NEXUS INFRASTRUCTURE PROJECT

Integrated Transport Network Development

Project ID:	NIX-2026-001
Project Name:	Nexus Infrastructure Project
Start Date:	12 January 2026
Finish Date:	24 July 2026
Total Duration:	28 weeks
Class Date:	27 December 2025

PROJECT SCOPE OF WORK

The Nexus Infrastructure Project involves the comprehensive planning, design, and implementation of an integrated transport network connecting major urban centres. The project encompasses feasibility studies, environmental impact assessments, detailed engineering design, procurement of materials and equipment, construction of infrastructure components, systems integration, testing, and final commissioning. The project will be executed in phases to ensure quality, safety, and regulatory compliance throughout the development lifecycle.

EXERCISE INSTRUCTIONS

You are required to complete a comprehensive project management analysis based on the provided project data. The exercise is divided into four parts, each building upon the previous analysis. Use the Excel workbook provided to perform all calculations and create the required diagrams and charts. All work should be submitted in a professional format with clear labelling and explanations.

PROJECT ACTIVITIES

Activity ID	Letter	Activity Name	Duration (wks)	Resources	Predecessor	Successor
A1000	A	Feasibility Study & Site Assessment	2	2	—	A1010, A1020
A1010	B	Preliminary Design & Route Planning	4	1	A1000	A1050
A1020	C	Detailed Engineering Design	6	3	A1000	A1030
A1030	D	Obtain Regulatory Approvals	3	2	A1020	A1040
A1040	E	Procure Materials & Equipment	3	2	A1030	A1070
A1050	F	Finalise Construction Plans	1	1	A1010	A1060
A1060	G	Mobilise Construction Crew & Equipment	4	2	A1050	A1070
A1070	H	Infrastructure Installation & Integration	6	3	A1060, A1040	A1080, A1090
A1080	J	Systems Testing & Validation	3	3	A1070	A1110
A1090	K	Environmental Remediation & Site Restoration	1	1	A1070	A1100
A1100	L	Quality Assurance & Final Inspection	4	3	A1090	A1110
A1110	M	Project Commissioning & Handover	2	1	A1080, A1100	—

PART A: NETWORK ANALYSIS

Develop a comprehensive understanding of project dependencies and critical path analysis.

Tasks:

- Draw a network diagram (Activity-on-Node or Activity-on-Arrow) showing all activities and their dependencies
- Calculate the Early Start (ES), Early Finish (EF), Late Start (LS), and Late Finish (LF) for each activity
- Determine the Free Float (FF) and Total Float (TF) for each activity
- Identify and clearly mark the critical path(s) in your network diagram
- Explain why certain activities have zero float whilst others have positive float

Deliverables:

Network diagram with all calculations clearly shown and critical path highlighted.

PART B: GANTT CHART DEVELOPMENT

Create a visual timeline representation of the project schedule.

Tasks:

- Construct a Gantt chart showing all activities on a 28-week timeline
- Show both the scheduled duration (ES to EF) and the float period (EF to LF) for each activity
- Use different colours or patterns to distinguish between critical path activities and non-critical activities
- Clearly indicate the free and total float for each activity on the chart
- Verify that the project completion date aligns with the target finish date of 24 July 2026

Deliverables:

Professional Gantt chart with legend, clearly showing all activities, durations, and float periods.

PART C: RESOURCE PLANNING & ANALYSIS

Analyse resource requirements and utilisation across the project timeline.

Tasks:

- Create a resource histogram showing the number of resources required for each week of the project
- Identify weeks with peak resource demand and weeks with low utilisation
- Calculate the average resource consumption per week across the entire project
- Develop a cumulative resource curve (S-curve) showing the total resources deployed over time
- Analyse resource levelling opportunities to reduce peak demands without extending the critical path

Deliverables:

Resource histogram and S-curve with analysis of resource utilisation patterns and recommendations for resource levelling.

PART D: BASELINE & VARIANCE ANALYSIS

Establish a project baseline and analyse schedule variances.

Tasks:

- Establish the baseline schedule using the calculated ES/EF dates for all activities
- Answer the following variance analysis questions:

1. Identify all activities on the critical path and explain why they have zero float.
2. Which activities have positive float? What does this mean for project scheduling?
3. If Activity C (Detailed Engineering Design) is delayed by 2 weeks, what impact would this have on the project?
4. Calculate the schedule variance for each activity if Activity A takes 3 weeks instead of 2.
5. Which activities are at risk if resources are reduced? Justify your answer.
6. Analyse the resource histogram. Identify weeks with peak resource usage and weeks with low utilisation.
7. Based on the S-curve, calculate the average resource consumption per week.
8. If the project must be completed 2 weeks earlier, which activities would need to be accelerated?
9. What is the impact on the critical path if Activity H (Infrastructure Installation) is delayed by 3 weeks?
10. Recommend resource levelling strategies to reduce peak resource requirements.

Deliverables:

Baseline schedule documentation and comprehensive answers to all variance analysis questions with supporting calculations.

SUBMISSION REQUIREMENTS

Format

All deliverables must be submitted in professional format with clear labelling, legends, and explanations.

Documentation

Include a brief written explanation for each part, describing your methodology and key findings.

Calculations

Show all calculations clearly. Use the provided Excel workbook to organise your work.

Presentation

Ensure all diagrams and charts are professionally formatted, properly scaled, and easy to read.

Deadline

Submit all work by the date specified by your instructor.

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