HOTAZEL SOLAR FACILITY 2 (PTY) LTD

TECHNICAL LAYOUT DEVELOPMENT REPORT FOR HOTAZEL 2

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Cape Environmental Assessment Practitioners (Pty) Ltd

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1. INTRODUCTION

Hotazel Solar Facility 2 (Pty) Ltd is proposing the establishment of a commercial photovoltaic (PV) solar energy facility (SEF), namely Hotazel 2, on the Remaining Extent (Portion 0) of Farm York A 279, situated approximately 3 km south-east of Hotazel, in the Northern Cape Province.

The technology under consideration are photovoltaic (PV) modules mounted on either fixed-tilt or tracking structures. Other infrastructure includes inverter stations, internal electrical reticulation, internal roads, a facility substation / collector switching station, a 132 kV overhead distribution line (OHL), auxiliary buildings, a construction laydown area, perimeter fencing, and security infrastructure. The facility substation / collector switching station will locate the main power transformer/s that will step up the generated electricity to a suitable voltage level for transmission into the national electricity grid, via the OHL. Auxiliary buildings include, inter alia, a control building, offices, warehouses, a canteen and visitors centre, staff lockers and ablution facilities, a gate house and security offices. The figure below depicts the typical layout of a solar PV energy facility.

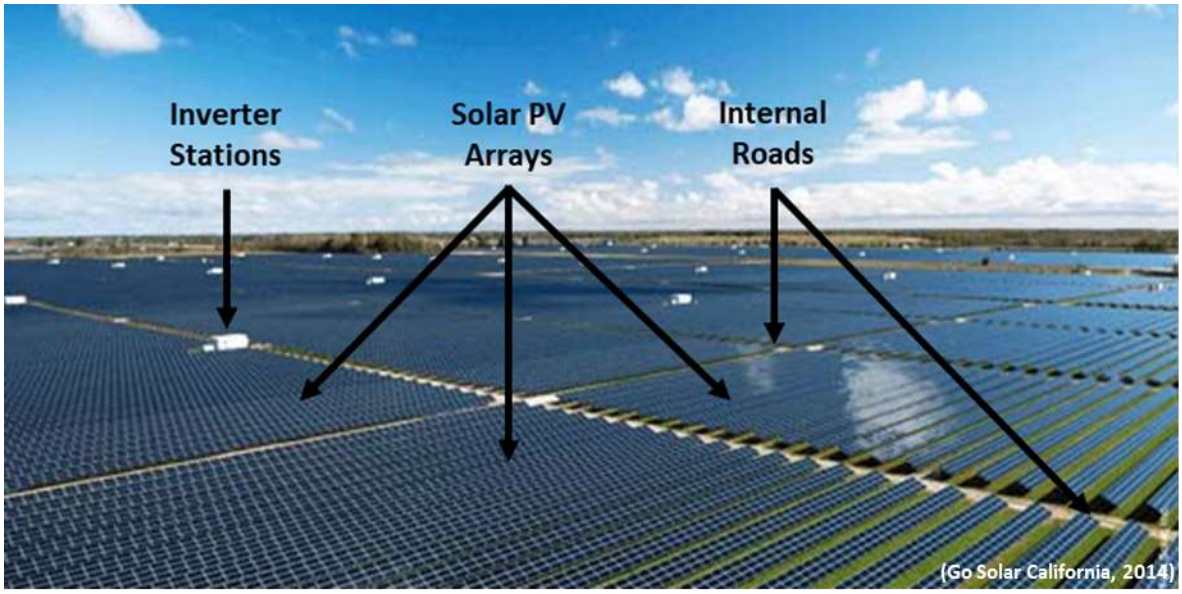

Figure 1: Typical Layout of a Solar PV Energy Facility.

Hotazel 2 will have a net output of 100 MW_{AC} with an estimated maximum footprint of ± 230 ha. The approximate area that each component of the Hotazel 2 will occupy is summarised below.

Table 1: Approximate area of each component

SEF Component	Estimated Area	% of Total Area (± 230 ha)	% of Farm Area (636.7946 ha)
PV structures/modules	± 210 ha	91.30 %	32.98 %
Internal roads	± 9 ha	3.91 %	1.41 %
Auxiliary buildings	± 1 ha	0.43 %	0.16 %
Substation	± 2 ha	0.87 %	0.31 %
Other	± 8 ha	3.47 %	1.26 %

2. LAYOUT DEVELOPMENT

It is customary to develop the final / detailed construction layout of the SEF only once an Independent Power Producer (IPP) is awarded a successful bid under the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), after which major contracts are negotiated and final equipment suppliers identified. However, for the purpose of the Draft Scoping Report (DSR) in accordance with the minimum requirements prescribed by the Department of Environmental Affairs (DEA), the details of the proposed layout for Hotazel 2 are included below.

2.1 INITIAL ASSESSMENT AREA

The Remaining Extent (Portion 0) of the Farm York A 279, situated in the District of Hotazel in the Northern Cape Province, was identified for the development of the proposed Hotazel Solar Facility 2 (Hotazel 2).

This was based on the favourable location characteristics which included: a strong solar resource; a viable grid connection; close proximity to towns with a need for socio-economic upliftment; land availability; land owner support; flat topography; no conflict to on-site and surrounding land use practices; easy accessibility; favourable wind and dust considerations; and distance from airports.

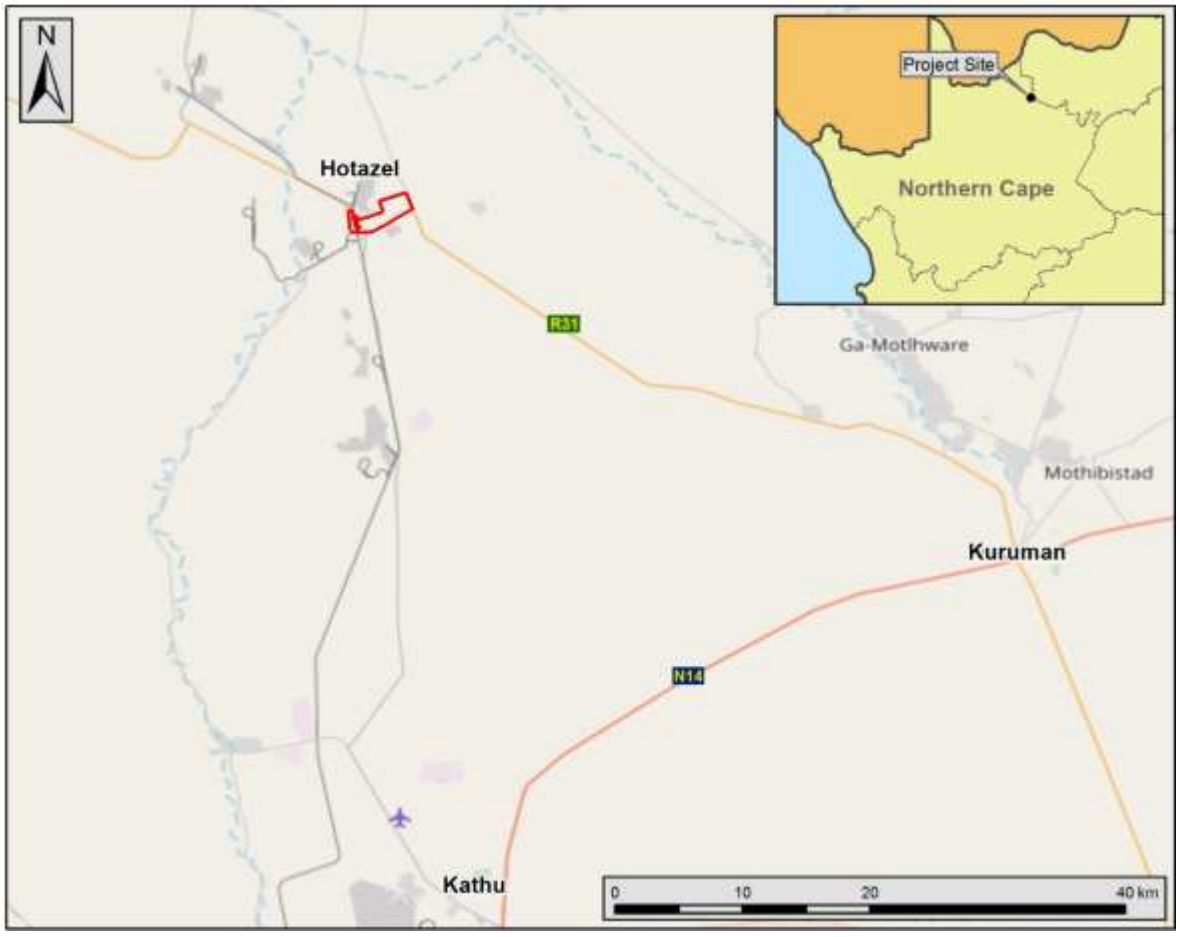

Figure 2: Locality of the Property.

An initial conceptual area of ± 450 ha was identified during the planning phase of the project. This area is illustrated in Figure 3.

Figure 3: Initial Conceptual Area

The delineation of the initial conceptual area was based purely on the power lines and the regional roads that intersect the property. This area was thus an undivided piece of land that was available for the development of a Solar PV Facility.

Following the identification of the initial conceptual area, a Full Scoping and Environmental Impact Assessment (S&EIA) process was conducted to assess any environmental sensitivities in the context of the proposed development of the Hotazel Solar facility (EIA Ref No: 14/12/16/3/3/2/1086). The project was granted Environmental Authorisation (EA) on 30 May 2019. The original authorised footprint is illustrated in Figure 4 below.

Figure 4: Original authorised Hotazel Solar footprint.

Subsequently, Hotazel Solar has been subject to a Part 2 Amendment process to shift the authorized project footprint by less than a kilometre towards the western boundary of the initial concept area. In doing so, there is now sufficient space for a potential second solar development (Hotazel 2) on the eastern side of the initial concept area (Figure 5).

Figure 5: Proposed Hotazel 2 footprint located adjacent to the amended Hotazel Solar footprint.

2.2 PROPOSED LAYOUT

Hotazel 2 is to consist of solar photovoltaic (PV) technology with fixed, single or double axis tracking mounting structures, with a net generation (contracted) capacity of 100 MW_{AC} (MegaWatts), as well as associated infrastructure, which will include:

- On-site substation / collector switching station;
- Auxiliary buildings;
- Access and internal road network;
- Laydown area (construction phase);
- Inverter-stations, transformers and internal electrical reticulation (underground cabling);
- There are three options proposed to connect Hotazel 2 to the Eskom Hotazel Substation:
    - Option 1 (Preferred): Overhead 132kV powerline from the Hotazel 2 on-site substation/ collector switching station to the Eskom Hotazel substation.
    - Option 2: Via a loop in loop out (LILO) into the Hotazel-Eldoret 132kV line.
    - Option 3: Overhead 132kV powerline from the Hotazel 2 on-site substation/ collector switching station to the Hotazel Solar collector switching station.
- Rainwater tanks; and
- Perimeter fencing and security infrastructure.

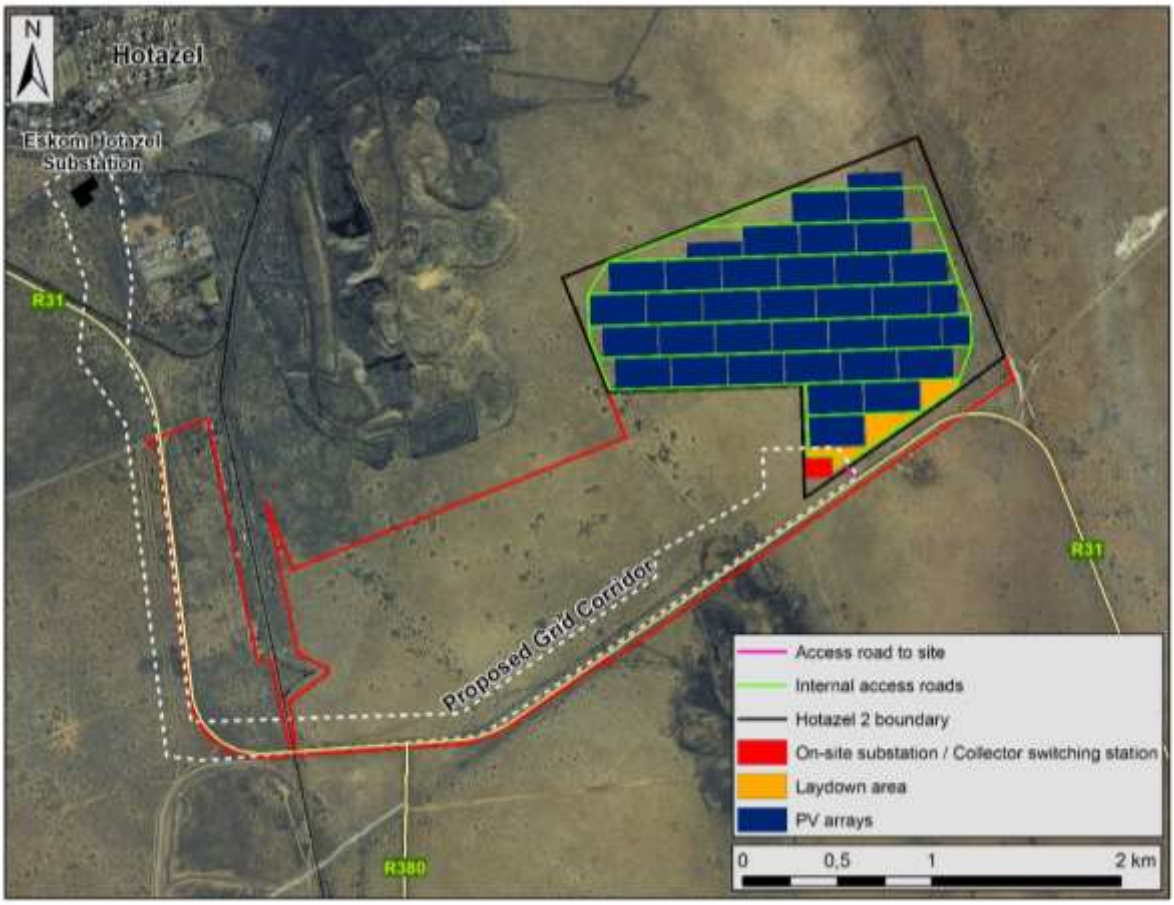

Figure 6: Proposed Hotazel 2 Layout

3. OVERVIEW OF THE SOLAR ENERGY FACILITY

The following section presents an overview of the main components of the SEF layout.

3.1 SOLAR ARRAY

Solar PV modules are connected in series to form a string. A number of strings are then wired in parallel to form an array of modules. PV modules are mounted on structures that are either fixed, north-facing at a defined angle, or mounted to a single or double axis tracker to optimise electricity yield.

3.2 MOUNTING STRUCTURES

Various options exist for mounting structure foundations, which include cast / pre-cast concrete, driven / rammed piles, or ground / earth screws mounting systems (Figure 7).

Figure 7: Mounting Structures. A) Cast Concrete Foundation. B) Driven/ Rammed Steel Pile. C) Ground / Earth Screw.

The impact on agricultural resources and production of these options are considered to be the same, however concrete is least preferred due the effort required at a decommissioning phase in order to remove the concrete from the soil, and therefore its impact on the environment. Hotazel 2 will therefore aim to make the most use of either driven / rammed piles, or ground / earth screws mounting systems, and only in certain instances resort to concrete foundations should geotechnical studies necessitate this.

3.3 AUXILIARY BUILDINGS

The auxiliary buildings will comprise of the following as a minimum:

- Control Building / Centre;
- Office;
- 2 x Warehouses;
- Canteen & Visitors Centre;
- Staff Lockers & Ablution; and
- Gate house / security offices.

The total area occupied is approximately 1 ha, excluding the facility substation / collector switching station.

3.4 GRID CONNECTION AND CABLING

It is proposed to connect the SEF directly to Eskom's Hotazel Substation located ± 3km to the north west of the property. The Hotazel 2 substation / collector switching station will be approximately 2 ha in size and feature a step-up transformer/s to transmit electricity via a 132 kV OHL directly to the Hotazel Substation. There are three options proposed to connect Hotazel 2 to the Eskom Hotazel Substation:

- Option 1 (Preferred): ±6.7km overhead 132kV powerline from the Hotazel 2 on-site substation/ collector switching station to the Eskom Hotazel substation. To assess the route, the line is buffered by 150 m (i.e. a 300 m corridor) in order to allow for micro-siting. The powerline will have a maximum height of 32m and a servitude width of between 31m and 36m.
- Option 2: ±100m overhead 132kV electrical transmission line which will connect via a Loop in Loop out connection into the existing Hotazel/Eldoret 132kV line. The powerline will have a maximum height of 32m and maximum servitude width of 52m.
- Option 3: ±1km overhead 132kV powerline from the Hotazel 2 on-site substation/ collector switching station to the Hotazel Solar collector switching station (which is currently going through a Part 2 Amendment process). The powerline will follow the same corridor as Option 1, but only until it reaches the Hotazel Solar collector switching station. The powerline will have a maximum height of 32m and a servitude width of between 31m and 36m.

A 100 MW_{AC} installation will require specific electrical components to meet the national grid code requirements in order to generate and supply electricity into the national grid.

The conversion from DC (modules) to AC is achieved by means of inverter stations. A single inverter station is connected to a number of solar arrays and will be placed along the internal service roads for ease of access. A number of inverter stations will be installed for the SEF (either centralized or string inverters), each of which is connected to the facility substation/ collector switching station.

Final placement of the inverter stations and facility substation/ collector switching station will need to take ground conditions into consideration. Interconnecting electrical cabling will be trenched where practical and will follow internal access roads to the greatest extent. Sensitive areas will consequently be avoided as far as possible, or alternatively, cables will be fastened above ground to the mounting structures so as to avoid excessive excavation works and clearing of vegetation.

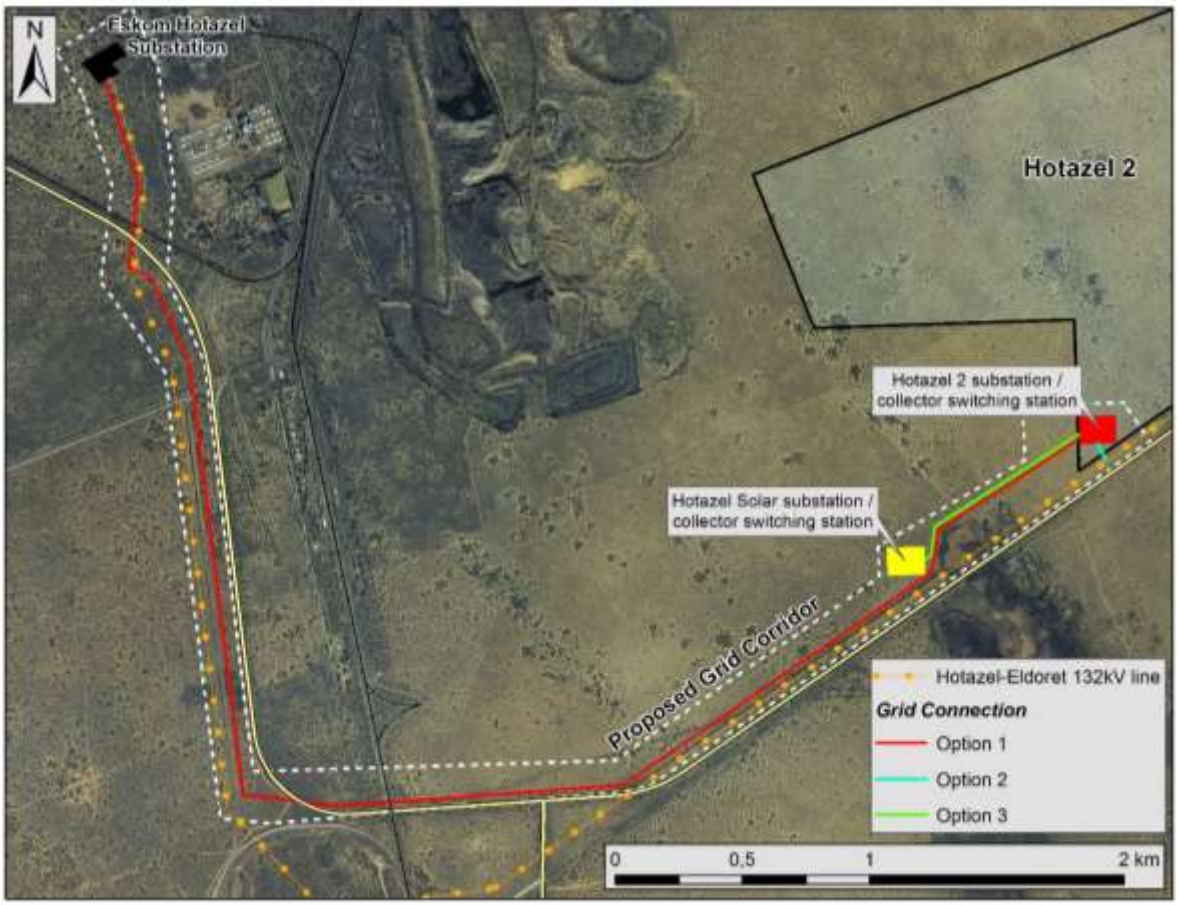

Figure 8: Grid Connection Alternatives

3.5 ACCESS AND INTERNAL ROADS

The project site will be accessed from the Regional Route 31 (R31), which runs along the southern boundary of the site. The new main access road will be approximately 100m long and up to 8m wide.

The internal road network of the SEF will be gravelled roads, approximately 5m in width, around

the solar array periphery. Roads located in-between the solar modules will be un-surfaced tracks to be used for maintenance and cleaning of solar PV panels.

A detailed transport and traffic plan is currently being compiled for the project. Traffic impacts will be assessed in the impacts tables of the Environmental Impact Report. Precautionary measures will be taken to mitigate the risk of ground disturbances where access roads will be constructed. Special attention will be given to drainage, water flow and erosion by applying appropriate building methods.

Figure 9: Site Access

3.6 SERVICES REQUIRED

3.6.1 Water

Water required during the construction and operation phases will be sourced from (in order of priority):

1. The Local Municipality (LM) - Specific arrangements will be agreed with the LM in a Service Level Agreement (SLA). Most likely the water will be either trucked in, or otherwise made available for collection at their Water Treatment Plant via a metered standpipe.

2. Investigation into a third-party water supplier which may include a nearby mine or other private services company.
3. A borehole drilled on site, which will be subject to complete geohydrological testing and a WULA.

3.6.2 Electricity

Electricity will be needed during the construction period as well as the operation period in the support offices, security systems etc. Electricity supply during construction will be arranged with either the LM or Eskom Distribution, via an 11kV or 22kV feeder line.

In addition, diesel/petrol generators for electricity generation may be used during the construction period.

3.6.3 Waste Management

Solid waste

During the construction phase, solid waste will mainly be in the form of construction material, excavated substrate and domestic solid waste. All waste will be disposed of in scavenger proof bins and temporarily placed in a central location for removal by the contractor. Any other waste and excess material will be removed once construction is complete and disposed of at a registered waste facility. Excess excavation material will either be spoiled offsite at a registered facility or used for landscaping berms within the overall PV footprint.

Sewerage

During the construction phase, chemical ablution facilities will be utilised. These ablution facilities will be maintained, serviced and emptied by an appointed contractor, who will dispose of the effluent at a licensed facility off site. Once construction is complete, the chemical ablution facilities will be removed from the construction site. A conservancy tank which will be regularly emptied by a registered service provider will be installed at the Operations & Maintenance building and on-site substation.

Hazardous substances

During the construction phase, use of the following hazardous substances is anticipated:

- Cement associated with the piling activities and construction of buildings and inverter station plinths;
- Petrol/diesel for construction plant; and
- Limited amounts of lubricants and transformer oils.

Temporary storage and disposal of hazardous waste will be done in compliance with relevant legislation (i.e. stored in covered containers with appropriate bunding). Refuelling areas to be in designated positions, with suitable mitigation to reduce the risk of hydrocarbon spills.

4 CONCLUSION

Further assessment, during the Scoping and EIA phases of Hotazel 2, will determine if there are any further environmental sensitivities within the project site. Specialists will provide recommendations and mitigation measures required to avoid or reduce any identified impacts.

At this stage, grid connection Option 1 is preferred.

Should Hotazel Solar connect to the grid via a LILO into the Hotazel-Eldoret 132kV line, it is unlikely that there will be capacity for Hotazel 2 to do the same. In this case, Options 1 would have to be used. Furthermore, Hotazel 2 may be constructed and commissioned before Hotazel Solar. Therefore, Option 1 would be the only technically feasible option in the above cases.

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