

Figure 6.63 shows the view looking north - east along the existing Wallumbilla to Gladstone Gas Pipeline.



Figure 6.63 *View looking north - east along the existing Wallumbilla to Gladstone Gas Pipeline*

The chainage markers seen in Figure 6.63 are used to by aerial surveys to identify the existing Wallumbilla to Gladstone Gas Pipeline.

There is an existing gas compressor station is setback approximately 200 m form the road. Figure 6.64 shows the view looking south - west from this location towards the Gladstone Gas Pipeline and towards the existing compressor station.



Figure 6.64 *View looking south-west along the existing Wallumbilla to Gladstone Gas Pipeline*

Figure 6.65 shows a close view of the Larcom Creek Compressor Station looking south - west from the Bruce Highway.



Figure 6.65 *Larcom Creek Compressor Station (Alinta)*

The Larcom Creek Compressor Station is barely noticeable from the Bruce Highway. Even in the enlarged view shown in Figure 6.65. This is due to the setback from the highway, the

colours and tones of the structures and the existing vegetation located within the Bruce Highway road reserve.

The landscape to the south of this location is predominantly cleared flat farmland. There are scattered trees located within paddocks and the Bruce Highway road reserve at this location.

There has also been some tree removal required in the road reserve to construct the existing Wallumbilla to Gladstone Gas Pipeline easement at this location.

The existing gas infrastructure at this location demonstrated the limited visibility of not only the pipeline easement and underground pipeline, however the above ground structures as well.

The existing Wallumbilla to Gladstone Gas Pipeline demonstrates the likely visual impact that can be expected as a result of the construction and operation of the QC LNG Export Pipeline in this landscape. *Figure 6.63* and *Figure 6.64* show that once rehabilitated, pipeline easements and other associated infrastructure can be visually integrated in to the surrounding landscape.

For these reasons, the visual impact of the proposed QC LNG Export Pipeline easement at this location is assessed as low to negligible.

6.31 VIEW POINT 31 - MOUNT LARCOM GLADSTONE ROAD

Viewpoint 31 is located on the Mount Larcom - Gladstone Road.

Mount Larcom Township is approximately 4.7 km north west of this location.

The North Coast Railway Line is located to the north of this location.

The proposed Export Pipeline will also be located near to this location.

The most visible landscape unit at this location is Landscape Unit 1 - Flat Farmland.

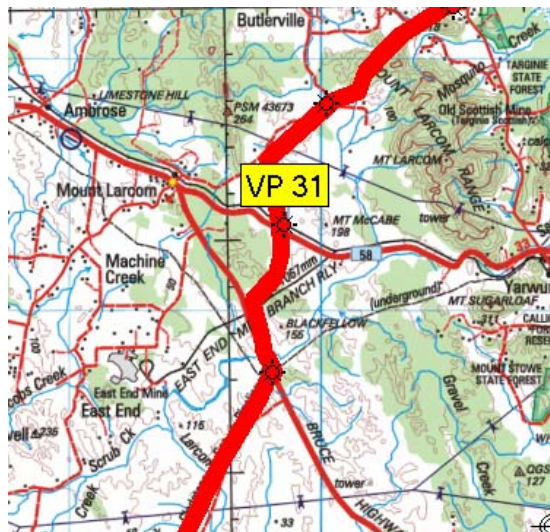


Figure 6.66 shows the view looking north-west along Mount Larcome - Gladstone Road from this location.

VP31 (GPS 56) 298511.4, 7363407.6)



Figure 6.66 *Mount Larcom - Gladstone Road looking north - west*

The North Coast Railway line is also visible in the right of Figure 6.66.

The landscape surrounding this location is predominantly cleared flat farmland. Rural landscapes such as this regularly undergo seasonal visual change through cropping, ploughing and grazing activity. Regular farming practices such as clearing firebreaks also occurs.

Once construction works are completed, the Export Pipeline will be returned to agricultural uses and will blend back into the surrounding landscape. Once rehabilitated the most visible component of the pipeline easement at this location will be the signage, access tracks and gates that may be required. Due to the existing infrastructure already at this location, the visual impact of the proposed Export Pipeline easement will be low - negligible.

6.32

VIEW POINT 32 - CORNER CULLEN ROAD AND NICHOLS ROAD

Viewpoint 32 is located near the intersection Cullen and Nichols Roads. Both are gravel roads.

The most visible landscape unit at this location is Landscape Unit 1 - Flat Farmland.

The proposed Export Pipeline will run in the landscape near to this location.

Figure 6.67 shows the view looking north-east from this location.



VP32 (GPS 56J 300182.4, 7368204.3)



Figure 6.67 *View looking north - east along proposed pipeline route*

Figure 6.67 shows that the landscape to the north-east of this location is predominantly cleared flat farm land. The existing taller vegetation such as trees and shrubs are located in the road reserves.

Figure 6.68 shows the view looking south-west from this location.



Figure 6.68 View looking south east

Figure 6.68 shows that the landscape to the south – east of this location is predominantly cleared flat farm land. The existing taller vegetation such as trees and shrubs are located in the road reserves.

Landscape Unit 1 – Flat Farmland is the most visible landscape unit at this location. This landscape unit has a low landscape sensitivity. There are also few visitors to this location. At the completion of construction works, the landscape in this area will be returned to agriculture uses. Over time the areas disturbed during construction will return to a similar colour as the surrounding landscape. For these reasons, the landscape sensitivity at this location is assessed as negligible.

6.33

VIEW POINT 33 - KANGAROO ISLAND BOAT LAUNCHING AREA

Viewpoint 33 is located near a public boat ramp to the north of Gladstone.

The proposed Export Pipeline will be installed underground near this location. It will continue under the Narrows and emerge at the QC LNG Plant proposed to be located on Curtis Island.

The most visible landscape unit at this location is Landscape Unit 5 - Mangroves.

Figure 6.69 shows the view looking east over the boat launch towards Curtis Island



VP33 (GPS 56) 311627.5, 7368313.2)



Figure 6.69 *Public boat launch.*

There is a sheltered, publicly accessible boat launch at the location. This area is used by local fishermen to access the Narrows. The launching area is protected from open water by an area of mangroves to the east of the launch.

The construction of the Export Pipeline at this location will require the removal of mangroves seen in Figure 6.69. Because the mangroves are quite dense in this location, they restrict visibility beyond the margins of the mangroves. Therefore, any vegetation removal in mangroves will be noticeable.

Because the export Pipeline will cut through the mangroves, vegetation removal associated with construction the Export Pipeline may also enable views through to the Narrows beyond. However over time the mangroves will re-establish and the location of the export pipeline will not be discernable. If this were to occur the visual impact is likely to be moderate until such a time that the mangroves are re-established.

If the proposed Export Pipeline was located where there are limited opportunities to view through the mangroves, the visual impact would be low.

6.34 *SUMMARY OF THE POTENTIAL VISUAL IMPACT FROM PUBLICLY ACCESSIBLE VIEWPOINTS*

The section has demonstrated that the landscape of the pipeline viewshed is a highly diverse landscape comprising a range of landscape types. The landscape is also one that has been highly modified over time and includes many instances of visual change, both permanent and dynamic.

The findings have identified that there were no viewpoints considered to have a high visual impact as a result of the development of the Project. Further, the overall visual impact from all of the viewpoints from these locations have been assessed as low to negligible either during construction or through the operation and maintenance of the Project.

6.35 *VISUAL IMPACT AFTER CONSTRUCTION*

After construction the pipeline easement will be reinstated where possible to pre-existing conditions and vegetation except for where landscape rehabilitation is limited to grass only.

There are many examples of existing infrastructure easements found near to, and within the viewshed of the Project. These include existing power stations, existing transmission, pipeline and rail lines as well as existing roads and access tracks.

The construction of pipeline easements in forested areas is noticeable due to the removal of vegetation that is required. Even though the location of the pipeline easement may be noticeable in these landscapes, visibility is often confined to a short area where the pipeline crosses a roadway at right angles. The corridor selection process has avoided areas of tall vegetation, where possible.

The only large structures proposed for the pipeline project is the In-line Compressor Station and the Booster Station located adjacent to the existing Condamine Power Station. Viewpoints 9 and 30 have shown that landscape screening is an effective mitigation measure in screening large infrastructure if required.

There are large areas of existing vegetation that can be found within the Project viewshed. This analysis has demonstrated the effectiveness of vegetation to screen views to the surrounding landscape. This is particularly useful in demonstrating the effectiveness of vegetation as a landscape mitigation measure to filter and in some instances potential screen structures from sensitive viewing locations.

When near main roads the pipeline can either:

- Run parallel to the roadway; or
- Cross the road at right angles.

This analysis has shown that where the pipeline runs parallel to the roads once rehabilitated it has the appearance of a widened road reserve and creates little visual impact.

Furthermore, when a pipeline crosses a road, generally at right angles, the visual impact in a vegetated or forest landscape is restricted to a view along an easement, which is not dissimilar to view along minor roads or access tracks. Therefore the visual impact in forested areas is low – negligible and in cleared areas the pipeline becomes indistinguishable against the existing pasture and the visual impact becomes nil.

It is therefore considered that there are no additional landscape mitigation measures to those outlined in the project description required to be implemented as a result of the construction and operation of the proposed pipeline and associated easement.

7 *ASSESSMENT OF THE IMPACTS OF NIGHT TIME LIGHTING*

This section responds to the night time lighting impacts as outlined in the Terms of reference for the Project. Accordingly permanent sources of light found in the landscape of the project as well as light sources identified within the project description will be addressed. The impact of Fauna is assessed in the Flora and Fauna report.

7.1 *EXISTING LIGHT SOURCES*

There are several light sources that can be found within the project view shed. These are both permanent sources such as around the existing towns of Chinchilla, Miles, Wandoan, Biloela and Gladstone. In rural landscapes other permanent lights sources can include farm houses and buildings as well as existing infrastructure such as the Condamine power station to the south and the Callide Power Stations to the north and the industrial areas associated with the Gladstone Harbour. Other, non permanent light sources include head and tail lights of vehicles travelling along the surrounding roads as well as trains and agricultural machinery that when required can be found working 24 hours a day.

7.2 *PROJECT LIGHTING*

Light sources for the Project include both permanent and intermittent sources and of light.

Permanent light sources will be limited to the proposed control room access lights for the In-line Compressor Station (if required) and the proposed Booster Station located near to the existing Condamine Power Station.

Intermittent lighting may include flaring of the Mainline Valves and Scraper Stations. Flaring of these structures will be infrequent and associated with maintenance procedures or emergency shut down only. These structures are to be located in relatively isolated locations where there are few receptors.

7.3 *LIGHTING DURING CONSTRUCTION*

Intense lighting may be required for the proposed pipeline and associated infrastructure for safety. This lighting will be in relatively remote areas and will be temporary only.

The night time lighting impacts of pipeline project is considered to be low through construction and negligible at completion. This is because the project is relatively remote in location and there is limited permanent lighting associated with the project.

8

RECOMMENDATIONS

The preceding analysis has shown that the major visual impact for the project will be during construction.

This will be due to the visual change, associated with the disturbance of the surrounding landscape and general construction related activities such as deliveries, storage and stockpiling of equipment and materials as well as construction and fabrication activities.

There are no measures that can be implemented to mitigate this stage of the works. Visual mitigation measures in this time relate more to construction management practices, rather than landscaping options.

Where construction works are undertaken in heavily vegetated areas such as state forests, the effects of construction will be more noticeable due to the removal.

Following construction, the majority of the disturbed areas that are located in areas of cleared farmland will have pasture/grasses re-established. Viewers may be able to discern a slight change in colour however, such a change would only be a negligible impact. The landscape rehabilitation methods outlined in the project description are considered to be adequate to mitigate the majority of the likely visual impacts that can be expected through the development of the project.

The mitigation measures additional to those outlined in the Rehabilitation Measures section of the Project Description are detailed below:

- Larger structures such as in line Compressor Station (if required) should not be located in areas where views to the surrounding landscape do not already contain constructed elements. These elements include but are not limited to fences, stock feeding equipment, water tanks, buildings, sheds and driveways.
- Where large structures such as In Line Compressor Stations are required to be installed, the site layout and location should allow for a landscape buffer to be installed to the perimeter of the sites.
- For larger structures, colours darker than the surrounding grass and vegetation should be used. This includes protective barriers to mainline valves and scraper stations.
- If, after the construction of any larger structures there is an un-acceptable level of impact, there may be the opportunity to undertake additional planting adjacent to local roads to mitigate these views.

CONCLUSION

This LVIA has reviewed the likely landscape and visual impacts of the Pipeline and has concluded that the visual impact post restoration will be negligible. The reasons are summarised below.

In summary, this landscape and visual impact assessment demonstrates that the Project will have a generally low to negligible visual impact on its surrounds. Furthermore, it is considered that the viewshed of the pipeline is a suitable landscape for the construction of the project. This conclusion is supported by:

Level of Visual Change in the surrounding landscape

- The Project is located in a landscape that has been extensively modified since European habitation. . The landscape units in the viewshed are well represented across this area. Agricultural activity, associated structures and other signs of human intervention have also created a landscape that can absorb other changes.

Visual impact to towns

- There is no visual impact on townships. There is also minimal visibility of the project from other settlements or residential dwellings in the area.

Visual impact to the parks, reserves and recreation areas

- The majority of the landscape found within the project study area is farmland.
- Most of the parks and reserves are covered by vegetation. Views from within these areas are limited to within these parks. The only visual impact will only occur where pipelines or other proposed infrastructure is to be located adjacent to existing roads and tracks.

Visual impact to the surrounding road network

- There is minimal visibility from major roads. The Moonie, Warrego and Leichardt Highway to the south as well as the Dawson and Bruce Highways which are located to the north are the major roads within the region. Although there will be views from these two highways the overall impact is expected to be low due to the predominately low landscape sensitivity and limited viewing opportunities afforded by topography and vegetation.
- Where Pipelines cross roads and highways at right angles, their visibility is also limited to only a very short section of the journey.
- There will be a visual impact on viewers using the minor roads within the locality. These run along and over proposed pipelines at various locations. Visibility from these minor roads, which have far fewer users than the highways and main roads, is sometimes restricted by roadside vegetation. It is considered that the visual impact will be low to negligible from these locations partly as the viewer numbers are low, but also because this rural landscape can absorb further change.

Impacts of night time lighting

- The Project components are located in relatively remote locations.
- There are existing light sources within the project viewshed including towns, the surrounding road network, rail and other large infrastructure.
- There permanent light sources of the project are limited to control room access only. This lighting will be similar to existing lights found around existing farm houses and sheds already found in the landscape.

- Because of the relatively remote location of the project components, there are few receptors of the intermittent lighting that may be associated with the project.

Landscape Mitigation

Chapter 7 has demonstrated that for many areas, even the larger of the above ground structures can be visually accommodated in to the surrounding landscape. The analysis has also shown that where there are potentially sensitive locations landscape mitigation measures such as planting or retention of screening vegetation will assist to reduce or remove visual impacts for mainline valves, scraper stations and the In-line compressor station. This is demonstrated in *Viewpoint 9 - Condamine Power Station* and *Viewpoint 10 - Warrego Highway*. These viewpoints demonstrated the effectiveness of landscape mitigation measures and screen plantings for large items such as the existing Condamine Power Station.

Because of the minimal visual impact to the surrounding landscape, it is considered that the proposed pipeline and above ground components can be easily accommodated into the surrounding landscape. Where there are sensitive views, the proposed on site landscape mitigation measures or revegetation and screen planting will assist to reduce the visual impact to these locations.

The Project is also located in a predominantly agricultural area which regularly undergoes transformation due to cropping and agricultural activity such as ploughing. These activities also change the landscape for periods of time. Once the construction activity finishes the pastures and open paddocks along the Pipeline easement will revert, and the only change will be a slight variation in the colour of the pasture where soil has been disturbed.

This analysis has shown that overall, construction and operation of the proposed pipeline Project will have a low to negligible level of visual impact on the surrounding landscape.

Annexure A

Parameters of Human Vision

PARAMETERS OF HUMAN VISION

The visual impact of a development can be quantified by reference to the degree of influence on a person's field of vision. The diagrams on the following pages illustrate the typical parameters of human vision. These provide a basis for assessing and interpreting the impact of a development by comparing the extent to which the development would intrude into the central field of vision (both horizontally and vertically).

Horizontal Field of View

Because the width of the proposed In-line Compressor Station is not known, the following calculations have been used as a guide only. These figures have been based on observations of similar infrastructure identified in the project area. Because these figures are estimations only, they have been exaggerated in dimensions to ensure a conservative result.

The table below analyses the degree to which development would impact on a typical horizontal field of view. 100m has been used as it is similar in length to

Table A.1 *Visual Impact based on the Horizontal Field of View of a 100m wide development*

Horizontal Field of View	Impact	Distance from an observer to a 100m wide development
<2.5° of view	Insignificant A 100m development would take up less than 5% of the central field of view. The face, unless particularly conspicuous against the background, will not intrude significantly into the view. The extent of the vertical angle will also affect the visual impact.	> 2.5 km
2.5° – 30° of view	Potentially noticeable A 100m development may be noticeable and its degree of visual intrusion will depend greatly on its ability to blend in with its surroundings.	150 m – 2.5 km
>30° of view	Potentially visually dominant At this distance a 100m development will fill more than 30 percent of the central field of vision and will always be noticed..	< 150 m

These calculations suggest that the impact of a 100 m wide development reduces to insignificance at 2.5 km, as the width of the development face would, at this distance, form less than 5% or 2.5° of the horizontal field of view.

However this calculation is based on the visual impact of a 100 m wide development being fully visible. Usually only portions of development are visible. The viewshed is better determined by the point at which a development becomes an indistinct line on the landscape. That is the point at which the vertical size diminishes to an imperceptible component within the vertical field on view.

The sketch below shows how the viewshed of a long horizontal object such as this proposal is determined by its height.

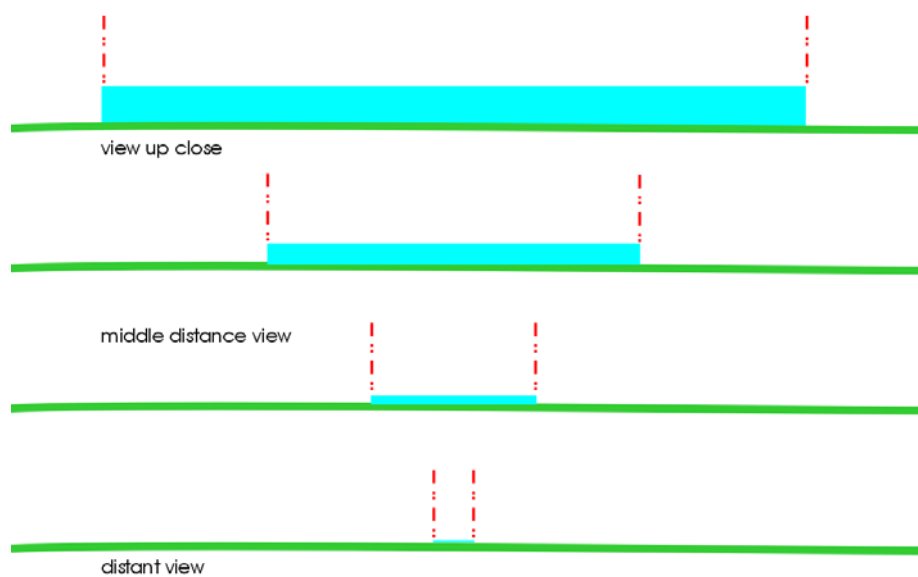


Figure A.1 *The effect of distance on a wide object*

This effect can also be demonstrated by the example of a farm fence that may be many kilometres in width, yet as one moves further away it becomes less apparent, until at some distance it is not possible to separate this element from the horizontal plane of the landscape.

A more useful viewshed is one that is determined by height.

Error! Reference source not found. shows the relationship between visual impact and the proportion of view that an 8.5 m high development will occupy within the vertical field of view. Where objects take up 5% of this field of view (5% of $10^\circ = 0.5^\circ$) they it be considered to be visually insignificant. Once objects take up at least 10% of the vertical they can be more readily discernible (10% of $10^\circ = 1^\circ$). This distance is also used to determine the outer extent of a viewshed or limit of study area. When an object takes up 65% of the vertical field of view they will always dominate the view.

Vertical Field of View

The following tables shows the zones of visual influence and viewshed extent for the proposed In-line compressor station with at approximate height of 8.5m in height.

Distance ranges are used as a guide only to determine zones of visual impact. However, it is recognised that visibility does not dramatically change when a viewer moves from 0.25km to 0.3km from the nearest component o infrastructure therefore these zones are but a guide.

Horizontal Cone of View

The central field of vision for most people covers an angle of between 50° to 60° . Within this angle, both eyes observe an object simultaneously. This creates a central field of greater magnitude than that possible by each eye separately.

This central field of vision is termed the 'binocular field' and within this field images are sharp, depth perception occurs and colour discrimination is possible.

These physical parameters are illustrated in the figure opposite.

The visual impact of a development will vary according to the proportion in which a development impacts on the central field of vision. Developments, which take up less than 5% of the central binocular field, are usually insignificant in most landscapes (5% of $50^\circ = 2.5^\circ$).

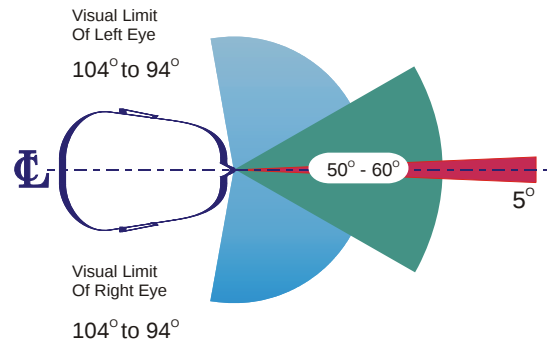


Figure A.1 Horizontal Field Of View

These calculations mean that a transmission tower approximately 5m wide would reduce to insignificance at 115m, a 10m wide tower would be insignificant at 230m as the transmission towers would form less than 5% or 2.5° of the horizontal field of view.

It is obvious that transmission towers are still very apparent at this distance and that their height, rather than their width gives a better, and more conservative, measurement on which to base the viewshed.

Vertical Field of View

A similar analysis can be undertaken based upon the vertical line of sight for human vision.

The typical line of sight is considered to be horizontal or 0° . A person's natural or normal line of sight is normally a 10° cone of view below the horizontal and, if sitting, approximately 15° .

Objects, which take up 5% of this cone of view ($5\% \text{ of } 10^\circ = 0.5^\circ$) would only take up a small proportion of the vertical field of view, and are only visible when one focuses on them directly. However, they are not dominant, nor do they create a significant change to the existing environment when such short objects are placed within a disturbed or man-modified landscape.

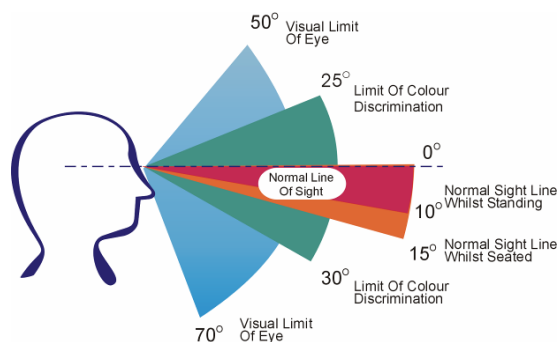


Figure A.2 Vertical Field Of View

The viewshed extends to a distance at which the proposed visible components of a development can be considered visually insignificant, even though they may still be visible. This occurs when an object forms less than the 0.5% of the vertical field of view as shown in Figure A.2.

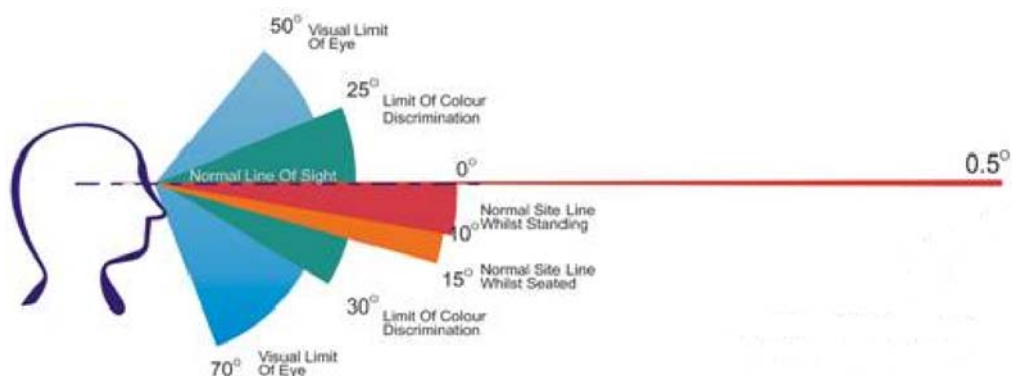


Figure A.2 The effect of distance on the visibility of a vertical object

The normal field of view is considered to be 10° . Objects that take up 5% of this cone of view ($5\% \text{ of } 10^\circ = 0.5^\circ$) are considered to be visually insignificant. Once objects take up at least 10% of the vertical field of view they can be more readily discernible ($10\% \text{ of } 10^\circ = 1^\circ$) and when they take up 65% of the vertical field of view they are considered to dominate the view. Refer to Annexure A for a detailed explanation.

The visual impact of the viewshed is also categorised by using distance ranges. These are used as a guide to determine zones of visual impact within the viewshed.

