Chapter 4  Engineering Parameters

4.1 National Design Standards

The design standards for the scheme are the National Roads Authority’s Design Manual for Roads & Bridges (the NRA DMRB). In particular, the following standards from the NRA DMRB are important at the route selection stage:

- NRA TD 9 Road Link Design
- NRA TD 10 Road Link Design for Type 2 & Type 3 Dual Carriageways
- NRA TD 27 Cross Sections and Headroom

And to a lesser extent:

- NRA TD 16 Geometric Design of Roundabouts
- NRA TD 40 Layout of Compact Grade Separated Junctions
- NRA TD 41-42 Geometric Design of Major/Minor Priority Junctions and Vehicular Access to National Road

In addition the Advice Note NRA TA 43: Guidance on Road Link Design provides useful background information in conjunction with NRA TD 9.

4.2 Proposed Design Speed

Design speed for the proposed mainline road is 100 kph.

4.3 Traffic Flow Information

Initial traffic flow information was compared with the nominal Capacity for Level of Service (LOS) D for each road type as defined in Table 4 of NRA DMRB TD 9/07. Table 4.1 gives the estimated AADT in the 2027 design year compared to the nominal Capacity given in TD9.

<table>
<thead>
<tr>
<th>Sections</th>
<th>Approx. Traffic Flow (AADT)</th>
<th>Road Type</th>
<th>Nominal Capacity (AADT) Table 4 of TD 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>N4 East : North of Drumsna Overbridge</td>
<td>13,600</td>
<td>Type 2 Dual Carriageway</td>
<td>20,000</td>
</tr>
<tr>
<td>N4 West : West of Cortober</td>
<td>13,300</td>
<td>Type 2 Dual Carriageway</td>
<td>20,000</td>
</tr>
</tbody>
</table>

4.4 Cross-Section

The proposed cross-section for the new mainline road is that of a Type 2 Dual Carriageway in compliance with the NRA DMRB TD27.

In general, the following road cross-section applies to the mainline:

- 1 x 1.5m wide central reserve with wire rope traffic separation barrier;
- 2 x 7.0m carriageways, with 2 traffic lanes in each direction;
- 2 x 0.5m hard strips;
• 2 x 3.0m nearside verges (including hard strips), with widening to provide adequate Stopping Sight Distance (SSD) and provision for non-motorised users;
• Road paved width: 16.5m;
• Overall width to back of verges: 21.5m minimum;

A detail of the proposed cross-section is given in Volume-2 Drawing RCSR-401 to 403.

Facilities for Pedestrians and Cyclists

The NRA DMRB TD 10 standard envisages that the Type 2 Dual Carriageway type is used generally off-line and that the original road that it replaces is available for the non-motorised user. Accordingly, only limited provision is made in the standard for non-motorised users on the Type 2 Dual Carriageways. In this instance, where a retrofit of a long length of the existing road is being considered, enhanced pedestrian and cyclist facilities need to be provided both for travelling along the road and for crossing the road.

At the time of the route selection for this scheme, the NRA was developing amended design standards for all-purpose roads to enable provision for dedicated facilities for pedestrians and cyclists where warranted. The emerging draft standard suggests that a two-way shared facility separated from road traffic is preferable where a demand is anticipated. The proposed dimensions of such a facility are as follows:
• 2.0m wide separator strip from the edge of the traffic lane on the road potentially reduced to 1.0m at a pinch-point. (This includes the hard strip);
• 2.5m wide shared footway/cycleway, with an absolute minimum of 1.75m at a pinch-point;
• 1.0m outer verge (0.5m absolute minimum) to top of embankment or cutting slope, or to a vertical feature such as a fence or railing;
• 5.5m wide overall verge from edge of road, (3.25m absolute minimum).

The proposed cross-section will be reviewed and revised as necessary during the preliminary design stage following consideration of the requirements of pedestrians and cyclists.

4.5 Horizontal Design Standards

Horizontal alignment design standard for the route options have been based on the need to provide desirable minimum horizontal curves in accordance with NRA DMRB TD9/07 for a mainline design speed of 100kph.

4.6 Vertical Design Standards

Vertical alignment standards for the route options have been based on the need to provide at least Desirable Minimum crest and sag curvatures in accordance with NRA DMRB TD 9/07. Such a provision will ensure that Desirable Minimum stopping sight distances are achieved. Table 4.2 shows the allowable maximum and minimum gradients.
Table 4.2 Maximum and Minimum Gradients for Type 2 Dual Carriageway

<table>
<thead>
<tr>
<th>Gradient</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Gradient</td>
<td>Desirable maximum gradient</td>
</tr>
<tr>
<td>Absolute Maximum Gradient</td>
<td>One step relaxation on maximum gradient – used at isolated locations where required</td>
</tr>
<tr>
<td>Normal Minimum Gradient</td>
<td>Normal minimum grade (at rollovers for the application of superelevation a higher minimum is required).</td>
</tr>
</tbody>
</table>

4.7 Junction Design Standards

Junction type will vary along the proposed new road with the classification of the road crossing. In general, on Type 2 Dual Carriageway sections the following junction types are permitted:

(i) Roundabouts,
(ii) Compact Grade Separated Junctions &
(iii) Left in / left out junctions.

The junction type will be selected at preliminary design stage and will depend upon the minor road classification and the predicted traffic flows and turning movements. However tentative junction types along the different route options are discussed in Chapter 15.

At this stage in the project design it has been assumed that local roads will generally be bridged over or under the mainline routes for new off-line construction sections where it is necessary or extinguished where there is no significant adverse impact or community severance. For a retrofit section of mainline routes, public side roads will generally be converted as left in / left out junctions. A review of the local road strategy will be undertaken at preliminary design stage.

4.8 Access to Private Land and Houses off the Type 2 Dual Carriageway

Access to private lands and houses off the Type 2 Dual Carriageway will be, where possible avoided by diverting either the house access or access tracks onto the local road network. By limiting the number of accesses onto the new proposed Type 2 Dual Carriageway the overall safety of the road will be improved. Where access cannot be gained to private land or houses via local roads or access tracks, consideration may be given to the use of a left in / left out junction as per the requirements of NRA TD 41-42.

4.9 Drainage Design Standards

In general NRA DMRB HD 33/06 has been followed for drainage design. Principals adopted for drainage assessment are as follows.

- Adequate surface drainage.
- Adequate subsurface drainage to lower the water table in cut areas.
- Conservation of water quality including identification of suitable outfall locations, attenuation of road run-off and pollution control.

At locations of crossing of watercourses OPW section 50 requirements have to be satisfied.