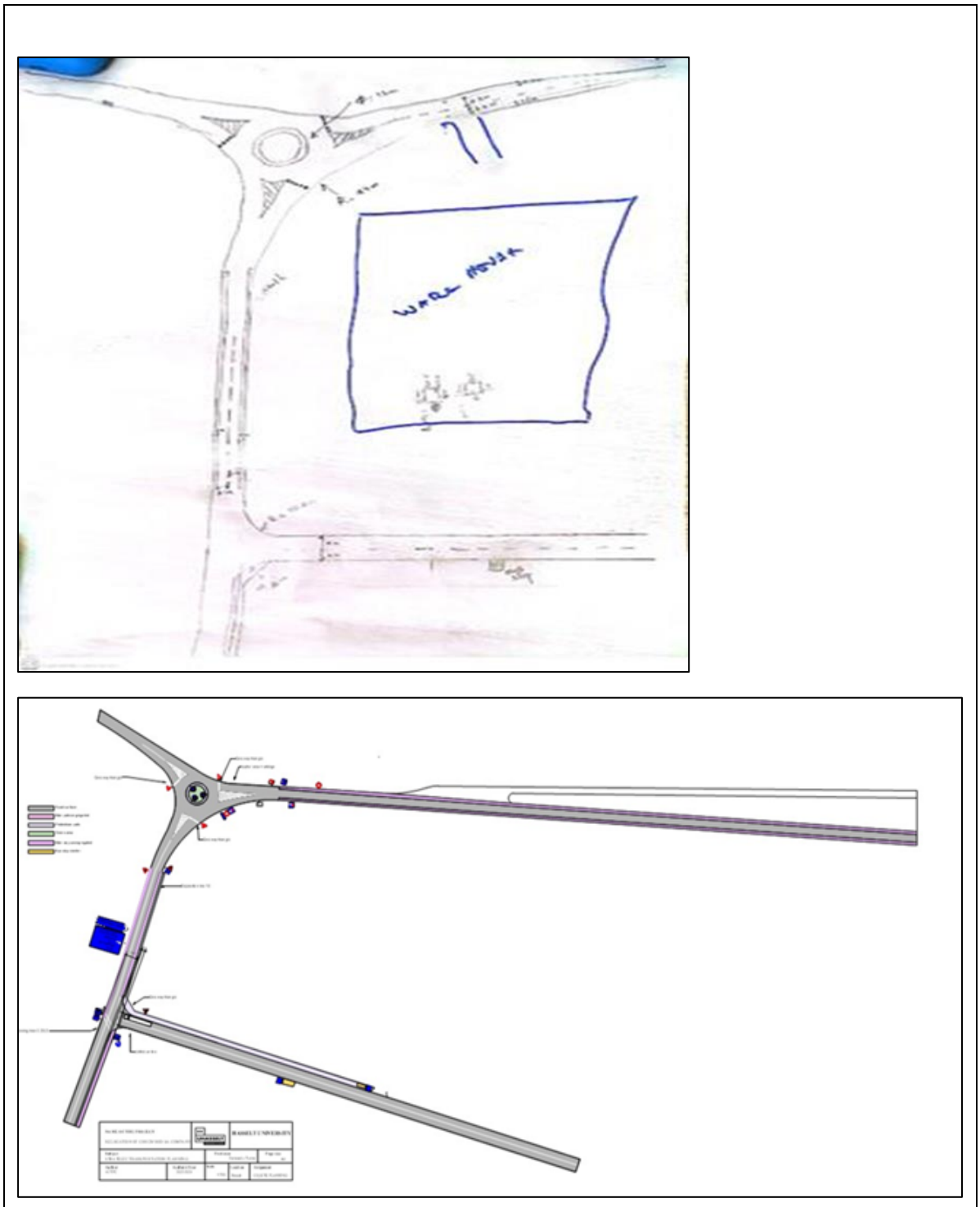
**Figure 4: Location access route network around the site location hand-sketched and drawn using Vectorworks CAD software**



## METHODOLOGY

Throughout this project, various software tools, including Vectorworks, Bricks CAD, AutoTURN, Excel, and QGIS, were employed in the planning processes for CoolWood SA's relocation to Hasselt. International standards were meticulously followed to ensure that the warehouses complied with the necessary regulations and requirements. By utilizing these diverse software applications and adhering to international standards, we have effectively streamlined the planning phase and ensured the

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utmost compliance of CoolWood SA's facilities with industry standards.

## RESULT AND DISCUSSIONS

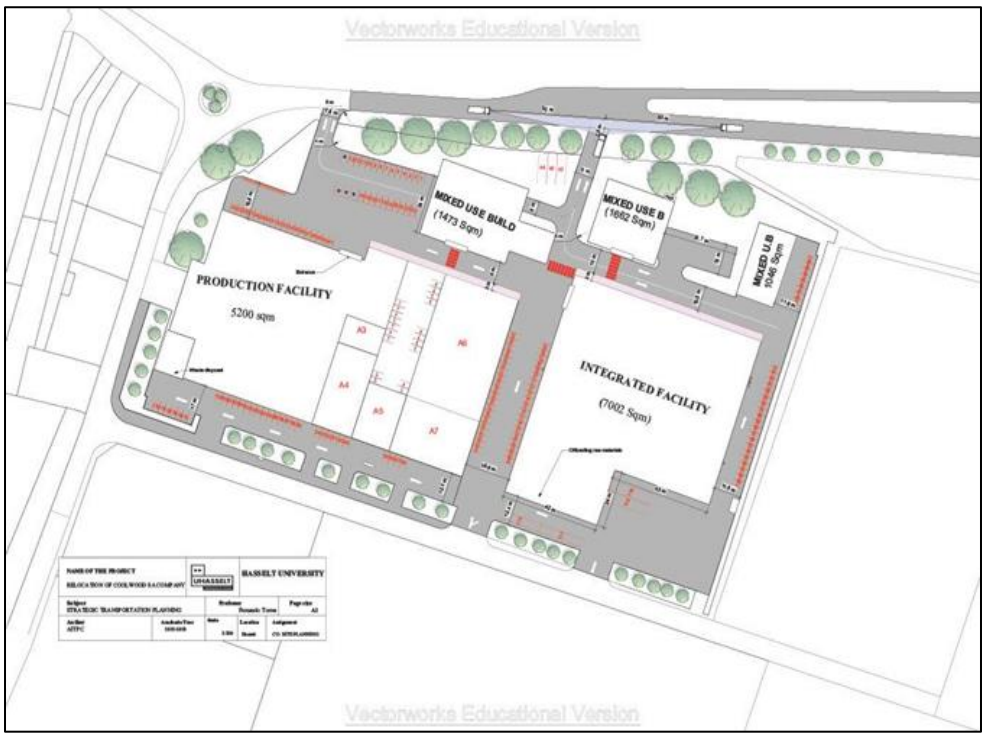
This section provides a proposed plan for internal movement and parking and an analysis of stopping sight distances resulting from the project. The plan aims to optimize vehicle flow, ensure safe parking areas, and analyze visibility for improved safety and efficiency within the warehouse premises.

### Internal Circulation Analysis

Careful planning and consideration of internal circulation are vital for the success of the facility (Pečený, et al. 2020). Measures were taken to prioritize employee safety, such as assigning a dedicated lane for forklift use and separating trucks from other vehicles. The facility allows for the simultaneous unloading of four trucks, considering both back and side offloading options to optimize efficiency and ensure a smooth operation within the facility.

An analysis of the loading and unloading process for various goods purchased by customers or supplied to restaurants was conducted. For this operation, delivery vans will utilize the routes between mixed-use buildings. Additionally, the same road will be utilized by private cars for accessing parking lots. Dedicated routes have been established for individuals with disabilities, private cars, visitors, pedestrians, and cyclists to access the various modules of the warehouse. These routes ensure convenient and safe access for each specific group, accommodating their unique needs and modes of transportation. To promote cleanliness and hygiene at the Warehouse, three designated waste disposal areas were assigned: one for the production facility, another for the integrated facility, and a third for the mixed-use buildings, particularly restaurants.

**Figure 5: Aerial view of the site space allocation by department using Vectorworks CAD software**




### Parking Calculation

The facility's parking capacity was determined according to Swiss standards, ensuring sufficient parking spaces for employees, visitors, and customers (Stadt Zurich, 2010). Adhering to these regulations promotes efficient parking management and a seamless experience for all facility users.

According to industry standards, the facility requires 205 parking spaces for employees and 41

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spaces for visitors, totaling 246 spaces (Stadt Zurich, 2010). However, it is assumed that some employees will use bicycles instead of cars, resulting in approximately 50 parking spaces being allocated for bicycles. Provisions were also made for heavy truck transportation, with the assumption that up to four trucks can load or unload simultaneously within the company compound. The plan includes designated parking for delivery vans and accommodates parking spaces for disabled individuals.

To this end, we provided 140 Car Parking, 50 Bike PP, 4 Truck PP, 4 Parking lots for Disabled people, and 4 Parking for Delivery vans.

**Table 3: Parking Calculation**

| Parking Calculation | | | | |
|---|---|---|---|---|
| No | **Use type** | **Area (m2)** | **Workers PP** | **Visitors PP** |
| 1 | Offices | 980 | 10 | 2 |
| 2 | Processing | 2859 | 29 | 63 |
| 3 | Assembly | 1225 | 12 | 24 |
| 4 | Finishing | 817 | 8 | 25 |
| 5 | Stockage finished products | 1430 | 14 | 36 |
| 6 | Raw processing area | 2451 | 25 | 57 |
| 7 | Stockage raw materials | 2860 | 29 | 68 |
| 8 | Stockage external components | 1021 | 10 | 29 |
| 9 | Exhibition building store | 2043 | 20 | 410 |
| 10 | Exhibition building collection area | 613 | 6 | 11 |
| 11 | Restaurant | 511 | 5 | 112 |
| 12 | Modules allocated to other companies | 3664 | 37 | 7 |
| | Sub-total | | 205 | 41 |
| | Total | | 246 | |
| Bicycle | 49.1376 ~50 | | | |

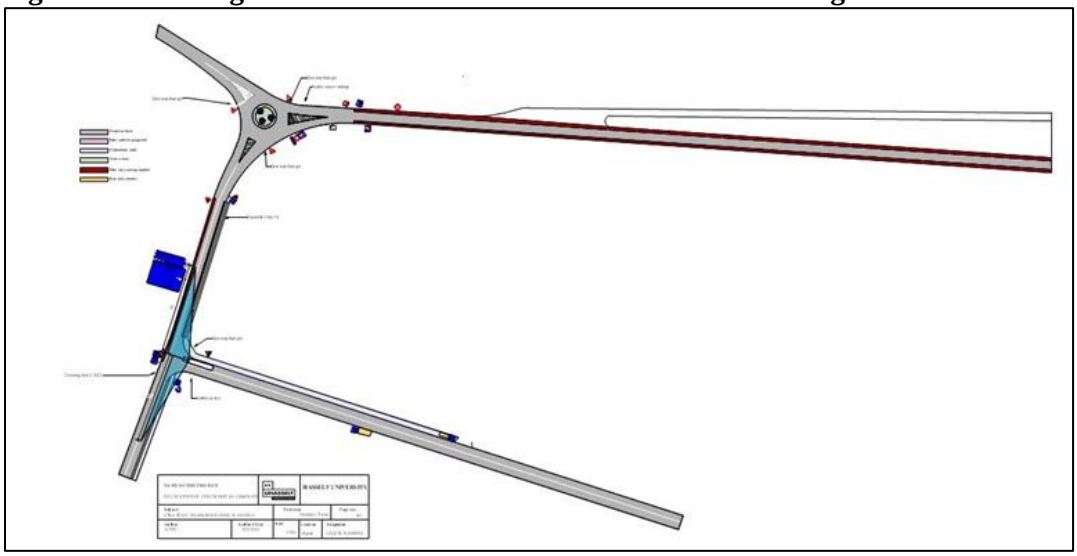
**External Network Traffic Analysis**

To ensure the safety of employees, drivers, and other road users who come to work, it is important to conduct an analysis of the external traffic movement around the premises. This analysis encompasses factors such as sight distance, where we evaluated the visibility of roads, intersections, and potential hazards to ensure drivers have clear lines of sight.

***Sight Distance for Cars***

Promoting safety through adequate stopping sight distance and clear visibility in premises vicinity.

**Figure 6: Truck sight distance to motorized traffic simulation using Vectorworks CAD**



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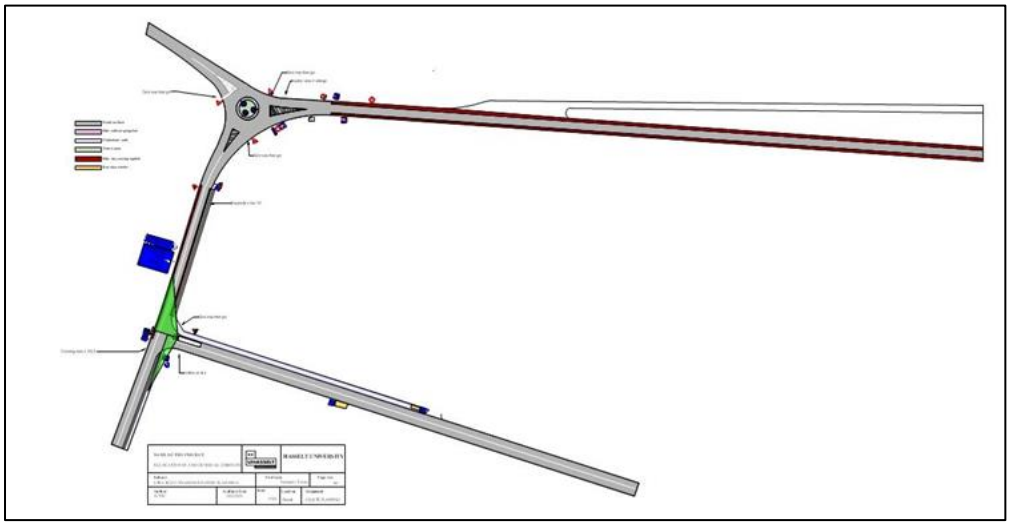
***Sight Distance for Cyclist***

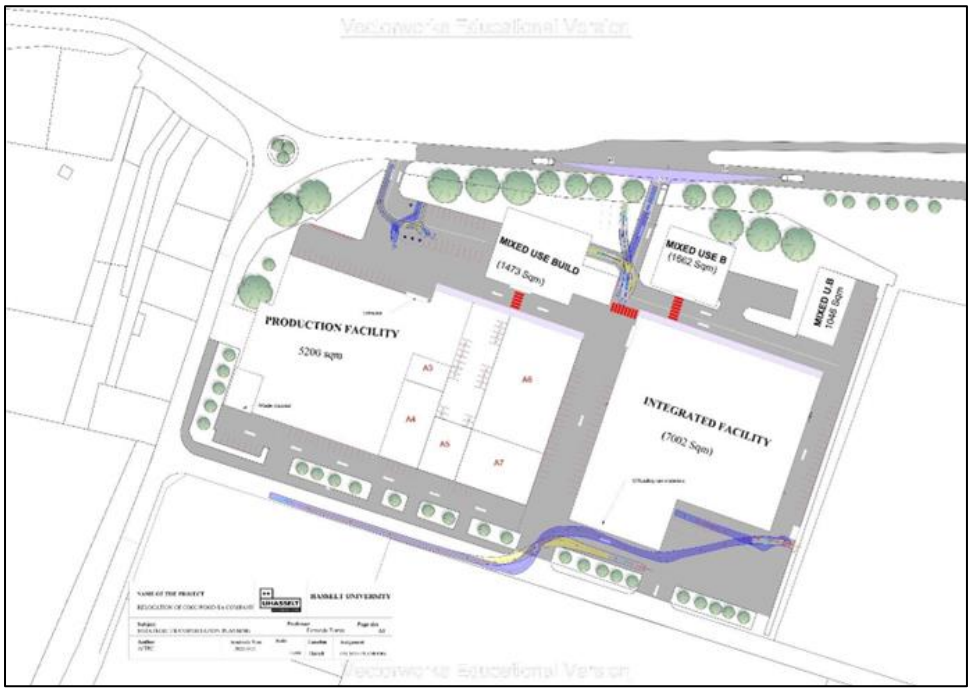
**Figure 7: Truck sight distance to Bike paths traffic simulation using Vectorworks CAD**



***Swept Analysis***

Conducting a comprehensive swept analysis, we performed a simulation to assess the safe entry and exit of trucks and other transportation modes from the premises. The accompanying figure illustrates the outcomes of this analysis, providing visual evidence of the verified safety measures in place.

**Figure 8: Truck Swept path analysis simulation using Autoturn Pro in BricsCAD**




**CONCLUSION**

Site planning is a crucial aspect of warehouse planning, with a primary focus on ensuring safety and promoting industry development. Based on the comprehensive study conducted, we can confidently conclude that the findings and recommendations presented in this report can serve as a valuable reference for CoolWood. By implementing the discussed strategies and measures, CoolWood can effectively enhance safety standards and foster the overall growth of its industry.

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